FINAL

FIFTH 2020 FIVE-YEAR REVIEW REPORT

FORMER FORT DEVENS ARMY INSTALLATION BRAC Legacy Sites

September 2020

Prepared for:

U.S. Army Corps of Engineers
New England District

696 Virginia Road

Concord, Massachusetts 01742

Prepared by:

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100
Marlborough, Massachusetts 01752

Contract No.: W912WJ-18-C-0011

Fifth 2020 Five-Year Review Report

Former Fort Devens Army Installation BRAC Legacy Sites Devens, Massachusetts

September 2020

CERTIFICATION:

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-18-C-0011. This document was prepared in accordance with the U.S. Army Corps of Engineers (USACE) Scope of Work and is hereby submitted for Government Approval.

Reviewed By:

09/28/2020

KGS Project Manager **Date**

Received By:

Penelope Reddy Digitally signed by Penelope Reddy Date: 2020.09.28 16:13:02 -04'00'

USACE Project Manager **Date**

Fifth 2020 Five-Year Review Report
Former Fort Devens Army Installation BRAC Legacy Sites

Devens, Massachusetts

September 2020

Approved By:

SIMEONE.ROBERT.J.1242822893 Digitally signed by SIMEONE.ROBERT.J.1242822893
Date: 2020.09.28 11:46:25 -04'00'

Robert J. Simeone **Date**

Devens BRAC Environmental Coordinator

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ABBREVIATIONS AND ACRONYMS

AAFES	Army Air Force Exchange Service
ABB-ES	ABB Environmental Services, Inc.
ABC®	Anaerobic BioChem®
ACO	Administrative Consent Order
AFFF	Aqueous Film Forming Foam
AFRC	Air Forces Reserve Center
AMSA	Area Maintenance Support Activity
AOC	area of contamination
ARAR	Applicable or Relevant and Appropriate Requirement
AREE	Areas Requiring Environmental Evaluation
Army	U.S. Army
AAFES	Army Air Force Exchange Service
ATP	Arsenic Treatment Plant
AWQC	Ambient Water Quality Criteria
BCT	BRAC Cleanup Team
BOH	Board of Health
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAAA	Corrective Action Alternatives Analysis
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
CMR	Code of Massachusetts Regulations
COC	contaminant of concern
COD	chemical oxygen demand
Conti	Conti Environmental, Inc.
COPC	Contaminant of Potential Concern
CSA	Comprehensive Site Assessment
CSF	cancer slope factor
CSM	conceptual site model
CVOC	chlorinated volatile organic compound
cy	cubic yard
1,2-DCB	1,2-dichlorobenzene
1,3-DCB	1,3-dichlorobenzene
1,4-DCB	1,4-dichlorobenzene
DCB	dichlorobenzene
DCL	Devens Consolidation Landfill

DDT	dichloro-diphenyl-trichloroethane
DO	dissolved oxygen
DoD	Department of Defense
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
ELCR	Excess Lifetime Cancer Risk
EOD	explosives ordnance discharge
EPA	United States Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
ERA	Ecological Risk Assessment
ERD	enhanced reductive dechlorination
ESD	Explanation of Significant Differences
ºF	degrees Fahrenheit
FFA	Federal Facility Agreement
FFS	focused feasibility study
Fort Devens	Former Fort Devens Army Installation
FOSET	Findings of Suitability of Early Transfer
FOST	Finding of Suitability to Transfer
FS	feasibility study
FYR	Five-Year Review
GERE	Grant of Environmental Restriction and Easement
gpm	gallons per minute
GW-1	MassDEP Groundwater Classification 1
GW-2	MassDEP Groundwater Classification 2
GW-3	MassDEP Groundwater Classification 3
HASP	Health and Safety Plan
HGL	HydroGeoLogic, Inc.
HHRA	Human Health Risk Assessment
HI	hazard index
HLA	Harding Lawson Associates
HMX	cyclotetramethylenetetranitramine
ICs	institutional controls
IMP	Installation Master Plan
INRMP	Integrated Natural Resources Management Plan
IRA	Intrinsic Bioremediation Assessment
IRIS	Integrated Risk Information System
IRZ	in-situ reactive zone
ISCO	in-situ chemical oxidation

ITRC	Interstate Technical Regulatory Council
IWS	In Well Stripping
KGS	KOMAN Government Solutions, LLC
LCRS	Leachate Collection and Recovery System
LEL	lower explosive limit
LGP	landfill gas probe
LHA	Lifetime Health Advisory
LIFOC	Lease in Furtherance of Conveyance
LTM	long-term monitoring
LTMP	Long-Term Monitoring Plan
LTMMP	Long-Term Monitoring and Maintenance Plan
LUC	land-use control
LUCIP	land use control implementation plan
µg/L	micrograms per liter
MAAF	Former Moore Army Airfield
MANG	Massachusetts Army National Guard
MassDEP	Massachusetts Department of Environmental Protection
MassDevelopment	Massachusetts Development and Finance Agency
MCL	maximum contaminant level
MCP	Massachusetts Contingency Plan
MEC	Munitions and Explosives of Concern
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MiHPT	Membrane Interface Probe Hydraulic Profiling Tool
MIP	Membrane Interface Probe
MMCL	Massachusetts Maximum Contaminant Level
MMRP	Military Munitions Response Program
MNA	monitored natural attenuation
ng/L	nanograms per liter
NCP	National Oil and Hazardous Substances Contingency Plan
ND	non-detect
NFA	No Further Action
NIA	North Impact Area
NPL	National Priorities List
NWR	National Wildlife Reserve
O&M	operation and maintenance
OB/OD	open burn/open detonation
OPS	Operating Properly and Successfully
ORD	Office of Research and Development

ORP	oxidation-reduction potential
ORSG	Office of Research and Standards Guideline
OU	Operable Unit
%	percent
PA	Preliminary Assessment
PACE	People of Ayer Concerned about the Environment
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PFAS	Per-and Polyfluoroalkyl Substances
POL	petroleum, oils, and lubricants
POTW	Publicly Owned Treatment Works
PP	Proposed Plan
ppm	parts per million
PRE	Preliminary Risk Evaluation
PRG	preliminary remediation goals
PVC	polyvinyl chloride
RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	cyclotrimethylenetrinitramine
RfD	reference dose
RG	remedial goal
RI	remedial investigation
ROD	Record of Decision
RPMP	Real Property Master Plan
SA	study area
SAP	Sampling Analysis Plan
SARA	Superfund Amendment and Reauthorization Act (1986 amendment of CERCLA)
SHL	Shepley's Hill Landfill
SI	Site Inspection
SMP	Soil Management Plan
SPIA	South Post Impact Area
SSI	Supplemental Site Inspection
SVE	soil vapor extraction

SVOC	semi-volatile organic compound
SWETS	Stone and Webster Environmental Technology & Services
TAL	target analyte list
TBC	To Be Considered
TCE	trichloroethene
TCL	Target Compound List
TCRA	Time Critical Removal Action
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
TPHC	total petroleum hydrocarbon compounds
TRC	Technical Review Committee
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USAR	U.S. Army Reserve
USFWS	U.S. Fish and Wildlife Services
USMCR	U.S. Marine Corps Reserve
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
UXO	Unexploded Ordnance
VC	vinyl chloride
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons
ug/kg	micrograms per kilogram
ug/L	micrograms per liter

EXECUTIVE SUMMARY

This fifth Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review (FYR) was conducted by the U.S. Army Corps of Engineers (USACE) – New England District (NAE) , for the former Fort Devens Superfund site "the Site" in Devens, Massachusetts. Located approximately 35 miles west of Boston, Massachusetts, the Site consisted of approximately 9,280 acres divided into North, Main and South Posts in the towns of Ayer, Shirley, Lancaster and Harvard.

Background

The former Fort Devens was placed on the National Priorities List (NPL) update of November 21, 1989, 54 Fed. Reg. 48187 and became subject to the special provisions for federal facility NPL sites in CERCLA § 120, 42 u.s.c. § 9620, and the Superfund Amendments and Reauthorization Act (SARA) § 211, 10 U.S.C. § 2701, Defense Environmental Restoration Program et seq. In 1991 Army and EPA signed a Federal Facility Agreement (FFA) that established the procedural framework and timetables for identifying, investigating and remediating human health and environmental impacts associated with the past and present activities at the former Fort Devens.

Devens was identified for closure by July 1997 under Public Law 101-510, the Defense Base Realignment and Closure (BRAC) Act of 1990. This resulted in accelerated schedules for the environmental investigations at Devens. Since 1991, the U.S. Army Environmental Center (USAEC) and the USACE have tasked Army contractors to perform SIs, Remedial Investigations (RI), Feasibility Studies (FS) and other CERCLA related activities for the sites addressed in this report.

Purpose of the Review

The purpose of a FYR is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

KOMAN Government Solutions, LLC (KGS) prepared this comprehensive FYR Report, on behalf of the USACE-NAE for the U.S. Department of the Army (Army), pursuant to CERCLA § 121, consistent with the National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii), and considering U.S. Environmental Protection Agency (USEPA) policy and guidance.

FYRs are required by statute, at a minimum of every five years, where both of the following conditions are true:

- Upon completion of the remedial action, hazardous substances, pollutants, or contaminants will remain on site above levels that allow for unlimited use and unrestricted exposure (UU/UE); and
- the Record of Decision (ROD) for the Site was signed on or after October 17, 1986 [the effective date of the Superfund Amendment and Reauthorization Act (SARA)] and the remedial action was selected under CERCLA Section 121.

For Sites with multiple OUs, the statutory requirement to perform FYRs is triggered by the "the initiation of the first remedial action that leaves hazardous substances, pollutants or contaminants on site at levels

that do not allow for unlimited use and unrestricted exposure." The first (2000) statutory FYR for the former Fort Devens was triggered by commencement of remedial activities at OU1/Shepley's Hill Landfill (SHL), in accordance with the September 1995, SHL Record of Decision (ROD).

The last (2015) FYR was issued on September 26, 2015. As discussed in Appendix C, there were a significant number of unresolved issues/concerns with the draft 2015 FYR that resulted in EPA's invocation of informal dispute resolution in accordance with the Devens FFA. Although EPA did concur with Army's short-term protectiveness determination for several OUs/AOCs, it deferred decisions regarding long term protectiveness until the issues, recommendations and requirements set out in EPA's September 22, 2015 letter, and summarized in OU/AOC-specific sections below, were addressed.

In accordance with CERCLA, the following Operable Units (OUs) (EPA CERCLIS identifier) and Areas of Contamination (AOCs) (Army Administrative Record identifier) must be evaluated in the 2020 FYR because contaminants remain above UU/UE levels. An assessment of each OU/AOC must be conducted to determine whether the ROD-specified remedy remains protective of human health and the environment and whether alternative remedial actions are needed to ensure adequate protection:

- Shepley's Hill Landfill (SHL) (OU1/AOCs 4, 5, and 18);
- Devens Consolidation Landfill (DCL) (OU2/AOCs 9, 40, and Study Area (SA) 13);
- South Post Impact Area (SPIA) (OU3/AOCs 25, 26, 27, and 41(groundwater);
- Barnum Road Maintenance Yards (OU 4/AOC 44 and 52);
- Defense Reutilization and Marketing Office (DRMO) Yard (OU5/AOCs 32 and 43A);
- Historic Gas Station (OU6/AOCs 43G and 43J);
- Former Elementary School Spill Site (OU7/AOC 69W);
- Former Moore Army Airfield (OU8/AOC 50);
- Building 3713 Fuel Oil Spill Site (OU9/AOC 57);
- Former Railroad Roundhouse (OU11/AOC 71);
- Former Grant Housing Area and 37-mm Impact Area (OU12); and,
- Former Oak and Maple Housing Areas (OU13).

OU10 / AOC 69X was not included in the FYR as the ROD selected "No Further Action" as the appropriate remedy. In addition, the remedial investigation (RI) of OU 14 / Base-wide PFAS is still in progress, and the results are not discussed in this FYR.

Community Notification, Involvement and Site Interviews

A Technical Review Committee was formed in 1991 to review documents and provide comments on technical issues and proposed activities. In 1994, the Technical Review Committee was converted into a Restoration Advisory Board (RAB) composed of community members as well as representatives of EPA and MassDEP. The RAB took over the functions of the former Technical Review Committee and provided expanded community representation. The current RAB mailing list includes approximately 100 individuals representing Army, EPA, MassDEP, MassDevelopment, local governments, and members of

the surrounding communities. individuals RAB meetings were initially held monthly and are now held quarterly, rotating between the towns of Ayer and Devens.

Community representatives, particularly members of People of Ayer Concerned about the Environment (PACE), representatives of the Nashua River Watershed Association, and local officials from the surrounding towns, have been involved in decision-making for the former Fort Devens throughout the CERCLA process. Whenever possible, PACE also participates in meetings of the Base Cleanup Team, which includes representatives of the Army, EPA, and MassDEP. Throughout the CERCLA process, the Army has implemented community involvement activities as required, including issuing public notices, holding public comments and meetings, issuing fact sheets to the community, maintaining an Administrative Record file and information repositories (i.e., satellite information stations), and providing other community involvement activities as required or as warranted.

A public notice announcing commencement of the fifth, 2020 FYR for the former Fort Devens and inviting the public to submit comments was published in the Sentinel & Enterprise and Nashoba Valley Voice newspapers on January 3 and 10, 2020 and the Lowell Sun on January 5 and 10, 2020. Army also announced commencement of the 2020 FYR at the January 16, 2020 RAB meeting. Copies of the published public notice are provided in **Appendix B**.

Interviews for the 2020 FYR were conducted in February and March 2020 with federal, state, and local authorities; property owners/lessees; the operations and maintenance contractor for the SHL treatment system; community representatives; and members of the general public. Of the 27 individuals contacted, 13 interviews were completed. Completed questionnaires for the OUs/AOCs included in this FYR are provided in **Appendix B**.

In general, comments related to the site were positive and supportive. Representatives from MassDevelopment indicated they are well informed and routinely coordinate with the Army through BCT meetings, RAB meetings, telephone, and email. MassDevelopment commented that communications could be improved by establishing an online GIS tracking system for institutional controls (ICs).

A community representative indicated that outreach to the community could be improved with proactive outreach to local towns, where BCT members present to town officials such as Boards of Selectmen, Health, Conservation Commission, etc. They also recommended the use of social media for information outreach, particularly official sources managed by the Towns. They indicated that the main community concern is currently drinking water contamination caused by PFAS. They also indicated that the Army's use of land use controls (LUCs) is not ideal from an abutter or future real estate sales perspective.

A member of the general public and resident of Devens indicated that the effect of the cleanup at Devens is very positive. They indicated that they moved to Devens with some confidence that the Army had cleaned up the munitions around the housing area and that contaminants at other sites have been cleaned-up or at least stabilized.

A representative from the Nashoba Board of Health indicated potential concern regarding community awareness of the presence of PFAS in sediment and waterways where people may swim or fish. It was suggested that there should be additional partnership and outreach with U.S. Fish and Wildlife as well as additional outreach to Board of Health and posting on waterways.

The Final 2020 FYR Report will be available for review at the Devens information repository located at

30 Quebec Street, (Building 666, Rm 132), Devens, MA 01432 and via the Devens website at "https://www.nae.usace.army.mil/missions/projects-topics/former-fort-devens-environmental-cleanup/". Documents reviewed for this FYR and references cited are included in Appendix A. Copies of the applicable community participation information are included in **Appendix B.** The individual site chronologies and background information for the OUs/AOCs included in this FYR are included in **Appendices C through M**.

Next Review

As discussed above, FYRs are required by statute a minimum of every five years. The next FYR for the former Fort Devens Superfund site must be submitted, therefore, on or before September 27, 2025.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Former Fort Devens Army Installation		
EPA ID: MA7210025154		
Region: 1	**State:** MA	**City/County:** Devens/Middlesex & Worcester
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]*:** U.S. Army Base Realignment and Closure (BRAC) environmental Office, Devens, MA USA		
Author name (Federal or State Project Manager): KOMAN Government Solutions under contract to USACE		
Author affiliation: Under contract to USACE		
Review period: 1/16/2020 - 5/22/2020		
Date of Site Inspection: 2/5/2020 -2/14/2020		
Type of review: Statutory		

Review number: 5
Triggering action date: 9/26/2015
Due date *(five years after triggering action date)*: 9/26/2020

Protectiveness Statements

Protectiveness Statements		
Operable Unit: OU01 - Shepley's Hill Landfill AOC 4,5, and 18	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at Shepley's Hill Landfill (AOCs 4, 5 and 18) is protective of human health and environment. The groundwater remedy, i.e., landfill cap and contingency pump and treat remedy, are functioning as intended in the ROD. Exposure pathways that could result in unacceptable risk are being controlled. LUCs are in place that protect potential residential receptors from exposure to impacted groundwater migrating from the landfill having chemicals in excess of MCLs. LUCs are enforced as demonstrated by the site interviews and site inspections performed annually and for this FYR. The groundwater extraction system continued to operate at the required pumping rate and monitoring data support the effectiveness of the groundwater remedy. Monitoring data demonstrate that the barrier wall is diverting groundwater to the north in the area west of the barrier wall in the overburden. The RAOs have been achieved through implementation of LUCs and construction, operation, and maintenance of the landfill cap, groundwater treatment system, and barrier wall. LUCs are enforced, and no exposures are currently occurring or imminent.		
Operable Unit: OU02 - Devens Consolidated Landfill and AOC 9, AOC40, and SA13	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at the DCL and contributor sites (AOC 9, AOC 40, and SA 13) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Removal actions at AOCs 9, 40 and SA 13 have achieved the RAOs as specified in the ROD. There is no current exposure of site-related waste to humans or the environment at levels that would represent a health concern. The landfill cover system prevents exposure to the waste material and contaminants within the DCL. LUCs are in effect for the DCL. Annual and FYR site inspections and site interviews confirm that LUCs are enforced.		
Operable Unit: OU03 - South Post Impact Area AOC 25, 26, 27, and 41	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy the SPIA (AOCs 25, 26, 27 and 41) is protective of human health and the environment.		

Exposure pathways that could result in unacceptable risks are being controlled. Groundwater and surface water monitoring confirm that there is no off-site migration of site contaminants at concentrations above monitoring criteria. The Army retains ownership of the property, continues to operate it for military training purposes, and effectively monitors unauthorized access (i.e. land use assumptions remain unchanged). The INRMP has been updated for 2020-2025 and has been implemented to monitor adverse effects on the ecosystem in the SPIA monitored area.

The FYR site inspection and interviews confirmed that site use is consistent with ROD assumptions (i.e. an active weapons and ordnance discharge area used by the Army and other agencies for training purposes).

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU04 - Barnum Road Maintenance Yards AOC 44 and 52	Protective	N/A

Protectiveness Statement:

The remedy at AOC 44 and 52 is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. The Army retains control of the property. Land use controls are in place that prevent exposure to soil that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The RAOs have been achieved through 1) excavation, cold mix asphalt batching soils, and paving; and 2) implementations of LUCs. Groundwater monitoring has confirmed there were no exceedances of COCs in groundwater.

The FYR site inspection and interviews confirmed that site remains controlled by the Army, there is no residential development of the site and the asphalt barrier is in place.

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU05 - DRMO Yards AOC 32 and 43A	Protective	N/A

Protectiveness Statement:

The remedy at AOCs 32 and AOC 43A is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The RAOs have been achieved through 1) excavation and disposal of contaminated soil and 2) reduction of groundwater contamination through natural attenuation and persulfate injections. At AOC 43A, contaminated groundwater concentrations have decreased below the groundwater cleanup levels. At AOC 32, groundwater monitoring has confirmed migration of contaminated groundwater at concentrations that could adversely affect human health and the environment has not occurred.

The FYR site inspection and interviews, and annual land use control inspections and interviews,

confirmed that site use remains industrial.

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU06 - Former Gas Station AOC 43G and 43J	Protective	N/A

Protectiveness Statement:

AOC 43G

The remedy at AOC 43G is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. The Army retains control of the property. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The RAOs have been achieved through 1) implementation of LUCs which prevent exposure to groundwater and 2) reduction of groundwater contamination through natural attenuation. Groundwater monitoring at AOC 43G has confirmed many of the contaminants of concern concentrations have decreased below cleanup levels and migration of contaminated groundwater at concentrations greater than the MCLs off Army property is not occurring.

The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains controlled by the Army, there is no residential use, and groundwater is not being used from the site.

AOC 43J

The remedy at AOC 43J is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The RAOs have been achieved through 1) implementation of LUCs which prevent exposure to groundwater and 2) reduction of groundwater contamination through natural attenuation and various in-situ treatments. Groundwater monitoring at AOC 43J has confirmed many of the contaminants of concern concentrations have decreased below cleanup levels and migration of contaminated groundwater at concentrations greater than the MCLs offsite is not occurring.

The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains industrial, there is no residential use, and groundwater is not being used from the site.

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU07 - Former Elementary School AOC 69W	Protective	N/A

Protectiveness Statement:

The remedy at AOC 69W is protective of human health and the environment.

The pre-ROD removal actions have eliminated underground storage tanks and the majority of contaminated soils that would otherwise be a continuing source of downgradient groundwater contamination. Exposure pathways that could result in unacceptable risks are being controlled.

The RAOs are achieved through LUCs and groundwater monitoring. The LUCs prevent potential human exposure to site soil and ground water contaminants left in place. The LUCs are enforced and no exposures are currently occurring or imminent. Groundwater monitoring confirms that off-site migration of contaminated groundwater above cleanup levels is not occurring.

The FYR site inspection and interviews, and annual LUC inspections and interviews, confirmed that site use remains consistent with the risk scenarios identified in the ROD (i.e., maintenance worker and elementary school children).

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU08 - Former Moore Army Airfield AOC 50	Protective	N/A

Protectiveness Statement:

The remedy at AOC 50 is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater or vapor that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The first RAO has been achieved through implementation of the remedy, specifically through 1) SVE, 2) IWS, 3) ERD, and 4) natural attenuation. Groundwater monitoring at AOC 50 has confirmed the first RAO has been achieved. Groundwater monitoring will confirm when the second RAO will be met via enhanced reduction dechlorination and natural attenuation, which continues to reduce the solvent plume concentrations.

The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that there is no new development and there is no use of groundwater.

Operable Unit:	*Protectiveness Determination:*	*Planned Addendum Completion Date*
OU09 - Former Building 3713 Fuel Spill AOC 57	Protective	N/A

Protectiveness Statement:

The remedy at AOC 57 is protective of human health and the environment.

Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposures are currently occurring or imminent.

The RAOs have been achieved through 1) excavation and disposal of contaminated soil, 2) reduction of groundwater contamination through natural attenuation, and 3) implementations of LUCs. Groundwater monitoring at AOC 57 has confirmed many of the contaminants of concern

concentrations have decreased below cleanup levels. The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains Rail Industrial Land Trade-Related and Open Space property.		
Operable Unit: OU11 - Former Railroad Roundhouse SA 71	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at SA 71 is protective of human health and the environment. The pre-ROD removal action resulted in the reduction of risk to human health in upland soils and the elimination of the ecological risk in pond sediments along the shoreline of SA 71. LUCs are in place that prevent ingestion/direct contact with residually impacted soil that could pose unacceptable human health risk, the LUCs are enforced, and no exposures are currently occurring or imminent. The FYR site inspection and interviews confirmed that site use remains open space. The RAO has been achieved because (1) Army retains ownership of the property; (2) the lease terms between Army and MassDevelopment (as detailed in the LIFOC) prevent MassDevelopment from occupying or using the property without written permission of the Army, and (3) a deed restriction prohibiting residential reuse and an environmental use covenant consistent with a NAUL will be implemented at the time of property transfer by the Army to MassDevelopment.		
Operable Unit: OU12 & OU13 - Former Grant, Oak, and Maple Housing Areas and 37-mm Impact Area	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedies at the former housing areas and 37-mm impact area are protective of human health and the environment The RAOs are achieved via LUCs that prevent direct contact with UXO. The LUCs are enforced (confirmed via annual 37-mm Impact Area inspections, annual site interviews, and the FYR site inspection and interview) and no exposures are currently occurring or imminent.		

1 SHEPLEY'S HILL LANDFILL (OU 1 / AOCs 4, 5, & 18)

1.1 Introduction

This section evaluates the CERCLA remedial action implemented at Shepley's Hill Landfill (SHL) to determine its effectiveness in reducing potential human health risk from exposure to contaminated groundwater within and emanating from SHL and at preventing groundwater from contributing to Plow Shop Pond (PSP) sediment contamination in excess of human health and ecological risk-based values.

1.1.1 Site Background

SHL is and 84-acre site located in the Towns of Ayer and Shirley (Middlesex County) and Harvard and Lancaster (Worcester County) approximately 35 miles northwest of Boston, Massachusetts. SHL is situated between the bedrock outcropping of Shepley's Hill to the west and Plow Shop Pond to the east. To the north of SHL are a low-lying wooded wetland and the Fort Devens Reservation boundary. Nonacoicus Brook, which drains Plow Shop Pond, also flows through this wooded wetland area and represents an important site feature. The southern portion of SHL borders the Defense Reutilization and Marketing Office (DRMO) yard, motor repair shops, and a warehouse (AOC 32/43A).

The three AOCs included in OU 1/SHL are AOC 4 – the sanitary refuse incinerator, AOC 5 – sanitary landfill No. 1, and AOC 18 – the asbestos cell.

- AOC 4: the former sanitary refuse incinerator was located in former Building 38 near the end of Cook Street and within the 50-acre is closed in Phase I of the landfill capping sequence. Incinerator ash was disposed of in the landfill and the incinerator itself was demolished and buried in the landfill.
- AOC 5: refers to Sanitary Landfill No. 1 or SHL, primarily the areas closed in Phases I-III of the landfill capping sequence. Primary wastes received included household refuse, glass, construction debris, incinerator ash, and spent shell casings.
- AOC 18: refers to the asbestos cell and is situated in the section of SHL closed during Phase IV of the landfill capping sequence.

Site chronology and additional site background information are included in **Appendix C**.

1.2 Response Action Summary

1.2.1 Basis for Taking Action

Following listing on the NPL and cessation of landfilling activities, the Army conducted a Remedial Investigation (RI) at SHL (E&E, 1993) and a then Supplemental RI (ABB-ES, 1993). These investigations determined that the principal threat to human health at the Shepley's Hill Landfill Operable Unit was long-term residential exposure to contaminated groundwater. Because it was believed to be a historical discharge area for groundwater passing beneath SHL and to have received contamination from the landfill, the RI included the collection of samples of Plow Shop Pond sediments and surface water. However, it was later agreed that potential threats to human and ecological receptors associated with contaminated sediments and surface water would best be addressed through creation of a separate OU (i.e. OU 11/AOC 72 - Plow Shop Pond).

1.2.2 Response Actions

The SHL ROD was signed by EPA on September 26, 1995 and determined that the Remedial Action Objectives (RAOs) for the SHL Remedial Action were to:

- Protect potential residential receptors from exposure to impacted groundwater migrating from the landfill having chemicals in excess of maximum contaminant levels (MCLs).
- Prevent impacted groundwater from contributing to the contamination of Plow Shop Pond sediments in excess of human health and ecological risk-based concentrations.

The ROD did not identify remedial objectives for surface soil, landfill gas, or leachate because the risk assessments did not identify potential risks from exposure to surface soil and ambient air. Landfill leachate was not identified during the RI or supplemental RI activities. In addition, the ROD concluded that potential threats to human and ecological receptors resulting from exposure to contaminated sediments and surface water in Plow Shop Pond would be addressed as part of a separate, Plow Shop Pond Operable Unit (i.e. OU11/AOC 72).

To address groundwater contamination at SHL, Alternative SHL-2 (Limited Action) was selected with Alternative SHL-9 (Collection/Discharge to POTW) as the contingency remedy if Alternative SHL-2 proved not to be protective. Each component contained provisions for the containment of landfill waste and management of contaminant migration.

Key remedy components of Alternative SHL-2 included:

- Landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- Survey of SHL;
- Evaluation/improvement of storm water diversion and drainage;
- Landfill cover maintenance;
- Landfill gas collection system maintenance;
- Long-term groundwater monitoring;
- Long-term landfill gas monitoring;
- ICs;
- Educational programs;
- 60% design of a groundwater extraction system;
- Annual reporting to MassDEP and USEPA; and
- Five-Year Site Reviews.

The contingency remedy, Alternative SHL-9: Collection/Discharge to POTW, added the components of groundwater extraction and discharge to the Town of Ayer POTW to Alternative SHL-2 to provide additional control to prevent off-site migration of contaminated groundwater.

Pre-ROD Actions

Landfill operations at SHL began at least as early as 1917 and ceased on July 1, 1992. The Army initiated the Fort Devens Sanitary Landfill Closure Plan in 1984. Fort Devens was placed on the NPL in December 1989. Landfill capping was complete in May 1993. Remedial Investigation (RI) and RI Addendum investigations were performed between 1991 and 1993 and concluded potential human exposure to arsenic in groundwater is the primary risk at the site. A Feasibility Study (FS) was completed in February 1995 to evaluate alternatives to reduce potential exposure risks, and in September 1995, the

ROD was signed.

Post-ROD Remedy Modifications (i.e. ESDs) and Response Actions

2005 Explanation of Significant Differences – Groundwater Extraction, Treatment and Discharge

Post-ROD groundwater monitoring results indicated that the selected remedy, Alternative SHL-2, would not meet risk-based arsenic performance standards. Therefore, the Army issued the first Explanation of Significant Differences (ESD), Groundwater Extraction, Treatment, and Discharge Contingency Remedy for SHL (CH2MHill, 2005) and implemented the contingency remedy, Alternative SHL-9. The arsenic treatment plant (ATP) was designed to extract groundwater and provide pretreatment of inorganics, primarily arsenic, prior to discharge to the Ayer POTW. However, at the time of the 100% Design, information subsequent to the ROD indicated that the Ayer POTW did not have the capacity to accept the extracted water. The ESD modified the discharge point to the Devens POTW and required pretreatment to remove arsenic to levels that met the Devens POTW permit requirements. The Army installed and started full time operation of a groundwater extraction and treatment system in March 2006 to address groundwater contamination emanating from beneath the northern portion of the landfill. As anticipated in the ROD and ESD, the objective of the ATP was to provide for aquifer restoration in the area down gradient of the landfill, now generally referred to as the northern impacted area or NIA.

2012 Non-Time Critical Removal Action – Barrier Wall Installation

Available groundwater monitoring data revealed that the landfill capping and groundwater extraction components of the SHL remedy were reducing, but not eliminating, groundwater flow and arsenic migration from SHL into Red Cove / Plow Shop Pond (i.e. AOC 72). In September 2012, Army released a *Final Removal Action Work Plan for Shepley's Hill Landfill Barrier Wall* (Sovereign/AMEC 2012) for a Non-Time-Critical Removal Action (NTCRA). The RAO of the NTCRA is to mitigate the arsenic-in-groundwater flux from SHL to Red Cove/Plow Shop Pond and reduce potential risk to environmental receptors consistent with local conditions in Plow Shop Pond. An 850-foot long barrier wall was installed from ground surface to bedrock to deflect groundwater emanating from the landfill groundwater to the north or northwest away from Red Cove.

2013 Explanation of Significant Differences – Expanded ICs/LUCs to Protect Potential Off-Site Receptors

The current ROD does not specifically address LUCs for any non-Army property located north of the landfill (known as north impact area) because the extent of the impact was not defined at the time of the ROD. An Explanation of Significant Differences (ESD) was issued in December 2013 that expanded the scope of the IC/LUCs and deed restrictions in the 1995 ROD to protect potential off-site residential receptors from exposure to contaminated groundwater in excess of MCLs in the NIA and along West Main Street in the Town of Ayer, until remedial goals have been met, as stipulated in the ROD. In addition, the LUCs will also protect any commercial receptors from exposure to off-site contaminated groundwater. The only significant differences in the remedy as detailed in the ROD are the incorporation of additional LUC language as an enforceable component of the ROD that will further protect potential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of MCLs. The LUCs implemented to address the RAO to protect potential residential receptors from exposure to contaminated groundwater in excess of MCL, until remedial goals have been met per the ROD include:

- Restrict access to groundwater so the potential exposure pathway to the contaminants would remain incomplete.

- Prohibit the withdrawal and/or future use of water, except for monitoring, from the aquifer within the identified groundwater LUC boundary.
- Maintain the integrity of any current or future monitoring system. LUC boundaries were set approximately 400 feet from the horizontal limits of groundwater contamination identified in 2013.

To meet the LUC performance objectives, institutional controls in the form of governmental permitting, zoning, public advisories, prohibitive directives (no drilling of drinking water wells) and other legal restrictions were implemented within the NIA. Specifics included:

- The Zoning By-Laws of the Town of Ayer, Town of Ayer Subdivision Control Regulations and Town of Ayer Building department Permitting Requirements. Town of Ayer zoning, permitting and building requirements to which the use of all new or existing buildings, other structures or land must comply.
- Moratorium on Groundwater Use within the Area of Land Use Controls – The Ayer BOH has issued a Moratorium on Groundwater Use.
- The Ayer BOH Well Regulations (Adopted January 10, 2001) – Town of Ayer permitting requirements for the installation of d use of new drinking water wells.
- The Massachusetts Drinking Water Regulation 310 CMR 22.00 – the state regulatory permitting and approval process for any new drinking water supply wells in Massachusetts that propose to service more than 25 customers or exceed a withdrawal of 100,000 gallons per day.

The LUCS will be maintained until the concentrations of contaminants of concerns in the groundwater are at such levels as to allow unrestricted use and exposure. A Land Use Control Implementation Plan (LUCIP) was issued following this ESD, describing the actions for all LUCS (implementation, maintenance and periodic inspections) and provided to stakeholders (Sovereign, 2014).

SHL Contaminants of Concern (COCs) and Cleanup Levels

Groundwater cleanup levels for the SHL groundwater included those in the 1995 ROD, 2005 ESD and 2013 ESD and were developed following the USEPA guidance documents entitled, *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk Based Preliminary Remediation Goals), Interim, December 1991*, and *OSWER Directive 9355.0-30, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* and are listed in **Table 1-1**. Table 1-1 Groundwater cleanup levels were developed using appropriate USEPA guidance at the time the ROD was signed. Cleanup levels in the ROD were developed using the baseline risk assessment and identified contaminants of concern. Some contaminants of concern cleanup levels were based on MCLs including arsenic, chromium, 1,2-dichlorobenzene, 1,2-Dichloroethane and nickel. The 2005 ESD stated that upon implementation of the contingency remedy. Manganese cleanup level was updated from 291 ug/l to 1715 ug/l and documented in the 2005 Five Year Review (SWET, 1996c). Also stated in the 2005 ESD, that the First Five Year Review Report (HLA, 2000) identified the issue of potential changes in the arsenic standard from 50 to 5 ug/l based on the June 22, 2000 USEPA proposed changes. Since that time, a new arsenic standard of 10 ug/l was promulgated (January 22, 2001) and public water systems needed to comply with the new standard by January 23, 2006. Per the 2005 Five Year Review, although ROD cleanup goals have not changed, it is anticipated that they will change to be responsive to this new standard of 10 ug/l while incorporating knowledge of the known ranges of background arsenic concentrations in groundwater at Devens.

Table 1-1 SHL ROD-Specified Contaminants of Concern and Cleanup Levels

Contaminants of Concern	Cleanup Level (µg/L)	Selection Basis
Arsenic	50	MCL
Chromium	100	MCL
1,2-Dichlorobenzene	600	MCL
1,4-Dichlorobenzene	5	MassDEP MCL
1,2-Dichloroethane	5	MCL
Lead	15	Action Level
Manganese	291	Background
Nickel	100	MCL
Sodium	20,000	Health Advisory
Aluminum	6,870	Background
Iron	9,100	Background

1.2.3 Status of Implementation

This section discusses the status of the remedy components identified in Section 1.2.2. of this document.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000

SHL was closed in five phases between 1987 and 1993 in accordance with MassDEP regulations 310 CMR 19.000. The Army submitted the final closure report in March 1996 pursuant to 310 CMR 19.000 (SWET, 1996b) and the LTM and Maintenance Plan in May 1996 (SWET, 1996). Landfill closure remedy component is complete.

Survey of SHL

Although the landfill had been surveyed after the final phase of capping, the ROD required that an accurate topographic survey of the landfill surface be performed prior to the design and implementation of remedial actions. It also included costs to survey the elevation and horizontal location of monitoring wells or piezometers installed as part of remedial alternative implementation, and to prepare record drawings. The landfill surface survey of SHL remedy component is complete.

A comprehensive sitewide location and elevation survey using the Massachusetts State Plane Coordinate System (NAD 1983 and NAVD 1988) was performed in 2017 for all existing and new monitoring wells, piezometers, transect vertical profile borings, and stream staff gauges at SHL and vicinity in support of the additional work defined in the EPA SOW. The SHL survey, dated November 30, 2017, includes survey measurements for 248 monitoring well, 16 soil boring, and 5 staff gauge locations in the following key-sub areas identified in the February 2016, SHL Scope of Work (Phase 2, Task 1) (i.e. north impact area, nearfield area, landfill area, and the barrier wall area) and other locations in the Shepley's Hill area and select upgradient wells at AOC 32 and 43A. Another elevation and location survey were conducted at the SHL including wells located in the NIA, Shepley's Hill, and landfill areas.

The survey report, dated January 23, 2018, includes survey measurements for 10 monitoring well locations (eight existing wells and two new wells). Location and elevation survey for existing and newly installed monitoring wells is ongoing.

Evaluation/Improvement of Stormwater Diversion and Drainage

The selected remedial alternative included an evaluation of stormwater diversion and drainage systems at and adjacent to SHL and implementation of modifications/improvements if practical and cost-effective. Per the 2005 Five Year Review (Section 3.7 Issues), a Draft Cap Drainage Report was issued in January 2003 detailing corrective actions for the landfill areas of poor drainage. In fall 2005 areas of poor drainage and ponding were initially addressed. Thereafter, annual landfill inspection reports in the annual report included evaluation of stormwater diversion and drainage system effectiveness.

As part of LTM activities, the Army implemented a routine inspection performed for stormwater ditches at the landfill during the annual landfill inspection as noted in the LTMMP (CH2Mhill, 2006). The stormwater diversion and drainage inspection activities are reported in the annual landfill inspection report as an appendix to the annual report. Annual maintenance/mowing of the drainage swales are performed as part of cap maintenance activities.

Annual inspections of the landfill drainage swales were performed from 2015 to 2019 revealing small to large vegetative growth. Large growth resulted in the removal during annual fall mowing events from drainage swales, but small growth was left intact resulting in prevention of erosion of the landfill cover. Stormwater diversion and drainage evaluation remedy component is ongoing.

Landfill Cover Maintenance

In accordance with the ROD, annual inspections were conducted from 2015 – 2019 to monitor the condition of the landfill cover, monitoring wells, cover surface, and drainage swales to determine if maintenance is needed. No deficiencies were observed for the cover surface, settlement, erosion, culverts and vegetative growth. A monitoring well deficiency was noted for barrier wall monitoring well SHM-11-08 which was bent (presumably by mowing equipment) and inaccessible, however the well is not part of the LTMMP monitoring network, and the metal stickup was removed. Security deficiencies included vandalism of the locked fence gate to Plow Shop Pond and the corrective measures included replacement of the chain and cut lock. Deterioration of the landfill access road in the northern portion of the landfill was observed and gravel road regrading was performed as a corrective measure. During the upgradient transect drilling, the cap was drilled through in one location but was repaired using a 30-mil polyvinyl chloride (PVC) geomembrane liner patch. Although not a deficiency, the central south portion of the landfill grass field is subleased by MassDevelopment for model airplane/drone use with no observed landfill cap damage. Results of the annual inspections are discussed in Appendix C. The landfill cover maintenance remedy component is ongoing.

Landfill Gas Collection System Maintenance

In accordance with the ROD, annual inspections were conducted of the landfill gas collection system 2015 to 2019. Inspection for damage of gas vents (GVs) and landfill perimeter gas points (GPs) was performed and no maintenance or repairs were identified for gas vents/points in 2015-2019. All gas vents are venting as expected. Results of the annual inspections are discussed in Appendix C. This remedy component is ongoing.

Long-Term Groundwater Monitoring

Groundwater monitoring was included in the selected remedy to monitor groundwater quality and to

assess future environmental effects. Detailed plans for long-term groundwater monitoring were initially developed during the alternative design phase in 1995 to evaluate remedy performance and assess future environmental effects. The Revised *Long-Term Maintenance and Management Plan* (LTMMP), prepared in May 2007 and amended in December 2009, 2015 and 2018) expanded the monitoring program to include evaluation of remedy performance. The ROD called for semi-annual groundwater monitoring for a minimum of 30 years. The groundwater monitoring program has increased from sampling 67 monitoring wells in 2007 to 107 monitoring wells in 2019.

In 2015, groundwater samples were collected from 24 well locations in the spring and from 94 well locations in the fall. In 2016, ground water samples were collected from 13 LTM well locations plus 17 additional well locations during the spring sample event and from 67 LTM well locations (including the two extraction wells) in the fall. From 2017 to 2019, groundwater samples were collected from 65 well locations in the spring (13 well locations from the LTM program plus 52 additional well locations) and from 107 well locations in the fall (74 well locations from the LTM program plus 33 additional well locations) plus the two extraction wells per the LTMMP Addendum (KGS, 2018). As set forth in the 2015 LTMMP, both water quality and hydraulic data are collected from a subset of wells on a semi-annual, annual and every five years basis; most wells are sampled on an annual basis in fall. The analytical parameters include field parameters, selected inorganic parameters, and select metals. The groundwater monitoring wells per the 2015 LTMMP were selected for assessment of remediation effectiveness from existing wells based on historical analytical results and both hydrologic and geochemical monitoring and modeling to provide representative samples in key sub-areas of the SHL remedy, including:

- Upgradient Areas – these are groundwater bearing zones discharging into the saturated overburden beneath the SHL footprint that encompass groundwater migrating in overburden toward SHL from the south and west and groundwater discharging from bedrock into the overburden beneath the SHL footprint or into the NIA. Monitoring of these upgradient groundwater zones is useful in understanding the levels of dissolved arsenic and dissolved oxygen entering the aquifer at the SHL and ultimately migrating to the north. These areas are monitored to meet the DQO's requirement for overall remedy component evaluations.
- Landfill Area – these are wells located in the SHL landfill footprint and historically contain some of the highest dissolved arsenic concentrations. Monitoring of the landfill area wells is critical in determining the rate of reduction in arsenic and changes in geochemical parameters at the landfill area which provides insight into the overall performance of remedy components.
- Barrier Wall Area – these are wells located on the eastern and western side of the barrier wall and can be used to monitor the hydraulic effect of the barrier wall in diverting groundwater flow to the north and thereby mitigating arsenic input to Red Cove.
- Nearfield Area – these are wells located in the vicinity of the ATP extraction wells near the northern toe of the landfill. Monitoring of these locations is key to evaluating the 3-dimensional nature of the hydraulic capture of the ATP remedy as well as tracking changes in both arsenic concentrations and changes in redox conditions north of the extraction system.
- North Impact Area – these wells are located beyond the downgradient capture zone of the ATP and will be used 1) for the LTM program in the NIA and 2) to monitor the performance of the ATP remedy in achieving the RAOs in the area of attainment. Data from

the NIA wells will also be used to assess redox changes as well as arsenic concentrations in groundwater over time

Annual reviews and periodic 5-year reviews built into the LTM process are the vehicles used to

optimize the data collection moving forward. During the current 5-year review process, the current LTM wells that are monitored annually will be evaluated and select wells will be designated for 5-year sampling events. The long-term groundwater remedy component is ongoing.

Long-Term Landfill Gas Monitoring

The purpose of the landfill gas monitoring program is to establish long-term trends with regard to gas production and venting. A combustible gas survey was performed annually 2015-2019 to determine whether methane, hydrogen sulfide, or volatile organic compounds trends have changed in landfill. Landfill gas was monitored using a MultiRAE meter and Landtec gas monitor at landfill gas vents and analyzed in the field by direct-reading instruments for lower explosive limit and total organic gases. Landfill gas vent results were generally consistent with historical results and indicate proper landfill gas venting is ongoing. Landfill gas trends in the southwest section of the landfill typically exhibited some of the highest levels of methane/LEL and CO2. The landfill cap was installed in 1993 and therefore annual landfill gas monitoring will continue through 2023 per MassDEP 310 CMR 19.000 Solid Waste Management regulations. The long-term landfill gas monitoring remedy component is ongoing.

Institutional Controls

The 1995 ROD required implementation of ICs to protect potential human receptors from risks resulting from exposure to contaminated groundwater. Separately in 1996, a deed restriction prohibiting installation of drinking water wells on landfill property was issued by the Army. In 2013, an ESD was issued to include ICs/LUCs for non-Army property located to the north of SHL (i.e. north impacted area (NIA)) and properties along West Main Street in the Town of Ayer. A summary of the ROD/ESD-required ICs is presented in Table 1-2 below. ICs were inspected annually 2015 to 2019 in conjunction with annual long-term monitoring activities, annual LUCIP interviews/checklists, and five-year door to door survey. Results of the LUC inspections are included in the Annual LTM reports. This remedy component is ongoing.

1.2.4 IC Summary Table

Table 1-2. OU 1 - Shepley's Hill Landfill - Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	OUs/AOCs	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	OU1 SHL The three AOCs 4, 5 and 18 are located within the SHL OU1 which	1995 ROD: Protect potential human receptors from risks resulting from exposure to contaminated groundwater by preventing use of the contaminated aquifer. No groundwater will be extracted for any purpose.	**Deed Restriction** Prohibition on installation of drinking water wells within OU LUC/IC boundaries

			encompasses the 84-acre landfill, the North Impacted Area (NIA) and areas/ property within ROD/ESD-defined IC/LUC boundaries	Mitigate the arsenic in groundwater flux from SHL to Red Cove/Plow Shop Pond to reduce potential risk to environmental receptors consistent with local conditions in Plow Shop Pond. <u>2013 ESD (expands scope of ICs/LUCs in 1995 ROD):</u> Protect potential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of MCLs by: • Restricting access to groundwater so the potential exposure pathway to the contaminants would remain incomplete; • Prohibiting the withdrawal and/or future use of water, except for monitoring, from the aquifer within the identified groundwater LUC boundary; and, • Maintaining the integrity of any current or future monitoring system.	2013 RACR for SHL Barrier Wall 2014 Final LUCIP, Restrictions on Groundwater Use, Shepley's Hill Landfill **Local/Town Zoning. Permitting and Building Regs/Requirements** – All properties within, and 400' from, the IC/LUC boundary must connect to public water supply. **Local/Town Moratorium on Groundwater Use** – Town of Ayer BOH prohibition on any and all uses of groundwater within, and 400' from, the IC/LUC boundary **Affirmative Measures** **Public education and outreach -** ongoing, periodic distribution of educational materials and groundwater use surveys to all property owners and residents within and 400' from the IC/LUC boundary

Barrier Wall

As discussed in Section 1.2.2 – "2012 Non-Time Critical Removal Action" and detailed in **Appendix C**, the vertical barrier wall was designed and implemented to intercept and divert groundwater flowing in overburden soils away from the Red Cove area of Plow Shop Pond. Since the last (2015) FYR, monitoring of the barrier wall has been conducted annually. An assessment of barrier wall performance using 3PE vector analysis was presented in the 2017 SHL annual report and the draft 2019 SHL annual report (under review by EPA at the time this FYR was prepared). The LTMMP will be updated to reflect the monitoring and performance of the barrier wall per the EPA SOW Additional Work requirements.

Educational Programs

The 1995 SHL ROD stipulated that periodic public meetings and presentations must be conducted to increase public awareness and ensure that the community is kept appraised of site activities and remaining contaminant levels. (see "Community Notification, Involvement and Site Interviews" above. This remedy component is ongoing.

60% Design of Groundwater Extraction System

The ROD required that Army conduct predesign hydrogeologic studies and prepare a 60 percent complete engineering design for a groundwater extraction and discharge to the Town of Ayer POTW, as a contingency remedy, prior to the first SHL FYR scheduled for 1998.

As detailed in Appendix C, a 60% design for the groundwater extraction system, as set forth in the ROD for SHL-2 and SHL-9, was finalized in 1997. The design became the existing two extraction wells/ATP system (with effluent discharge into the Devens POTW). The post-ROD final design expanded on the earlier design and added the second extraction well and on-site arsenic treatment plant to increase the volume of contaminated groundwater extracted and reduce arsenic concentrations in the extracted groundwater (added pretreatment) to comply with discharge requirements for the Devens POTW.

Principal components of the groundwater extraction/ATP system include:

- Extraction system – two extraction wells;
- Chlorine dioxide (ClO2) generation and addition;
- Coagulation system via a contact tank with direct-drive batch mixer;
- Microfiltration system;
- Solids removal via inclined plate clarifier (IPC);
- Bag filtration and discharge of IPC decant water;
- Polymer-aided flocculation of sludge using a filter bed roll-off (FBRO); and
- Discharge of ATP effluent to the Devens publicly owned treatment works (POTW).

Army installed the groundwater extraction/ATP system in March 2006. During the 2015-2019 FYR period, the ATP system operated approximately 89% of available hours with downtime related primarily to routine maintenance. The 2015 through 2019 Annual Reports document the non-routine shutdown periods during this time. The average online flow rate for the system during this period was approximately 55.8 gpm and the average effective flow rate of the system was approximately 49.8 gpm when shutdown periods are included. The 2015 FYR average flow rate was 48.5 gpm and the average effective flow rate was 41.0 gpm, indicating an increase in flow rates during the 2020 FYR period compared to 2015 FYR period.

ATP operations, routine maintenance and repairs were normal during this time with the exception of major equipment failures in 2016, 2018 and 2019. See Section 1.2.4 for Extraction System/ATP for additional details. This remedy component is ongoing.

Annual Reporting to MADEP and USEPA

Annual report summarizing site activities, sample data and LUC inspections conducted in the prior year would be submitted annually to MADEP and USEPA. Details of and references for the 2015 to 2019 Final SHL Annual Reports are included in Appendix C. This remedy component is ongoing.

Five-Year Reviews

See Executive Summary, "Purpose of Review" above. This remedy component is ongoing.

1.2.5 Systems Operations/Operation & Maintenance

Landfill and ATP Operations & Maintenance has been performed 2015-2019 in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (*Sovereign/HGL, 2015*), which specifies the SHL O&M activities. No modifications to the O&M activities have occurred since the last 5-year review. LTM and landfill O&M activities from 2015 through 2019 included annual landfill gas vent monitoring, semi-annual groundwater sampling, semi-annual well gauging and annual landfill cap inspections. Security fencing is inspected annually, and sections of perimeter fence were replaced during this time. Landfill gas vents are monitored annually, groundwater monitoring wells are inspected and sampled semi-annually, extraction wells are sampled semi-annually, monitoring wells are gauged semi-annually, and leachate discharge is sampled annually as part of the current LTM program for SHL.

Annual IC inspections and interviews were also conducted. Existing land use and site conditions were assessed during these interviews to ensure that IC requirements are met.
In addition, settlement and cover system monitoring is conducted on a visual basis during the scheduled annual landfill inspections. The landfill is mowed on an annual basis, typically in September or October.

<u>Landfill Cover and Gas Collection System Maintenance</u>

In accordance with the Revised Draft Final LTMMP Plan Update for SHL (Sovereign, 2015), the landfill cover and gas collection system are inspected annually, and routine maintenance is performed, when necessary. The annual inspection identifies and corrects any problems pertaining to the effectiveness of the cap system, erosion, and the conditions of gas vents, gas points, monitoring wells and piezometers. Monitoring wells are inspected in conjunction with the annual landfill inspection and well evaluation forms document the condition of each well in the LTMMP network. Observations are made regarding the fencing, vegetative cover, vegetative types, erosion, settlement, performance of drainage features, access road, culverts and general conditions. Key findings from the 2015 to 2019 annual reports for landfill maintenance and monitoring include:

- Landfill gas vents and gas pipes were observed to be in good condition. The vent pipes are functioning as intended with screens intact. No new repairs were performed.
- The vegetative layer is inspected and maintained annually. The vegetative layer was cut/mowed annually in September to a manageable height. Mowing was performed on October 1-2, 2015; September 27-28, 2016; September 25-26, 2017; September 25-26, 2018, and September 30-October 1, 2019.
- The overall condition of the landfill was found to be satisfactory for observations on vegetative cover, vegetative types, erosion, settlement and general conditions. The utility berm was intact and no adverse effects to the berm were observed. No new repairs were performed.
- Drainage swale large vegetative growth was removed but small growth and wetland plant life were not disturbed.

- Monitoring wells were observed to be in good condition overall. Roadbox replacement was performed at two wells along Sculley Road and a royer cover was replaced at a well in the NIA next to Nonacoicus Brook. Additionally, six monitoring wells had their PVC risers cut down to allow space for proper gripper seal and metal standpipe/royer cover closure. Well identification exterior labels on road boxes were repainted in 2017 and again in 2019. Several wells near the ATP were redeveloped due to sediment buildup. Single keyed locks were placed on all SHL LTM wells 2015-2019 with the exception of the brass locks on the EPA PZ wells.
- Landfill access road was observed to be in good condition with no erosion between the barrier wall and the south gate, however, the section of road from the barrier wall to the ATP was regraded in 2018 due to rutted and soft road conditions.
- Landfill culverts located at the norther portion of the landfill beneath the access driveway to the APT were observed to be in good condition and large vegetation removed annually.
- The landfill gas vents, and gas points are sampled on an annual basis for the following parameters:
- VOCs concentration in parts per million (ppm)
- Percent oxygen (O_2)
- Hydrogen sulfide (H_2S) concentration in ppm
- Percent lower explosive limit (LEL)
- Carbon monoxide (CO) concentration in ppm
- Percent carbon dioxide (CO_2), and
- Percent methane (CH_4)

For all events from 2015 through 2020, the gas monitoring results were consistent with historical results throughout the landfill, indicating proper gas venting. Although these results are not directly related to RAOs for Shepley's Hill Landfill, they are indicative of the continued absence of landfill gas migration away from the landfill and therefore continue to support the protectiveness of the remedy with regards to nearby buildings and the potential for landfill gas migration to these buildings.

Groundwater Extraction/ATP System

The arsenic treatment system is designed to remove arsenic from extracted groundwater through co-precipitation with iron followed by microfiltration. The ATP is housed in a 40 x 40-foot steel building. The extraction system consists of two deep overburden extraction wells (EW) located at the northwestern portion of the landfill cap and can operate simultaneously or independently of one another.

The SHL ATP was operational ("uptime") approximately 85 to 92 percent of the time from 2015 to 2019. The average flow when online ranged from 54.2 to 58.9 gallons per minute (gpm) from 2015 to 2019. The average extraction rate ranged from 47.5 to 53.1 gpm. The average downtime of the ATP ranged from 8 to 15 percent of the total time for routine and non-routine maintenance. ATP operations, routine maintenance and repairs included some major equipment failures in 2016, 2018 and 2019. In 2016 the system CPU failed and was upgraded. In 2018, the ATP main electrical breaker malfunctioned and caused a 30-day shutdown of the system. In 2019, system modifications included replacement of the chlorine dioxide skid Programmable Logic Controller (PLC) due to critical failure.

High levels of sludge generation is caused from the high concentration of inorganics (primarily iron) in the influent. Influent arsenic concentrations have continued to decrease when compared to influent arsenic concentrations at the time of startup of the ATP in 2006; however, the average annual combined inorganic concentrations (iron, arsenic, and manganese) remain high at approximately 64.5 ppm. Total average sludge removed from 2015 to 2019 ranged from 250 to 406 tons. The sludge is generated through the microfiltration process and is stored onsite within a filter bed roll-off. Every two weeks the accumulated sludge is removed from the roll-off and transported under a nonhazardous waste manifest to a licensed disposal facility. Through December 2017, the sludge was transported to the Turnkey Landfill in Rochester, NH. Beginning in January 2018, the Turnkey Landfill stopped accepting sludge from all sources (not just the ATP). As a result, the sludge is now transported to Tradebe Treatment & Recycling of Stoughton in Stoughton, MA.

The Army will be conducting a pilot test in the fall of 2020 to evaluate if the current microfiltration system can be replaced with a Lamella Gravity Settler and a Dynasand Filter to improve the performance and safety of the ATP.

1.3 Progress Since the Last Review

This section includes the protectiveness determinations and statements from the **last** five-year review as well as the recommendations from the **last** five-year review and the current status of those recommendations. As detailed in Appendix C, EPA raised a significant number of issues/concerns with the draft 2015 FYR that were not adequately addressed or resolved prior to Army's issuance of the final 2015 FYR. While EPA concurred on the short-term protectiveness determinations for most of the OUs/AOCs evaluated in the 2015 FYR Report, including OU 1 SHL, it deferred decisions regarding long term protectiveness until successful resolutions of the issues, recommendations and requirements set forth in EPA's September 22, 2015 correspondence.

Protectiveness Determinations/Statements from the 2015 FYR

The remedy at SHL is considered to be protective of human health and the environment in the short-term.

Short-term protectiveness is achieved because:

- There are no current health concerns due to exposure of Site-related waste to humans or the environment;
- The landfill cover system prevents exposure to the landfill waste material and contaminants; and,
- The remedy protects potential residential receptors from exposure to contaminated groundwater migrating from the landfill through land use controls that prohibits access to groundwater.

Long-term protectiveness will be accomplished through continued performance of operation,

maintenance, and monitoring activities and the eventual restoration of the groundwater to cleanup goals or background conditions.

As previously discussed, although EPA concurred with Army's short-term protectiveness determination, it was unable to concur on the long-term protectiveness determination because of the following unresolved issues/concerns (as set forth in EPA's comments on the 2010 and 2015 Devens FYR):

1. The current SHL remedy is inadequate for achieving the RAOs (and cleanup goals (i.e. MCLs) set forth in the 1995 ROD, in a reasonable timeframe - While the existing extraction/ATP

appears effective in treating extracted groundwater to permitted POTW discharge limits, available site-specific data strongly suggests that the current extraction/ATP system, as designed, implemented and operated, is inadequate for achieving ROD/ESD-specified RAOs and cleanup levels. Army shall develop a more effective, long-term remediation strategy that:

a. contains (and/or treats) arsenic-contaminated groundwater at the north end of the landfill;
b. is technically feasible and cost-effective;
c. considers whether the aerial extent of the impacted aquifer and degree of complexity in hydrogeologic and geochemical conditions precludes achievement of current RAOs and cleanup levels;
d. is able to achieve the RAOs and cleanup goals as set forth in the 1995 ROD (or yet-to-be determined, site-specific cleanup target level(s) in a ROD Amendment); and,
e. includes RAOs for the restoration of groundwater within the NIA.

While some progress had been made between issuance of the 2010 and 2015 FYRs, Army refused to proceed on development of an alternate remedy without EPA acceptance of a revised CSM (that included dissolution of previously attenuated arsenic as the primary/significant source of currently elevated arsenic concentrations).

2. Develop a comprehensive groundwater monitoring program that effectively evaluates the performance of all current remedial system components - The revised 2015 LTMMP needs to be amended to focus specifically on the collection (and assessment) of data needed to select a final remedy and develop performance metrics to evaluate cleanup progress; specifically, the revised LTMMP shall include, at a minimum, the following:
   a. sufficient well locations, sampling frequency and analysis/statistical metrics for analysis of monitoring data;
   b. evaluates the performance of all current remedial system components;
   c. evaluates contaminant source strength under the landfill, plume response at the toe of the landfill, and plume response in the NIA;
   d. evaluates trends in contaminant concentrations and geochemical parameters prior to and following startup of the ATP,
   e. analyzes concentration trends relative to remedial approach at north toe of SHL, and
   f. identifies critical DQOs (using site-specific data) to support development of a Final FS, selection of final remedy and development performance metrics to comprehensively evaluate final remedy performance.
3. Refine the current SHL groundwater flow model that (1) accounts for the potential decline in arsenic concentrations in the absence of changes in “geochemical parameters” that might be used as indicators of redox conditions (2) incorporates site-specific data to evaluate contaminant source strength under the landfill, plume response at the toe of the landfill, and plume response in the NIA.
4. Develop a SHL specific, arsenic background value (and/or some acceptable "range" from which

to gauge remedy performance) that is derived from statistical analysis of existing monitoring locations with datasets supported from historical or on-going sampling programs.

5. Continue to operate the existing ATP at an extraction rate consistent with that specified in the SHL Contingency Remedy RD/RA Work Plan (i.e., 50 gpm)

As stated in comments on the 2010 and 2015 FYR, EPA remains opposed to even a "temporary shut-down" of the existing ATP nor is it willing to consider a TI waiver until all of the previously-agreed upon issues have been successfully addressed and all of the previously-identified tasks have been completed. All references to a possible system shut down should be omitted from the FYR.

In an attempt to resolve these issues and others outlined in EPA's September 9, 2015 comments, EPA invoked the dispute resolution provisions set forth in Section XIII of the 1991 Devens FFA on November 3, 2015. After months of conference calls, meetings and email exchanges, EPA issued a "Scope of Work" for the Additional Work required to evaluate long-term protectiveness of the SHL remedy on February 24, 2016. The SHL SOW divided the required Additional Work into three, consecutive phases with specific tasks/subtasks to be performed in each. A description and current status of the Phase 1, Phase 2 and Phase 3 tasks/subtasks is provided in Table 1-3 below. A summary of the informal dispute resolution is included in **Appendix C**.

Table 1-3. Status of Recommendations from the 2015 FYR

2016 SHL SOW **Phase 1 – Demonstrate Plume Capture** Demonstrate Sufficient Containment/Capture of Contamination Migrating from SHL		
Task #	**Description**	**Current Status**
1	Delineate capture zone based on hydraulic and geochemical data	Incomplete
2	Delineate lateral & vertical extent of contaminant plume upgradient of extraction system	Incomplete
3	Delineate lateral and vertical extent of contamination downgradient of extraction system along Scully Road	Completed 6/30/18
4.a	Submit updated SHL groundwater flow model and documentation	Completed 06/15/20
4.b	Validate updated SHL groundwater flow model with field-measured hydraulic head data and water level measurements	Incomplete
5	Validate extent of capture by evaluating concentration trends in specified NIA monitoring locations as compared to flow paths developed from the updated groundwater flow model	Incomplete
If EPA determines, upon completion of Phase 1 Work that the existing extraction/ATP system is not adequately capturing the plume so as to be protective of human health and the environment or that the Army has not submitted to EPA sufficient data to determine that the plume is being adequately captured, EPA will provide a supplemental SOW that the Army shall implement to collect sufficient data for that determination. The supplemental SOW may describe additional data needs or may describe changes to the existing treatment system sufficient.		

2016 SHL SOW **Phase 2 – Collect Sufficient Data to Evaluate Remedy Performance**		
Task #	**Description**	**Current Status**
1	Collect groundwater samples (for five (5) years) from each of the SOW-specified monitoring locations grouped according to key sub-areas (i.e. extraction wells (semi-annual), landfill area	Incomplete

	(annual), nearfield area (semi-annual), north impact area (semi-annual); upgradient area (annual), and barrier wall area)	
2	Perform a study to determine the site-specific background level of arsenic in groundwater using data from monitoring locations outside the influence of the plume (SHL SOW, Table 1 and Figure 4)	Incomplete
If EPA, after review of the data and Technical Memorandums submitted as part of Phase 2, or at a later time, determines that a supplemental SOW is necessary to evaluate the performance of the remedy, the Army shall implement the supplemental SOW provided by EPA.		

2016 SHL SOW Phase 3 - Document Remedy in a Decision Document		
Outcome #	**Description**	**Current Status**
1	If EPA determines, based on the data collected in Phases 1 and 2 that the containment system (as it currently exists or as modified), coupled with MNA, can achieve restoration of the aquifer to ROD-specified cleanup levels within a reasonable period of time, Army shall issue the appropriate Decision Document (Explanation of Significant Difference or Amended ROD).	Incomplete
2	If EPA determines that the containment system, coupled with MNA, does not result in restoration of the aquifer, Army shall develop a remedy and issue a proposed plan for that remedy to for EPA concurrence; Army shall construct, operate and maintain the remedy consistent with all requirements of the FFA upon issuance of a final ROD.	Incomplete

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in Appendix L of the Final 2015 Five Year Review (KGS, 2015).

1.4 Five-Year Review Process

1.4.1 Community Notification, Involvement & Site Interviews

Details regarding community notification and involvement activities for the 2020 FYR are discussed in the Executive Summary, “Community Notification, Involvement and Site Interviews.” In addition to the general comments discussed therein, the following are comments specific to ongoing remedial activities at SHL.

A property owner abutting the SHL indicated that the ongoing cleanup at SHL is acceptable and would like to see the landfill continue to support a quiet habitat for the abundance of observed wildlife. He indicated that the vacuum truck used at the plant on Tuesday’s from 7:30 to 10:30 am generates a lot of noise and that it would be better for the neighborhood if it came later in the morning. He suggested that if there is large vehicle activity, that construction crews enter from the South Gate of the landfill. He also

asked that trees not be cut down near the property line unless he is consulted. He asked to be contacted by email before activities start, when possible.

The contractor representative for the treatment plant indicated that the ATP system was operating within capacity and necessary upgrades were completed during this performance period. Major issues this period included in 2018 an unexpected failure of the main electrical breaker and in 2019 failure of the PLC on the chlorine dioxide skid. Currently and since installation of the additional microfilters in 2015, the system is operating at its maximum capacity and efficiency.

1.4.2 Data Review

Groundwater quality and chemistry data from 2015 to 2019 will be used to evaluate performance and effectiveness of the SHL remedy (i.e. ability of the extraction/ATP system, as designed, constructed and operated, to effectively contain/capture the groundwater plume at the toe of the landfill, achieve the ROD-specified RAOs and cleanup levels, and ensure protectiveness of human health and the environment). To adequately evaluate each of these performance criteria, data are to be evaluated in accordance with the criteria and procedures set forth in the February 2016 SHL SOW (Phase 1 Task 5 & Phase 2 Task 1) and the recommendations described in Section 1.3 above. Results of the analyses will be conducted at a future time and results reported under Phase 1, Task 5 in order to support the technical assessment questions in Section 1.5 and protectiveness determination for the SHL remedy in Sections 1.6.

Groundwater and chemistry data per the 2015 LTMMP requirements from 2015 through 2019 are highlighted below and provided in **Appendix C**. The LTM and performance monitoring data for SHL are provided in detail in the annual operations, maintenance, and monitoring reports. Historical exceedances of the cleanup goals for arsenic, iron, and manganese from 1991 through 2019 are summarized in **Table C-1**. Graphical and statistical analyses of selected wells are also presented in **Appendix C**.

Data reviewed for this FYR included data presented in the 2015 through 2019 Annual Reports, which are provided in **Appendix A**. The following data summaries from 2015 through 2019 include:

- A summary of groundwater quality results;
- A summary of arsenic trends for select monitoring wells; and,
- Supplemental sampling for VOCs and metals.

Groundwater Summary

Sitewide from 2015 to 2019, dissolved arsenic concentrations ranged from ND to 6,400 µg/L with maximum concentrations detected during the annual fall sample events within the landfill area (Appendix C, Table C-1). The highest concentration of arsenic detected in the spring (2017) was 4,700 µg/L at landfill area monitoring well N5-P1. The highest concentration of arsenic detected in the fall (2017) was 6,400 µg/L at landfill monitoring well SHM-10-15. Arsenic concentrations declined in the landfill area from 6,400 µg/L in 2017 to 5,800 µg/L in 2018 to 5,600 µg/L in 2019.

Dissolved iron concentrations ranged from ND to 113,000 µg/L with maximum concentrations detected annually at various locations including the north impact area, nearfield area, landfill area and barrier wall area (**Appendix C, Table C-1**). The highest concentration of iron detected in the spring (2015) was 113,000 µg/L within the north impact area. The highest concentration of iron detected in the fall (2015) was 88,800 µg/L within the nearfield area.

Dissolved manganese concentrations ranged from ND to 20,000 µg/L with maximum annual detections located within the nearfield or north impact areas (**Appendix C, Table C-1**). The highest concentration

of manganese detected in the spring (2015) was 14,800 µg/L within the north impact area. The highest concentration of manganese detected in the fall (2017) was 20,000 µg/L within the north impact area. Annual maximum manganese concentrations showed a decline from 20,000 µg/L in 2017 to 17,000 µg/L in 2018 to 14,000 µg/L in 2019.

The annual reports for 2015-2019 indicate the results of each site-wide monitoring event illustrate a general groundwater flow from the southwest to the north towards Nonacoicus Brook with a deflection of groundwater flow to the north in the area west of the barrier wall in the overburden. There have been no significant changes in groundwater flow direction or identification of a new groundwater divide during this FYR period.

Arsenic Trends

An analysis of arsenic trends was performed using data from monitoring well locations identified in LTMMP. Mann- Kendall statistical analysis was performed for many wells located throughout the landfill and NIA and results are provided in annual reports. Additional evaluation of arsenic trend data will be conducted for EPA's SHL SOW, Phase 1 Task 5 and Phase 2 Task 1.

Arsenic trends graphs and Mann-Kendall statistical analysis trends (95% confidence level) using ProUCL software for wells or a subset of wells identified in the 2015 LTMMP (p. 20) were performed annually (2015-2019) and statistical analysis summary results are presented below. LTMMP wells that did not have at least 4 rounds of arsenic data or were below the cleanup level of 10 ug/l (or ND) were not analyzed. The results are provided in **Appendix C**.

- 2015 - 44 wells were selected for analysis and 32% of monitoring wells showed a decreasing trend, 7% of monitoring wells showed an increasing trend and 61% of monitoring wells showed insufficient evidence of a significant trend.
- 2016 - 41 wells were selected for analysis and 27% of monitoring wells showed a decreasing trend, 27 % of wells showed an increasing trend and 46% of wells showed insufficient evidence of a significant trend.
- 2017 - 41 wells were selected for analysis and 37% of monitoring wells showed a decreasing trend, 7% of wells showed an increasing trend and 23% of wells showed insufficient evidence of a significant trend.
- 2018 - 40 wells were selected for analysis and 50% of monitoring wells showed a decreasing trend, 5% of wells showed an increasing trend and 45% of wells showed insufficient evidence of a significant trend.
- 2019 - 40 wells were selected for analysis and 48% of monitoring wells showed a decreasing trend, 3% of wells showed an increasing trend and 50% of wells showed insufficient evidence of a significant trend.

In addition, an analysis of arsenic trends (95% confidence level) was performed for each of the key subareas identified in the 2015 LTMMP using data from the associated group of monitoring well locations. Results for each subarea (and the monitoring locations associated with each) are summarized below for the most recent year (2019):

Landfill Area (N5-Pl, SHL-99-29X, SHM-10-07, SHL-10-11, SHM-10-12, SHM-10-13, SHM-10-14, and SHM-10-15) – An evaluation of arsenic trends in this area revealed that SHM-10-11, located in the central south portion of the landfill had evidence of an increasing trend. Wells N5-P1 and SHM-10-13

had evidence of a decreasing trend. The other five wells had insufficient evidence of statistically significant trend. There is insufficient data to determine if cleanup levels are achievable.

Nearfield Area (SHM-93-22B, SHM-05-41B, SHM-05-41C, EPA-PZ-2012-1B, EPA-PZ-2012-3A/B, EPA-PZ-2012-4B, EPAPZ-2012-6B, EPA-PZ-2012-7B, SHL-5, SHL-9, SHL-22, SHM-93-22C, SHM-96-5B, SHM-96-5C, SHM-05-41A, SHM-05-42B, SHM-10-06, SHM-10-06A, and SHM-10-16) – An evaluation of arsenic trends in this area revealed that 9 wells had insufficient evidence of statistically significant trend. Eleven wells had evidence of a decreasing trend. No wells had evidence of an increasing trends. There is insufficient data to determine if cleanup levels are achievable.

North Impact Area (SHM-05-40X, SHM-13-03, SHM-13-07, SHM-13-08 SHM-13-04, SHM-13-06, SHM-99-31C, SHM-99-32X, SHM-13-05, and SHM-13-14D) – An evaluation of arsenic trends in this area revealed that 6 wells had evidence of a decreasing trend. Four wells had insufficient evidence of statistically significant trend. No wells had evidence of an increasing trends. There is insufficient data to determine if cleanup levels are achievable.

Upgradient Area (SHL-15 and SHL-24) – An evaluation of arsenic trends in this area revealed that the wells had insufficient evidence of statistically significant trend. There is insufficient data to determine if cleanup levels are achievable.

Barrier Wall Area (No wells were evaluated for arsenic trends in this area). There is insufficient data to determine if cleanup levels are achievable.

Extraction Wells (EW-1 & EW-4) – (Extraction wells were not evaluated for arsenic trends under the LTMMP).

In addition, using results from the nearfield and north impact area trend analyses, an estimated time to achieve ROD-specified cleanup levels will be calculated under SOW Phase 1, Task 5 at a future time.

Results of the trend analysis for the landfill area will be used to estimate the time it will take for the landfill source to be depleted. This analysis will be performed under the SOW Phase 1, Task 5 requirement at a future time.

Site-specific groundwater monitoring data comprises the primary line of evidence in evaluating performance and effectiveness of the SHL remedy. While existing data is insufficient to adequately evaluate performance of the SHL remedy, the analysis of 2015 to 2019 arsenic trend data and updated estimates of the time to achieve ROD-specified cleanup levels (based on the arsenic trend analysis in "Nearfield Area" and the "North Impacted Area" sub-areas identified in the SHL SOW) discussed above suggest that sole reliance on the extraction/ATP system, as currently designed, may not present a final solution to contain/capture contamination migrating from SHL and attain cleanup-goals beyond the landfill/base boundary.

Adequacy and long-term performance of the ATP will be addressed through technical analysis to be conducted under SOW Phase 1 (Demonstrate Plume Capture) and Phase 2 Task 2 (Designation of Arsenic Background) in order to better define adequacy of the current remedy. Determination of background concentration for arsenic in the hydrogeologic setting for SHL will provide a critical piece of information to support reliable assessment of the performance of the ATP as currently configured.

The Additional Work specified in the SHL SOW (EPA, 2016) will provide the data/information needed to evaluate and confirm remedy performance and effective, long-term protection of human health and the environment. In addition, the SHL LTMMP will be expanded to ensure that the data necessary to demonstrate sufficient containment/capture of contamination migration from the landfill and evaluate

remedy performance is collected. The determination of background concentration for arsenic in the hydrogeologic setting for SHL will provide a critical piece of information to support reliable assessment of the performance of the ATP and evaluate other long-term remediation strategies, if warranted.

Supplemental Sampling to Support Five Year Review

At the request of EPA in support of the 2020 Five Year Review, the Army collected supplemental groundwater samples for selected VOCs and metals analyses from most of the 1995 ROD-specified historical LTM well locations along the eastern edge and downgradient of the landfill and at additional locations in accordance with the approved workplan (KGS, 2019). EPA requested samples be collected in fall 2019 and spring 2020 and parameters were compared to the cleanup levels referenced in the 1995 ROD and presented in **Table C-2** in **Appendix C**. Several additional locations (not ROD-specified) were added downgradient of the landfill based on the present-day monitoring well network including EW-01, EW-04, SHM-10-16, SHM-99-31C and SHM-99-32X. At each location, samples were collected for field parameters and offsite laboratory analysis of three VOCs and eight dissolved metals. The supplemental VOCs analyzed included COCs identified in the ROD: 1,2-dichlorobenzene, 1,2-dichloroethane and 1,4-dichlorobenzene. The supplemental dissolved metals analyzed included the COCs identified in the ROD: aluminum, arsenic, chromium, iron, lead, manganese, nickel, and sodium. Field parameters were recorded including turbidity, dissolved oxygen, temperature, pH, specific conductivity, and oxygen reduction potential (ORP). The field and laboratory parameters are used as indicators of current conditions at the landfill's eastern edge and downgradient of the landfill. Per the 1995 ROD, the highest organic (VOC) concentrations in the downgradient monitoring wells included SHL-11, SHL-19, SHL-20 and SHM-93-10C and the highest inorganic concentrations in downgradient wells, SHL-10, SHL-11, SHL-19 SHL-20 and SHM-93-22C (SHM-93-10C was not sampled). Sampling results are in **Table C-2** in **Appendix C.**

The fall 2019 supplemental sampling results are summarized below:

- <u>SHL-10, SHL-11, SHL-19, SHL-20, and SHM-93-22C</u> (wells selected based on the historical detections of VOCs/inorganics at these locations near the barrier wall and eastern boundary of landfill). Arsenic, iron, manganese, and sodium exceeded cleanup levels at SHL-11. The other metals did not exceed the cleanup levels. No VOCs exceeded cleanup levels. Chemistry results from SHL-10 and SHL-20 were rejected, as it was concluded that a field error occurred with sample labelling from these two well locations.
- <u>SHM-10-16, SHP-99-31C, and SHM-99-32X</u> (wells selected downgradient of the historical VOCs/inorganics detections). Arsenic, iron, manganese, and sodium exceeded cleanup levels at these locations with the exception of iron at SHM-99-32X. The other metals did not exceed the cleanup levels. No VOCs exceeded cleanup levels.
- <u>EW-01 and EW-04</u> (located at the ATP to assess COCs at the influent sampling ports of each extraction well). Arsenic, iron, and manganese exceeded cleanup levels at these locations. The other metals did not exceed the cleanup levels. No VOCs exceeded cleanup levels.

The spring 2020 supplemental sampling results are summarized below:

- <u>SHL-10, SHL-11, SHL-19, SHL-20, and SHM-93-22C</u> (wells selected based on the historical detections of VOCs/inorganics at these locations near the barrier wall and eastern boundary of landfill). No metals or VOCs exceeded cleanup levels at SHL-10, SHL-19, and SHM-93-22C . Only sodium exceeded cleanup level in SHL-20. Only arsenic, iron, manganese, and sodium

exceeded cleanup levels at SHL-11. No VOCs exceeded cleanup levels.

- SHM-10-16, SHP-99-31C, and SHM-99-32X (wells selected downgradient of the historical VOCs/inorganics detections). Arsenic, iron, manganese, and sodium exceeded cleanup levels at these locations with the exception of iron at SHM-99-32X. The other metals (aluminum, chromium, lead, nickel) did not exceed the cleanup levels. No VOCs exceeded cleanup levels.
- EW-01 and EW-04 (located at the ATP to assess COCs at the influent sampling ports of each extraction well). Arsenic, iron, and manganese exceeded cleanup levels at these locations. The other metals (aluminum, chromium, lead, nickel) did not exceed the cleanup levels. No VOCs exceeded cleanup levels.

Overall, the fall 2019 and spring 2020 water quality results in support of the 2020 five-year review were comparable and similar with the exception of fall 2019 rejected data from SHL-10 and SHL-20.

Barrier Wall Performance Monitoring

The barrier wall evaluation was performed, is under review, but has insufficient data for a full evaluation. The barrier wall assessment included analysis of water levels and dissolved arsenic concentration data to evaluate groundwater flow and arsenic flux from the landfill to Red Cove. To evaluate the effect of the barrier wall on geochemistry and dissolved arsenic, a trend analysis of dissolved arsenic concentrations was performed for monitoring wells located west (upgradient) and east (downgradient) of the barrier wall. The geochemical trend analysis for the barrier wall will be provided under Phase 1, Task 5 SOW.

1.4.3 Site Inspection

A site inspection was conducted on February 10, 2020 in support of the five-year review. The purpose of the inspection was to assess the protectiveness of the remedy. Annual fall inspections (2015-2019) are conducted to ensure protectiveness of the selected remedial action and that performance objectives listed above were being met. Features of the landfill that were inspected included the cover system, drainage system, gas vent system, access road, monitoring wells and piezometers. Observations were made regarding the vegetative cover, vegetative types, erosion, settlement and general conditions. The overall condition of the landfill was satisfactory.

The FYR site inspection for SHL was conducted on February 10, 2020. The inspection was documented using site inspection forms in accordance with the USEPA Five Year Review Guidance (EPA, 2001). Features of the landfill that were inspected included the cover system, drainage system, gas vent system, access road, monitoring wells and piezometers. Observations were made regarding the vegetative cover, vegetative types, erosion, settlement and general conditions. The overall condition of the landfill for the five-year site inspection was acceptable based on observations of the specific features of the landfill per the requirements of the ROD landfill covering maintenance requirements (P. 49) and annual landfill inspection reports per **Appendix D** of the LTMMP (Sovereign, 2015). The inspection checklist is included in **Appendix C** along with supporting photographs.

1.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?

- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

While various components of the SHL remedy (i.e. landfill cover maintenance, landfill gas collection system maintenance, long-term landfill gas monitoring, ICs, and educational programs) are in place and appear to be functioning as intended in the ROD/ESDs, EPA has requested additional data collection and data evaluation activities to evaluate whether the remedial action, specifically the groundwater extraction/ATP system, and barrier wall components can effectively achieve RAOs and cleanup levels in a reasonable time frame and ensure protection of human health and the environment. This is discussed further in Section 1.6.1 Other Findings.

Remedial Action Performance

The landfill cover maintenance, landfill gas collection system maintenance, long-term landfill gas monitoring, ICs, and educational programs portions of the remedy continue to be protective of human health and the environment. Land fill cap inspections, landfill gas monitoring, groundwater monitoring, and IC enforcement monitoring are conducted at the required frequencies specified in the ROD/ESDs. No IC breaches have been reported. Groundwater extraction, treatment, and discharge to the Ayer POTW is ongoing and continues to be needed since groundwater contaminant concentrations still exceed cleanup criteria. EPA has requested additional data collection and evaluation to determine whether the groundwater extraction/ATP system, and barrier wall components can effectively achieve RAOs and cleanup levels in a reasonable time frame and ensure continued protection of human health and the environment. This is discussed further in Section 1.6.1 Other Findings.

System Operations/O&M

Operating procedures for the non-groundwater treatment components (i.e. landfill inspections, landfill gas monitoring, groundwater monitoring, IC enforcement, and educational programs) are working in a manner that will continue to maintain the effectiveness of the portions of the remedy addressed by these components. As discussed in Section 1.2.4, the ATP operations, routine maintenance and repairs were normal during this time with the exception of equipment failures in 2016, 2018 and 2019 that resulted in unscheduled system downtime. These major equipment failures are likely related to the age of the system. EPA has requested additional data collection and evaluation to determine whether the groundwater extraction/ATP system, and barrier wall components can effectively achieve RAOs and cleanup levels in a reasonable time frame and ensure continued protection of human health and the environment. This is discussed further in Section 1.6.1 Other Findings.

Implementation of Institutional Controls and other Measures

The current ICs were identified in the 2013 ESD and 2014 LUCIP and are described below. These fall under the category of "Governmental Controls" as defined in EPAs' 2011 guidance titled: Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance".

- *Zoning By-Laws of the Town of Ayer* - Town of Ayer Subdivision Control Regulations and Town

of Ayer Building Department Permitting Requirements. Town of Ayer zoning, permitting and building requirements to which the use of all new or existing buildings, other structures or land must comply.

- *Moratorium on Groundwater Use within the Area of Land Use Controls* - The Ayer Board of Health (BOH) has issued a Moratorium on Groundwater Use (Appendix B of the 2014 LUCIP).
- *Ayer Board of Health (BOH) Well Regulations (Adopted January 10, 2001)* – Town of Ayer permitting requirements for the installation and use of new drinking water wells.
- *Massachusetts Drinking Water Regulation 310 CMR 22.00* – the state regulatory permitting and approval process for any new drinking water supply wells in Massachusetts that propose to service more than 25 customers or exceed a withdrawal rate of 100,000 gallons per day.

During this FYR period the Army also implemented the following affirmative measures described in the 2013 ESD and 2014 LUCIP to further ensure that the LUC performance objectives are being met.

Public education and outreach via ongoing periodic distribution of educational materials and groundwater use surveys to be distributed to all property owners and residents with the stated goal of confirming that no groundwater wells are in use within the entire area of LUCs

A door-to-door survey was conducted on September 3 and 5, 2019 to 1) collect updated information on the property record, 2) explain the arsenic distribution in the groundwater aquifer and the health impacts that may result from drinking contaminated groundwater, 3) explain that using contaminated groundwater for irrigation or dermal contact of contaminated groundwater is prohibited and 4) explain that installation of a private well or well point that draws groundwater from the contaminated aquifer is prohibited. The survey questionnaire form was completed for each address within the NIA. Information obtained and documented in the survey questionnaire form for each address during the door to door survey was tabulated in a summary table including updates on occupant name; listed if occupant was home; cross referenced if address was listed on Town of Ayer metered water user list; cross referenced to Town of Ayer assessors online database for property owner information; confirmed water supply connection; documented if any private wells were present on property and in use; documented if occupant received advanced mailing notification of the door to door survey; confirmed no groundwater use for consumption, irrigation or dermal contact; documented if an abandoned well was present on property; and, documented if any cross connections existed. It was documented if the occupant was not home and if so, a second educational pamphlet (separate from the mailing) was left at the door or mailbox.

Meet with town officials (Ayer BOH, Department of Public Works (DPW), etc.) annually, or more frequently if necessary.

On January 16, 2020 the Army confirmed with Town of Ayer that the “Restriction Groundwater Use” pamphlet was updated and posted on the Ayer BOH website. On January 16-17, 2020, the Army conducted phone interviews with the Ayer DPW Superintendent, Nashoba Associated BOH, and Ayer Building Commissioner. The Ayer DPW Superintendent stated that he was aware of the LUCs and has no issues with the current LUC implementation or coverage area. The Nashoba Associated BOH representative stated that she is aware of the pamphlet and planned to distribute it to the BOH. The Ayer Building Commissioner noted that he is familiar with the pamphlet and has no issues with LUC implementation.

Distribution of the LUCIP to local and federal parties.

The LUCIP was finalized in August 2014 and copies were provided to the Town of Ayer Board of Health, Department of Public Works, and Building Department. A copy of this LUCIP was placed in the central Army repository and the public libraries for the Town of Ayer, Massachusetts. A copy of this LUCIP was also provided to all property owners within the Area of LUCs along with the initial survey of landowners and educational pamphlet distribution.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. There have been changes in standards and TBCs since the 1995 ROD, 2005 ESD, and 2013 ESD were issued, but none affect protectiveness of the remedy for reasons discussed below. The changes as described below are not expected to alter the protectiveness of the remedy because land use controls prevent future residential exposure to groundwater.

Question B Summary:

Changes to MCLs for two chemicals of concern (arsenic and nickel) have occurred and are identified in Table 1-4 below. These changes are not expected to alter the protectiveness of the remedy, because the remedy relies on land use controls to restrict access to groundwater so the potential exposure pathway to the contaminants remains incomplete. Also discussed below, the changes to Federal floodplain regulations at 40 CFR Part 6 require preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The 500-year floodplain is higher in elevation than the bottom of the wastes in the landfill. Additional evaluation of the landfill cap design is included in the Other Findings section below.

EPA published updated policy addressing PFAS, specifically PFOA, PFOS and PFBS as described further below. These changes do not affect the current protectiveness of the remedy because the remedy relies on land use controls to prevent future residential exposure to groundwater. PFAS including PFOA, PFOS and PFBS are currently being investigated at SHL as part of the base-wide PFAS RI discussed in Section 12 of this FYR. There are no changes to in risk assessment methods or exposure pathways that affect the protectiveness of the remedy. Expected progress towards meeting RAOS will be determined as part of the SHL SOW Phase 1 Task 5 and Phase 2 Task 1 activities discussed further in Section 1.6.1 Other Findings.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1995 ROD[1], newly promulgated standards for chemicals of potential concern, and TBCs (to be

[1] The 1995 ROD stated that the ARARs for the Alternative SHL-9 are the same as for Alternative SHL-2 with the addition of the General Pretreatment Program regulations (40 CFR 403) promulgated pursuant to the Clean Water Act. These regulations require that nondomestic wastewater discharges to a POTW must comply with the general prohibitions of the regulation, any categorical pretreatment standards, and local pretreatment standards. The discharge of groundwater to the POTW would be sampled to evaluate compliance with the regulation. The 2005 ESD did not discuss ARARs.

considered) that may affect the protectiveness of the remedy. Location-and action-specific ARARs listed in 1995 ROD have been met since the remedial construction work has been completed. Changes to chemical-specific ARARs are summarized below.

Table 1-4. Evaluation of Chemicals of Concern Cleanup Levels, Shepley's Hill Landfill

Chemical of Concern[1]	ROD Cleanup Goal (CG) (µg/L)	Basis	Current MCL (µg/L)	Current MassDEP MMCL (µg/L)	Change to CG Needed?
Arsenic	50	MCL	10	10	Yes. Current MCL and MMCL is lower than CG
Chromium	100	MCL	100	100	No
1,2-Dichlorobenzene (o)	600	MCL	600	600	No
1,4-Dichlorobenzene (p)	5	MMCL	75	5	No Change
1,2-Dichloroethane	5	MCL	5	5	No
Lead	15	Action Level	15	15	No
Manganese	291	Background	50[2]	50[2]	No. Background concentration selected as CG in ROD
Nickel	100	MCL	None	100[3]	Yes. MCL remanded in 1995
Sodium	20,000	Health Advisory	20,000	20,000[3]	No
Aluminum	6,870	Background	50 – 200[2]	50 – 200[2]	No
Iron	9,100	Background	300[2]	300[2]	No

Notes:

1. The LTM Program (Stone and Webster Technology and Services, 1996) established arsenic, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and 1,2-dichloroethane as trigger chemicals because of the carcinogenic risk associated with each of these compounds.
2. Secondary MCL or MMCL.
3. Massachusetts Drinking Water Guideline.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at

least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS: In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that extended the EPA advisory to include PFOS, PFOA, perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of all five compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

The presence of PFAS in groundwater, and surface water and sediment at SHL is being investigated to address PFAS at former Fort Devens. The on-going base wide PFAS remedial investigation is discussed in Section 13 of this FYR.

Federal Floodplain Management: Federal regulations at 40 CFR Part 6, Appendix A identified in the ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The Army has assessed potential floodplain impacts from a 500-year flood event on the Shepley's Hill Landfill. Based on the information provided in OLIVER, the Massachusetts GIS system, the 500-year floodplain appears to lie between 226- and 246-feet above sea level. The 1995 ROD describes the bottom of the waste at Shepley's Hill Landfill at 214 feet above sea level in the north and central portions of the landfill, and at 230 feet above sea level in the southeast portion of the landfill. As part of the Phase I closure, refuse within 100 feet of the 100-year floodplain was removed and relocated elsewhere in the landfill. The 1996 close out report (Stone and Webster, 1996) describes the bottom of the waste at 220 feet above sea level at the north end of the landfill, and at 225 feet above sea level in the central and northeast portions of the landfill. Based on the above information, there is potential for the 500-year flood level to impact the wastes that remain in place.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFAS, specifically PFOA, PFOS and PFBS as described below. These changes do not affect the current protectiveness of the remedy because the remedy relies on land use controls to prevent future residential exposure to groundwater. EPA has also updated toxicity values for lead in soil. These changes do not affect the current protectiveness of the remedy because the average soil concentrations remain below EPA's updated screening level of 200 ppm.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*

In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2014 PFBS*** *non-cancer toxicity value*

Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***Lead in Soil Cleanups***

Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

As part of this FYR, the lead results in confirmation samples collected at SHL during the RI and Supplemental RI were reviewed to determine if average lead concentrations exceeded the updated

screening level of 200 ppm for residential exposure. Three soil leachate samples were collected from the landfill during the RI. All lead concentrations were less than 200 ppm. During the Supplemental RI, soil samples were collected at multiple depths from seven soil borings. Lead concentrations exceeded 200 ppm in one sample from boring SP-10-12 and four samples (not including a duplicate) from boring SP-10-15. The average concentration for lead in SP-10-12 was 61 ppm. The average concentration for lead in SP-10-15 was 139 ppm. Based on this review, no further remedial work is necessary to address remaining lead in soil.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 1995 ROD and 2015 FYR. As noted above, these changes do not affect the current protectiveness of the remedy because the remedy relies on land use controls to prevent future residential exposure to groundwater.

In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1995 ROD and 2006 ESD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

  In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Vapor intrusion (VI) was not recognized as an exposure pathway of concern at SHL in either the ROD or ESD. Therefore, the VISL calculator has not been run for this site.

Expected Progress Towards Meeting RAOs

The large number of wells with no significant arsenic trend (50 percent of the monitoring network), high concentration of arsenic in groundwater during 2015 – 2019 review period (up to 6,400 µg/L), and number of wells exceeding the MCL (59 percent as of Fall 2019) suggest that the remedy will have difficulty in achieving cleanup levels. Additional evaluation of 2015 – 2019 monitoring data will occur as part of the SHL SOW Phase 1 Task 5 and Phase 2 Task 1 activities summarized in the Issues/Recommendations section below. This evaluation will include updated estimates of the time to achieve the cleanup goal of MCLs in the Nearfield Area and North Impacted Area and updated estimates of the time it will take the landfill source to be depleted.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information come to light that could call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this FYR period.

1.6 Issues/Recommendations

There were no issues identified that affect the protectiveness of the remedy and therefore no recommendations. However, EPA and Army have identified several additional steps that will help in future evaluations of remedy performance and will be included in future five-year review evaluations. These are identified below in Section 1.6.1 Other Findings.

1.6.1 Other Findings

The following are EPA requests and other recommendations that were identified during the FYR. It is noted that EPA's requests involve additional planning documents, sampling, and data evaluation, that will be completed outside of the FYR period. Planning documents (LTMMP, sampling plans, etc.) are administrative in nature and do not affect protectiveness of a remedy. Until the work described in the plan has been completed, there is no basis for predetermining how the results will or will not affect performance or protectiveness of the remedy. The results of the requested additional sampling and data evaluation will be provided in future reports and incorporated into the next FYR.

- EPA has requested that Army demonstrate plume capture by completing SHL SOW Phase 1 tasks 1, 2, 4, and 5 (Task 3 has already been completed). This work is in progress and consists of monitoring and assessment activities only (e.g. no changes to the remedy itself).
- EPA has requested that Army collect sufficient data to evaluate remedy performance by completing SHL SOW Phase 2 Tasks 1 &2. This work will commence upon successful completion and acceptance by EPA of all Phase I activities. Phase II also consists of monitoring and assessment activities only.
- EPA has requested that Army submit a revised draft LTMMP for a comprehensive groundwater monitoring program that evaluates performance and verifies effectiveness of all remedial system components. The revised LTMMP should include sampling to evaluate barrier wall performance, verify attainment of ROD RAOs, and monitor/verify continued success of the SHL and Plow Shop Pond (Red Cove) removal actions.

- EPA has requested that Army submit a draft work plan for pore water and sediment sampling in the Red Cove area of Plow Shop Pond and conduct the sampling.
- EPA has requested that Army reassess the barrier wall performance based on EPA comments on the draft assessment report. EPA requested the inclusion of pore water and sediment sampling activities in Red Cove area of Plow Shop Pond noted above.
- It is recommended that the Army review the landfill cap design to determine if additional measures are necessary to protect the landfill from a 500-year flood event.

1.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU01 - Shepley's Hill Landfill AOC 4,5, and 18	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at Shepley's Hill Landfill (AOCs4, 5 and 18) is protective of human health and environment. The groundwater remedy, i.e., landfill cap and contingency pump and treat remedy, are functioning as intended in the ROD. Exposure pathways that could result in unacceptable risk are being controlled. LUCs are in place that protect potential residential receptors from exposure to impacted groundwater migrating from the landfill having chemicals in excess of MCLs. LUCs are enforced as demonstrated by the site interviews and site inspections performed annually and for this FYR. The groundwater extraction system continued to operate at the required pumping rate and monitoring data support the effectiveness of the groundwater remedy. Monitoring data demonstrate that the barrier wall is diverting groundwater to the north in the area west of the barrier wall in the overburden. The RAOs have been achieved through implementation of LUCs and construction, operation, and maintenance of the landfill cap, groundwater treatment system, and the barrier wall. LUCs are enforced, and no exposures are currently occurring or imminent.		

1.8 Next Review

The next FYR for SHL is required five years from the completion of this review (September 2025).

1.9 References

References are included in **Appendix A**.

2 DEVENS CONSOLIDATION LANDFILL AND CONTRIBUTOR SITES (OU 2 / AOCs 9, 40, and SA 13 (SOLID WASTE)

2.1 Introduction

This is the fifth FYR for the Devens Consolidation Landfill (DCL), the last being completed in 2015 (KOMAN 2015). Because the contributor sites AOC 9, 40 and SA 13 were inadvertently omitted from the 2015 FYR, EPA required that it be evaluated in an Addendum to the 2015 FYR Report (KGS, 2020a). In accordance with CERCLA, the NCP and EPA FYR guidance, the DCL and contributor sites AOCs 9, 40, and SA 13 are discussed in this 2020 FYR because hazardous substances, pollutants, or contaminants remain at these sites above levels that allow for unlimited use and unrestricted exposure (UU/UE).

2.1.1 Site Background

On December 8, 1997, Army issued the first of two Proposed Plans for the cleanup of the seven landfills (AOCs 9, 11, 40 and 41 and SAs 6, 12 and 13) that called for the complete excavation of landfilled debris at three of the seven landfills, limited removal of surficial debris at others and relocation/disposal in a new landfill to be constructed near the existing Shepley's Hill Landfill (OU 1).

In response to public comments received on the December 1997 proposed remedy, the Army issued a revised Proposed Plan on November 25, 1998 that included (1) no further action for SA 6, (2) surface debris, hot spot removal and site monitoring at AOC 41 and SA 12 (both located in the Army-retained, South Post area of the former Fort Devens); and, (3) full debris removal at AOCs 9, 11, 40, and SA 13 and relocation/disposal of excavated soils, sediments and other debris either at an offsite landfill or at a new onsite landfill to be constructed at the former golf course driving range.

Upon construction of the consolidation landfill, excavation of landfilled debris, and collection/evaluation of confirmatory sampling data, no further action was required for AOC 9 and site monitoring requirements for AOC 41 were incorporated into the 1996 South Post Impact Area (SPIA) ROD. The MassDEP is responsible for future monitoring as SA 12 (HLA, 1999). Because contaminants were detected (and remain) above levels permissible of unrestricted future use, AOCs 9 and 40 and SA 13 are evaluated in this 2020 FYR.

Each of the seven landfills are discussed below. A site chronology and additional SA/AOC-specific background information are included in **Appendix D**.

AOC 9 was located on the former North Post, north of Walker Road and west of the wastewater treatment plant. The landfill was operated from the late 1950s until 1978 and was used by the Army, National Guard, site contractors, and off-post personnel. Landfill materials at AOC 9 were generally demolition debris, including wood, concrete, asphalt, metal, brick, glass, and tree stumps. Debris volume was estimated to be 112,000 cy.

AOC 11 was located east of Lovell Road on the Main Post, adjacent to the Nashua River. The two-acre landfill received wood-frame hospital demolition debris from 1975 to 1980. Debris volume was estimated to be approximately 35,000 cy. The landfill was within a wetlands complex that runs along the western side of the Nashua River. East of the landfill, a 40-ft wide soil berm separated the landfill from the Nashua River. Refuse, including large pieces of metal, wood, bricks, and other construction debris was exposed at the ground surface throughout the site, except where an access road has been constructed over the fill. The landfill area was vegetated and is bordered on the north and south by wetlands.

AOC 40 was located along the edge of Patton Road in the southeastern portion of the Main Post. It

extended out into the former wetland along Cold Spring Brook (CSB), now submerged beneath CSB Pond. This area was used for the disposal of construction debris (masonry, asphalt, wire and metal), ash, stumps, and logs.

AOC 41 was located on the former South Post of Fort Devens, approximately one-half mile west of the Still River Gate, on the north shore of New Cranberry Pond. The landfill, less than one-quarter acre in size, was used up to the 1950s for disposal of nonexplosive military and household debris, including beverage cans, bottles, and motor vehicle parts. Debris volume was estimated to be approximately 1,500 cy.

SA 6 was located on the eastern side of Shirley Road on the South Post. The area was used between 1850 and 1920, prior to Army ownership, for disposal of household debris, primarily metal and glass. The volume of debris in the landfill was estimated to be 500 cy.

SA 12 was located on a steep, wooded slope adjacent to the Nashua River floodplain and partially encroaching on wetlands on the South Post. The area was used by the Army from 1960 to the late 1980s. The debris came from construction and range operations, consisting mostly of lumber, sheet metal, concrete, and leaves mixed with soil. The volume of debris in the landfill was estimated to be approximately 8,700 cy.

SA 13 was used between 1965 and 1990 for disposal of construction debris, stumps, and brush. Debris volume was estimated to be approximately 10,000 cy. The landfill was less than one acre in size and is located on the west side of Lake George Street near Hattonsville Road on the former Main Post. SA 13 was surrounded by large trees, but no trees were growing on the landfill itself. Tree stumps, limbs, and trunks were deposited on the surface of the landfill and down the steep lower slope. A wetland was located at the base of this slope.

A site chronology and additional site background information are included in **Appendix D**.

2.2 Response Action Summary

2.2.1 Basis for Taking Action

Contaminants of concern included low levels of inorganic analytes in surface water and groundwater; PAH, TPH and inorganic analytes were detected in sediment samples from wet areas around AOC 9, AOC 40, and SA 13; and PAH, TPH, pesticides and inorganic analytes were detected in soil samples collected from above the debris areas at AOC 9, AOC 40, and SA 13.

SA 6

No formal risk evaluations have been performed for SA 6. 19th-century household debris at the site were not expected to pose unacceptable risk to human health or the environment. Due to the nature and relatively small volume of debris, risks to potential human and ecological receptors at SA 6 were considered non-existent, as indicated in the ROD.

SA 12 and AOC 41

As indicated in the ROD, chemicals present at the SA 12 and AOC 41 exceeded screening standards established for residential land use. While there were no current risks identified, future residential use of the presented potential health risks which would be addressed by restricting site access and through continued use of the landfills for military training purposes. Contaminant concentrations in sediment adjacent to the Nashua River present risk to ecological receptors at SA 12. However, contaminant concentrations in sediment adjacent to the river were higher than those in sediment at the foot of the

landfill, suggesting that the river itself is a contributor to floodplain sediment contamination. Potential wildlife risks exist at AOC 41, due primarily to exposure to contaminants in surface soil. Surface soil removal will address the potential risks.

AOC 9

A human health preliminary risk evaluation was conducted for AOC 9 to evaluate potential risk associated with exposure to contaminants in surface soil, subsurface soil, groundwater, surface water, and sediment, as indicated in the ROD.

Surface soil concentrations exceeded screening standards established for residential land use, but below Devens background. While there were no current risks identified because the planned use for the site is for commercial activities such as light industrial business or technology, no residential use is planned.

Although exceedances of commercial/industrial screening standards for exposure to subsurface soil were noted, the PRE concluded the potential for exposure was minimal for the planned site use.

Surface water samples had concentrations of analytes greater than their respective drinking water standards and guidelines. The magnitude and frequency of exposure to surface water in this area are expected to be less than that upon which the drinking water guidelines are based. Use of drinking water guidelines for comparison to surface water concentrations is a conservative approach due to a lack of available health- based guidelines for exposure to surface water.

Arsenic was detected in sediment at concentrations greater than the residential soil screening concentration, but arsenic is not expected to pose a significant human health risk in the sampled swampy area, because exposure to sediment in this area would be much less than expected in a residential setting.

In groundwater, two organic analytes, chloroform and TPHC, were detected in AOC 9 monitoring wells. Chloroform was detected once in Round 1 at 0.585 micrograms per liter (µg/L), a concentration below the Massachusetts drinking water guideline. The chloroform detection was attributed to laboratory contamination. TPHC was detected in three out of ten samples, once in Round 1 and twice in Round 2. No federal drinking water standard or guideline exists for TPHC, so concentrations were compared to proposed MCP GW-1 guidance values. Detected concentrations were slightly greater than the proposed guidance value. Two of the three TPHC detections were in a groundwater monitoring well located upgradient of the landfill boundary.

Inorganic analytes were detected above background in virtually all groundwater samples collected from up-, down-, and cross-gradient AOC 9 monitoring wells. The maximum detected concentrations of some of the inorganic analytes exceeded their respective drinking water standard or guideline, which were attributed to suspended materials in the unfiltered groundwater samples. The standard for arsenic was exceeded in a sample collected upgradient from the landfill boundary. Commercial activities such as light industrial business or technology research are planned for the site. No residential use is planned. Therefore, comparison of chemical concentrations in groundwater to values protective of site resident ingestion of groundwater is conservative, and likely overstates current risk.

An ecological PRE was conducted to evaluate potential ecological risks associated with exposure to site contaminants in AOC 9 surface soil, surface water, and sediment. It is unlikely that the low levels of contamination in surface soil, surface water, and sediment will have an adverse effect on receptors, as indicated in the ROD.

AOC 11

A human health risk assessment was conducted to evaluate potential human health risks associated with exposure to contaminants in surface soil, surface water and sediment at AOC 11, as indicated in the ROD. Risk to adult and child recreators through exposure to surface soil, adult and child swimmers and waders exposed to surface water, and adult and children exposed to sediment were equal to or below the EPA risk management range and there were no unacceptable health effects.

An ecological risk assessment was conducted to evaluate potential ecological risks associated with exposure to contaminants in AOC 11 surface soil, surface water, and sediment. Exposure risks to surface soil are expected to be moderate and are likely overestimated. Tests results failed to indicate toxicity strictly associated with AOC 11 wetland surface waters. The AOC 11 wetlands exhibit high average and maximum risks from exposure to sediment, but the elevated risk levels were not clearly attributed, at least solely to contaminants derived from AOC 11. Rather, periodic over-bank flooding of the Nashua River appears to have contributed a portion of metal and pesticide contamination found in both the AOC 11 and upstream wetlands, while the wetlands appear to be retarding contamination influx to the Nashua River, as indicated in the ROD.

SA 13

A human health PRE was conducted to evaluate potential human health risks associated with exposure to site contaminants in SA 13 surface soil, groundwater, surface water, and sediment. Future use of SA 13 was assumed to be residential for purposes of the PRE; however, no residential use is planned for this site. Therefore, comparison of chemical concentrations in the various media to values protective of site resident exposure is conservative, and likely overstates risk, as indicated in the ROD.

The levels of detected organic analytes in surface soil are below USEPA Region III residential soil concentrations, with the exception of four PAHs. Of the 13 inorganic analytes detected above the base-wide statistical background concentrations, arsenic and beryllium were detected at concentrations above their respective USEPA Region III residential soil concentrations.

Groundwater at SA 13 was not believed to pose a risk to human health.

Because exposure to surface waters in the wetlands is anticipated to be restricted to wading in the future, it is not likely an individual would encounter concentrations that would pose a threat to the individual's health.

Concentrations of inorganics in sediment are not expected to pose a significant health risk in the sampled area because based on planned future site use, exposure to sediment would be much less than that expected in a residential setting.

An ecological PRE was conducted to evaluate potential ecological risks associated with exposure to contaminants in SA 13 surface soil, surface water, and sediment, as indicated in the ROD.

In surface soil, the concentration of lead may pose a risk to certain ecological receptors. In surface water, the presence of mercury in SA 13 surface water may pose a threat to ecological receptors. In sediment, DDE, heptachlor, and gamma-chlordane may be causing significant risks to ecological receptors.

AOC 40

A human health risk assessment was performed for AOC 40 to evaluate potential risks associated with exposure to site contaminants in surface soil, groundwater, and sediment, as indicated in the ROD. The health risks faced by a recreational fisherman or family member who consumes fish from Cold Spring

Brook Pond fell within the USEPA target risk range of 1 x 10-6 to 1 x 10-4. The health risks associated with contact with surface soil under current land use conditions (adult and child), future assumed residential conditions, incidental ingestion of surface water while fishing in Cold Spring Brook Pond, and contact with Cold Spring Brook Pond sediment are within or below the USEPA cancer risk guidance value of 1x10-6 and target HI of 1. Although not evaluated as a potential exposure pathway in the risk assessment, health risks from contact with the pond surface water while swimming were expected to be low.

Cancer risks associated with future residential use of unfiltered groundwater exceeded the USEPA points of departure and USEPA target risk range. Arsenic accounted for approximately 99 percent of the total risk. The cancer slope factor for inorganic arsenic may overestimate true cancer risk by as much as an order of magnitude relative to risk estimates associated with most other carcinogens. Two additional analytes, BEHP and manganese, presented risks above the points of departure. The hazard quotients (HQs) for manganese ranged from 16 to 37. BEHP presented cancer risks slightly above the point of departure (at 6.5x10-6). BEHP is a common laboratory contaminant and it is possible that the BEHP reported in AOC 40 samples resulted from laboratory contamination. Although these risks are above USEPA guidance values, they were estimated based on residential exposure to groundwater under future land use conditions. However, no residential use of the site is planned. Therefore, comparison of chemical concentrations in the various media to values protective of site resident exposure is conservative, and likely overstates risk. Because there is no residential groundwater exposure under current land use conditions, there is no associated carcinogenic risk. Noncancer risks associated with manganese in drinking water may be overestimated due to the uncertainty and limitations of the single epidemiological study upon which the reference dose (RfD) for manganese is based. Maximum detected contaminant concentrations from the March and June 1993 sampling rounds showed aluminum, iron, and manganese exceeding their Secondary MCLs. Federal and state guidelines for sodium in drinking water were also exceeded. The primary MCL for BEHP of 6 µg/L was exceeded by its maximum detected concentration of 14 µg/L; the average concentration of 4 µg/L was below the MCL.

An ecological risk assessment was performed to determine whether environmental contaminants may pose a risk to ecological receptors at AOC 40. The risk assessment indicated that sediment contamination in Cold Spring Brook Pond may pose a risk to ecological receptors, as indicated in the ROD.

2.2.2 Response Actions

As stated above, the DCL ROD was issued in July 1999 [Harding Lawson Associates (HLA), 1999] for the excavation of debris, soils and sediments from seven landfills. The selected remedial alternative (Alternative 4c) required full excavation of AOCs 9, 11, 40 and 41, and SAs 12 and 13 and disposal either in an off-site landfill or in a proposed onsite landfill.

The remedial response objectives as defined by the 1999 ROD were:

- Prevent human exposure to groundwater contaminants released from Devens landfills that exceed acceptable risk thresholds;
- Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds;
- Prevent landfill contaminant releases to surface water that result in exceedance of the ambient water quality criteria (AWQC) or acceptable ecological risk-based thresholds;
- Reduce adverse effect from contaminated landfill media to the environment that would reduce the

amount of land area available for natural resource use;

- Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds, and,
- Support the civilian redevelopment effort at Devens.

Key components of the selected remedy are outlined below:

- No Further Action (SA 6);
- Debris excavation, backfilling with clean soil, and regrading/revegetation (AOCs 9, 11. and 40 and SA 13) and disposal in either an offsite landfill or an onsite landfill (to be constructed) near the former golf course driving range;
- Drum and sediment removal and disposal (AOC 40).
- Wetland restoration (AOCs 9, 11 and 40);
- Design/installation of a cover system, leachate collection system, landfill gas vents, and groundwater monitoring wells (for onsite landfill only);
- Confirmation sampling – Performed upon conclusion of excavation activities to confirm removal of all landfill debris and contaminated media, if any, to unrestricted future use (i.e. UU/UE);
- Implementation of LUCs/ICs for the proposed Consolidation Landfill and for contributor sites where debris will be excavated but unrestricted land use is not achievable or economical; and,
- FYRs at the DCL and debris sites where unrestricted land use was not achieved.

Cleanup goals were established by using USEPA Region 9 Preliminary Remediation Goals for residential soil and/or Massachusetts Contingency Plan (MCP) S-1 Soil Standards, whichever was more stringent. The cleanup goals are provided in **Appendix D**.

2.2.3 Status of Implementation

SA 6

No action was taken at SA 6 per the ROD.

AOC 9

Prior to any construction activities, hay bales and silt fence were installed along the perimeter of the disposal and material staging areas as needed. Erosion and sedimentation controls were installed in accordance with the Environmental Protection Plan (EPP) and were maintained throughout the project to prevent impact to the wetland areas and to isolate disposal areas from non-disposal areas, as necessary.

Trees and shrubs located within the limits of work and the material staging areas were cut, chipped, and transported off site by an approved subcontractor. Stumps removed during the clearing and grubbing operation were segregated and stockpiled separately from the excavated landfill debris. This material was processed through a stump grinder and transported off site or transported in bulk shipments off site.

Access roads were constructed with gravel fill and maintained with gravel fill to provide a stable base for safe travel.

Two material staging areas for the stockpiling of potentially contaminated materials were constructed in accordance with the project specifications. A track dozer was used to rough grade the staging areas to remove any large obstructions or intrusions. The staging areas were prepared for stockpiling by placing a 20-mil polyethylene liner over a smooth-graded area enclosed by a perimeter containment berm, which segregated the disposal debris from the work area.

Survey control points (e.g. stakes, flagging, etc.) were installed to show the required work limits and elevations for cuts and fills, as necessary, to provide adequate guidance during the remedial activities.

The surface water entering disposal Areas I, II, III, IV, and V, was diverted away from the work area via haul roads and/or earthen berms around the perimeter of each area. Surface water naturally flowed towards the southern edge of the site into a wetland area, which was protected by silt fence and hay bales.

Debris was excavated from the 8.9-acre disposal area and transported to staging areas, which were used for material holding during sampling and waste characterization activities. Excavation activities at AOC 9 began in January 2001 and were completed in June 2002. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the DCL for disposal. A total of 161,477 tons of debris materials from AOC 9 were disposed in the DCL. Debris materials primarily consisted of concrete, scrap steel, tires, soil, and miscellaneous demolition debris.

During the excavation process, larger debris (i.e., wood, scrap steel, concrete debris and tires) was segregated from the stockpiled material and stored separately in an effort to recycle and reduce the volume of material to be disposed in the landfill. Segregated material was disposed of off-site at a licensed facility. Concrete debris was processed through a crushing plant for possible reuse as backfill in other areas, if analytical results indicated the material met the PRGs.

A total of 156,000 cy of debris was removed from AOC 9, approximately 44,000 cy more than the original estimated volume of 112,000 cy. The additional debris volume was attributed to greater excavation depths due to extended debris limits beyond those originally estimated.

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The confirmatory soil sample results are provided in **Appendix D**.

Confirmation soil samples were collected from 32 locations for a total of 37 samples within the AOC 9 excavation area. Three of the original confirmatory samples had concentration above the cleanup levels. The areas represented by the samples received additional excavation and another round of confirmatory samples were collected until the cleanup levels were attained. Subsequent review of the data within the remedial action closure report (Shaw, 2003?) indicates the cleanup goals were not attained at location CO-013 during the initial confirmatory sampling. Additional excavation was not conducted at CO-013 where the PAH benzo(a)pyrene was detected at a concentration [0.31 milligrams per kilogram (mg/kg)] above the cleanup goal (0.062 mg/kg).

Surface water, sediment samples, and groundwater samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1

The majority of the site was restored as upland areas. Upland areas were seeded with a restoration seed mixture that contained native grasses. The wetland area was restored by backfilling with clean fill and manufactured wetland soil. The restored wetland was stabilized with a custom wetland seed mix.

The property was transferred from Army ownership to MassDevelopment for redevelopment purposes in

2006. LUCs were recorded in the March 2006 deed to prevent residential development of the property. Annual LUC inspections and FYRs are required to evaluate ongoing remedy performance and continued protection of human health and the environment.

AOC 11

Prior to any construction activities, hay bales and silt fence were installed along the perimeter of the disposal and material staging areas as needed. Erosion and sedimentation controls were installed in accordance with the EPP and were maintained throughout the project to prevent impact to the wetland areas and to isolate disposal areas from non-disposal areas, as necessary.

Trees and shrubs located within the limits of work and the material staging areas were cut, chipped, and transported off site by an approved subcontractor. Stumps removed during the clearing and grubbing operation were segregated and stockpiled separately from the excavated landfill debris. This material was processed through a stump grinder and transported off site or transported in bulk shipments off site.

Access roads were constructed with gravel fill to provide a stable base for safe travel.

The material staging area was constructed in accordance with the project specifications. A track dozer was used to rough grade the staging areas to remove any large obstructions or intrusions. The staging areas were prepared for stockpiling by placing a 20-mil polyethylene liner over a smooth-graded area enclosed by a perimeter containment berm to contain the disposal debris.

Survey control points (e.g. stakes, flagging, etc.) were installed to show the required work limits and elevations for cuts and fills, as necessary, to provide adequate guidance during the remedial activities.

Debris was excavated from the 2.7-acre disposal area and transport to the staging area, which was used for material holding during sampling and waste characterization activities. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the DCL for disposal. A total of 38,96 tons of debris materials from AOC 11 were disposed in the DCL.

During the excavation process, scrap steel and concrete was segregated from the stockpiled material and stored separately. Scrap steel was disposed off-site. Concrete debris was processed through a crushing plant for possible reuse as backfill in other areas, if analytical results indicated the material met the PRGs.

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The confirmatory soil sample results are provided in **Appendix D**. Two of the original confirmatory samples had concentration above the cleanup levels. The areas represented by the samples received additional excavation and another round of confirmatory samples were collected until the cleanup levels were attained.

Surface water and sediment samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1.

Restoration activities included excavating a 30-foot wide channel to connect the north and southern wetland areas, restoring the ground surface on either side of the channel, applying wetland see mixture to restore vegetation, restoring the berm adjacent to the Nashua River, benching the steep western slop and adding stone protection material were needed, adding topsoil where needed, and reestablishing vegetation in the disturbed upland area. The material staging area was also graded, covered with topsoil and seeded to stablish vegetation.

AOC 40

Prior to any construction activities, hay bales and silt fence were installed along the perimeter of the disposal and material staging areas as needed. Erosion and sedimentation controls were installed in accordance with the EPP and were maintained throughout the project to prevent impact to the wetland areas and to isolate disposal areas from non-disposal areas, as necessary.

Trees and shrubs located within the limits of work and the material staging areas were cut, chipped, and transported off site by an approved subcontractor. Stumps removed during the clearing and grubbing operation were segregated and stockpiled separately from the excavated landfill debris. This material was processed through a stump grinder and transported off site or transported in bulk shipments off site.

Access roads were constructed with gravel fill and maintained with gravel fill to provide a stable base for safe travel. Fencing, concrete barriers and gates were installed along the work limits to close off Patton Road to unauthorized vehicles. The gates were used to control unauthorized vehicles from entering and leaving the site and were locked during all non-working hours.

Two material staging areas for the stockpiling of potentially contaminated materials were constructed in accordance with the project specifications. A track dozer was used to rough grade the staging areas to remove any large obstructions or intrusions. The staging areas were prepared for stockpiling by placing a 20-mil polyethylene liner over a smooth-graded area enclosed by a perimeter containment berm, which segregated the disposal debris from the work area.

Survey control points (e.g. stakes, flagging, etc.) were installed to show the required work limits and elevations for cuts and fills, as necessary, to provide adequate guidance during the remedial activities.

Excavation activities at AOC 40 began in November 2000 and were completed in September 2002. Debris was excavated from the 3.9-acre disposal area and transported to the staging areas which were used for material holding during sampling and waste characterization activities. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the DCL for disposal. A total of 166,799 tons of debris materials from AOC 40 were disposed in the DCL. Debris materials primarily consisted of concrete, scrap steel, stumps, soil and miscellaneous demolition debris.

A total of 148,450 cy of debris was removed from AOC 40; this was 38,450 cy more than the original estimated volume of 110,000 cy. The 38,450 cy of additional debris was attributed to greater excavation depths than originally anticipated. It should be noted that although drum removal was included in the selected remedy, no drums were encountered during these remedial actions. Excavation limits to remediate the extent of debris encroached onto the existing roadway (Patton Road) adjacent to the disposal site. Road realignment was designed and constructed so that traffic would be detoured during the remedial activities.

Restoration activities began in September 2002 and were completed in October 2002. Due to the steep gradient, the side slopes adjacent to Patton Road were stabilized and protected by rip rap. Rip rap was placed from the base of the slope to approximately 10-foot above the waterline. Remainder of the slope was stabilized with six inches of loam and seeded with a native grass seed mixture. The restoration activities were completed in accordance with the Habitat Restoration Work Plan (*S&W, 2002*).

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The confirmatory soil sample results are provided in **Appendix D**.

Out of 36 confirmatory samples collected, eight samples had concentration above the cleanup levels. The areas represented by the samples received additional excavation and another round of confirmatory samples were collected until the cleanup levels were attained. Review of the confirmatory sample data indicates three locations had final confirmatory samples with concentrations greater than the cleanup goals. The PAH, benzo(a)pyrene, was above cleanup goals at CO-028A (0.74mg/Kg) and CO-031 (0.33 mg/Kg) and PAHs, benzo(a)anthracene (0.85 mg/Kg) and benzo(b)fluoranthene (0.98mg/Kg), were above cleanup goals (0.62 mg/Kg and 0.62 mg/Kg, respectively) at CO-028A. Arsenic was above the cleanup goal of 22 mg/Kg at CO-029 (38 mg/Kg).

Surface water, sediment, and groundwater samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1.

The property was transferred from Army ownership to MassDevelopment for redevelopment purposes in 2006. LUCs were recorded in the March 2006 deed to prevent residential development of the property. Annual LUC inspections and FYRs are required to evaluate ongoing remedy performance and continued protection of human health and the environment.

AOC 41

Prior to any construction activities, hay bales and silt fence were installed along the perimeter of the disposal and material staging areas as needed. Erosion controls were installed in accordance with the EPP Erosion and sedimentation controls were maintained throughout the remedial activities to prevent adverse impacts to New Cranberry Pond and to isolate disposal areas from non-disposal areas, as necessary.

Minimal land clearing was conducted within the limits of work. Small trees and brush were hand cleared with chainsaws and gas-powered weed whackers and removed. The material generated from clearing and grubbing operations was consolidated with the debris for disposal at the on-site landfill.

Debris was excavated from the 0.25-acre disposal area and transported to the SA 12 staging area, which were used for material holding during sampling and waste characterization activities. Characterized debris material was transported to the DCL for disposal. The remedial activity conducted at AOC 41 generated 200 cy of material.

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The confirmatory soil sample results are provided in **Appendix D**. The results of the confirmatory soil samples were below the cleanup criteria.

Surface water and sediment samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1.

Topsoil was placed and graded over the excavation areas and then seeded to stabilize and reestablish vegetation. Access roads were also regraded to original grades following the completion of all work activities.

SA 12

Prior to any construction activities, hay bales and silt fence were installed along the perimeter of the disposal and material staging areas. Erosion and sedimentation controls were installed in accordance with

the EPP and were maintained throughout the project to prevent impact to the wetland areas and to isolate disposal areas from non-disposal areas, as necessary.

Trees and shrubs located within the limits of work and the material staging area were cut, chipped, and transported off site by an approved subcontractor. Stumps removed during the clearing and grubbing operation were segregated and stockpiled separately from the excavated landfill debris. This material was processed through a stump grinder and transported off site or transported in bulk shipments off site.

Access roads were constructed with crushed stone to provide a stable base for safe travel and to minimize the tracking of debris onto the road when trucks entered and exited the site during hauling operations.

The debris material staging area was constructed in accordance with the project specifications. The staging area was prepared for stockpiling by placing a 20-mil polyethylene liner over a graded area with a perimeter berm to contain the disposal debris.

Survey control points (e.g. stakes, flagging, etc.) were installed to show the required work limits and elevations for cuts and fills, as necessary, to provide adequate guidance during the remedial activities.

Debris was excavated from the 0.54-acre disposal area and transported to staging areas, which were used for material holding during sampling and waste characterization activities. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the DCL for disposal. A total of 16,706 tons of debris materials from SA 12 were disposed in the DCL.

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The confirmatory soil sample results are provided in **Appendix D**. The results of the confirmatory soil samples were below the cleanup criteria.

Surface water and sediment samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1.

Extensive slope reconstruction occurred at the site during the restoration activities. Following the placement of the gravel sub-base, a 12-inch stone protection layer was constructed on the bottom of the slope. The remainder of the slope received a minimum of 4 inches of topsoil and was hydroseeded with native grasses. The material staging areas were also graded, covered with topsoil and seeded with native grasses to establish vegetation. A guardrail was installed at the top of the slope following completion of restoration activities.

SA 13

Prior to any construction activities, erosion controls (silt fence and hay bales) were installed along the perimeter of the work area and at the top of the slope between the staging area and the down-gradient disposal area. Erosion controls were installed in accordance with the EPP. Erosion and sedimentation controls were maintained throughout the project to prevent adverse impact to off-site receptors and to isolate disposal areas from non-disposal areas, as necessary.

Trees and shrubs located within the limits of work were sheared and chipped or transported off-site by an approved subcontractor. Chipped trees, along with stumps removed and segregated during remediation of the disposal debris, were stockpiled separately from landfill debris and later ground for use as mulch at the site.

Debris was excavated from the 0.8-acre disposal area and transported to the staging area, which was used for material holding during sampling and waste characterization activities. Characterized debris material was transported to the DCL for disposal. A total of 13,715 tons of debris materials from SA 13 were disposed in the DCL.

During the excavation process, larger debris (i.e., wood, scrap steel, concrete debris and tires) was segregated from the stockpiled material and stored separately in an effort to recycle and reduce the volume of material to be disposed in the landfill. Material that resulted from these efforts was disposed of off-site at a licensed facility. Although the concrete was segregated and processed, the end product did not meet the requirements for reuse as backfill or road base material. Processed concrete was mixed with the debris stockpile and was disposed at the DCL. Debris materials primarily consisted of concrete, scrap steel, soil and miscellaneous demolition debris (i.e., glass and wood) along with some stumps and brush.

A total of 13,900 cy of debris was removed from SA 13, 3,900 cy more than the original estimated volume of 10,000 cy. The 3,900 cy of excess debris was attributed to deeper excavation over extended debris limit than originally anticipated. The actual excavation depths ranged from 4 ft to 8 ft deeper than proposed excavation grades throughout the center of the excavation area.

Upon completion of excavation/debris removal activities, confirmatory soil samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and VPH/EPH. The results of the confirmatory soil samples were below the cleanup criteria. The confirmatory soil sample results are provided in **Appendix D**. Background samples were collected prior to stockpiling material in the staging area. Two of the samples had concentrations of benzo(a)pyrene and arsenic at concentrations above the cleanup criteria.

Surface water, sediment, and groundwater samples were not collected after the excavation work was complete. The current and future, potential exposure pathways evaluated in the human health and ecological risk evaluation are discussed in Section 2.2.1.

Restoration activities commenced in October 2001. Slopes were graded as necessary to provide a safe area and to promote drainage to feed the small wetland area to the south. Topsoil was placed over disturbed areas that were then seeded to stabilize and reestablish vegetation of the wetland and upland areas. Restoration activities were completed in accordance with the Habitat Restoration Work Plan (S&W, 2002).

The property was transferred from Army ownership to MassDevelopment for redevelopment purposes in 2006. LUCs were recorded in the March 2006 deed to prevent residential development of the property. Annual LUC inspections and FYRs are required to evaluate ongoing remedy performance and continued protection of human health and the environment.

Construction of the On-Site Consolidated Landfill

The final decision to proceed with the construction of an on-site consolidation landfill near the former golf course driving range was issued June 30, 2000. A temporary (120 day) access agreement signed on September 15, 2000 which allowed for the commencement of site mobilization and preparation activities. Construction of the DCL was performed between September 2000 and November 2002. Over the course of the construction, approximately 591,804 tons of materials were excavated from the debris landfills and disposed of in the new landfill. The landfill construction consisted of several components, performed in three phases. The first phase involved construction of the landfill liner system, leachate collection system, and sedimentation pond. The second phase primarily consisted of transportation and disposal of excavated debris, debris placement, and compaction and grading. The final phase involved capping of the

landfill which included installation of gas vents and a gas venting layer, a dual composite and 40-mil flexible polyethylene (VFPE) liner, a sand drainage layer, and vegetation support layers. A current site map for the DCL is presented as **Figure D-2**.

The approved DCL landfill easement occupies 16.88 acres with approximately 8 acres utilized for debris disposal. Soils disposed at the DCL included those contaminated with petroleum, pesticides, PCBs, PAHs, and asbestos, for a total waste volume of 365,000 cy. Materials disposed off-site included wood, scrap metal, tires and creosote wood, for a total waste volume of 12,270 cubic yards (cy).

A Remedial Action Closure Report was prepared by Shaw Environmental (formerly Stone & Webster, Inc.) in September 2003. A Completion Memorandum attached to the report was signed by EPA that states the following: "All soil remediation at the six sites is complete and the sites have been restored in accordance with the approved Restoration Plan. In addition, the consolidation landfill has been constructed and capped in accordance with the approved plans and specifications, and the surrounding work areas restored". EPA further certified that "…work on the project is complete and was accomplished in accordance with the Record of Decision dated July 1999". DCL LUCs are evaluated through the performance of annual IC inspections, which are conducted per the "IC Monitoring Plan" included in the LTMMP (*Sovereign/HGL, 2015*). Five-year reviews are conducted to evaluate ongoing remedy performance and continued protection of human health and the environment.

MassDevelopment maintains ownership of the DCL property and agreed to grant the Army a permanent easement to build and operate the landfill (Easement Agreement Track No. 400E, June 2001). The easement additionally details the Land Use Controls (LUC) between the Army and MassDevelopment for the DCL.

2.2.4 Institutional Controls Summary Table

The ICs for the DCL and contributor sites AOCs 9 and 40 and SA13 are described in the table below. The 1999 ROD states the following: "Institutional controls are planned for the proposed Consolidation Landfill, and for those sites where debris will be excavated but unrestricted land use is not achievable or economical. Institutional controls will be in the form of land use restrictions for property released by the Army during Fort Devens base closure activities. By preempting residential use, these controls will help limit human exposure. These controls would be drafted in cooperation with state and local government. The agency responsible for enforcement of the institutional controls has not been identified at this time".

Table 2-1. DCL and Contributor Sites AOCs 9, 40 and SA 13 – Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Unclear; possibly soil, sediment, surface water and/or groundwater	Yes	Yes	DCL	Unclear	Unknown
Unclear; possibly soil, sediment, surface water and/or groundwater	Yes	Yes	AOC 9 AOC 40 SA 13	Residential restrictions on sites not achieving UU/UE	Quitclaim Deed Parcels A2A, A4 & A8, March 2006

2.2.5 Operations and Maintenance / Long-Term Monitoring

Landfill leachate is discharged to the sanitary sewer and conveyed to the Devens wastewater treatment plant for treatment and disposal under MassDevelopment Industrial Wastewater Discharge Permit No. 017. The landfill is mowed on an annual basis, typically in the fall months. Annual landfill gas vent monitoring, semi-annual groundwater sampling, annual leachate discharge sampling, monthly O&M of the leachate pump station, semi-annual well gauging, annual landfill cap inspections, and annual IC inspections and interviews are performed in accordance with the current DCL long-term monitoring program. Eleven landfill gas vents are monitored annually, four groundwater monitoring wells are sampled semi-annually, seven monitoring wells are gauged semi-annually, and leachate discharge is sampled annually as part of the current LTM program for the DCL. In addition, visual settlement and cover system monitoring is conducted on a visual basis during the scheduled annual inspections. Annually, LUC interviews are conducted with MassDevelopment and Devens Enterprise Commission personnel regarding the following items:

- Familiarity with the LUCs imposed upon the property and documentation of these controls;
- Excavations (planned or emergency) that may involve soils and groundwater; and
- Proposed plans for property sale, future redevelopment, and construction or demolition activities at the site.

LUCS at the DCL, AOC 9, AC 40, and SA 13 are visually verified annually via an on-site inspection. The LUC inspection is performed to identify the following:

- Any signs of increased exposure potential to the public from soil and/or surface water contaminants;
- Any evidence that groundwater extraction wells had been installed at the site; and
- Any evidence of site use changes.

Details regarding ongoing O&M and LTM activities conducted 2015 to 2019 are presented in the 2016, 2017, 2018 and 2019 Annual Main Post LTM Reports

2.3 Progress Since the Last Review

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 2-2. Protectiveness Determinations Statement from the 2015 FYR and FYR Addendum

DCL	Protectiveness Determination	Protectiveness Statement
DCL	Protective (as stated in the 2015 FYR)	*The remedy at DCL and its contribution sites (AOCs 9, 40 and SA 13) is protective of human health and the environment, and exposure pathways that could result in unacceptable risk are being controlled. Long-term protectiveness of the remedial action is verified by groundwater and leachate effluent monitoring at the DCL to assess potential leachate migration. Current monitoring data indicate that the remedy is functioning as required.* While EPA agreed that there were no issues affecting short-term protectiveness of the 1999 remedy for three DCL Contributor Sites AOC9, AOC40, and SA13, it could not concur with Army's long-term protectiveness determination because the required analysis of each of the ARARs and TBCs (i.e., exposure assumptions, toxicity data, cleanup levels and remedial action objectives) included in the 1999 ROD was not performed. Army agreed to prepare and submit an Addendum to the 2015 FYR for the DCL contributor sites with the required ARARs analysis (see below).
Contributor Sites (AOCs 9 and40 and SA 13)	Short-term Protective (as stated in the 2015 FYR Addendum for the DCL Contributor Sites)	*The remedy for the DCL Contributor Sites AOC9, AOC40, and SA13 was evaluated in the 2015 Devens Five-Year Review Addendum (June 2019). Unfortunately, several components of the five-year review process, as specified in EPA' s June 200I "Comprehensive Five-Year Review Guidance" - OSWER 9355.7-03B-P (" the FYR Guidance") and supplemental guidance thereto, were inadequately addressed in the draft Addendum. Specifically, the FYR*

		must adequately respond to three technical assessment questions (i.e. A, B, and C); specifically, it must answer Question B, "Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid," in order to properly evaluate whether changes to the ARARs and TBCs (i.e., exposure assumptions, toxicity data, cleanup levels and remedial action objectives) used at the time of remedy selection affect the validity of RAOs and the protectiveness of the remedy. Building upon the preliminary work conducted as part of this (2015) Devens Five-Year Review Addendum, Army agreed to complete its ARARs assessment in the next (2020) Devens five-year review. *In addition, in accordance with amended floodplain management and wetland protection regulations* *(44 C.F.R. 9, Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of* *Wetlands)), Army will ensure protection of wastes left in place within a floodplain by monitoring, managing and repairing, if necessary, rip-rap and/or soil covers up to the 500- year flood elevation. The amended floodplain regulations will also be discussed and more thoroughly evaluated as part of the next (2020) Devens five-year review.*

Table 2-3. Status of Recommendations from the 2015 FYR and FYR Addendum

OU/AOC	Issue	Recommendations	Current Status
DCL AOC 9 AOC 40 SA 13	ARAR assessment not complete	Complete analysis of each of the ARARs and TBCs (i.e., exposure assumptions, toxicity data, cleanup levels and remedial action objectives) included in the 1999 ROD	Included in 2020 FYR
		Ensure protection of wastes left in place within a floodplain by monitoring, managing and repairing, if necessary, riprap and/or soil covers up to the 500-year flood elevation; discuss and more thoroughly evaluate the amended floodplain regulations	Included in 2020 FYR

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in **Appendix L** of the Final 2015 Five Year Review (KGS, 2015).

2.4 Five-Year Review Process

2.4.1 Community Notifications, Involvement & Site Interviews

The USACE announced the commencement of this (2020) Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in the Executive Summary regarding the overall cleanup of Devens. There were no AOC-specific comments related to the DCL.

2.4.2 Data Review

No sampling was conducted at any of the DCL contributor sites because long-term monitoring of the DCL contributor sites is not required under the selected remedial action. However, groundwater monitoring is conducted at the DCL in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (*Sovereign/HGL, 2015*), which specifies the DCL O&M activities. Groundwater monitoring wells LFM-99-02B, LFM-99-05A, LFM-99-06A, and LFM-03-07 are included in the current LTM sampling program for the DCL and have been sampled semi-annually over the past five years. In addition, monitoring wells LFM-99- 01B, LFM-99-03B, and LFM-99-05B are gauged for the depth to water. Groundwater at DCL is sampled as part of the spring and fall LTM events and submitted for the following analyses: VPH, EPH (including target PAHs), pesticides, total metals, and wet chemistry parameters: total dissolved solids [TDS], chloride, sulfate, nitrate/nitrite, total alkalinity, total cyanide, and chemical oxygen demand [COD]. Samples are collected and submitted for PCB analysis every five years.

Historical analytical results for the DCL are summarized in tables, see **Appendix D**. Groundwater from all four monitoring wells contained VPH, EPH, and pesticide concentrations below the respective GW-1 standards in groundwater data from 2015 through 2019. PCBs were not detected in the wells when they were sampled in 2019. Metals have been consistently below respective GW-1 standard in groundwater at all four DCL monitoring wells since the November 2003 sampling event, and the 2015 through 2019 results were in agreement with the historical data. The wet chemistry parameters from 2015 through 2019 also remained generally consistent with past data.

The annual reports for 2015 – 2019 indicate that groundwater flow at the DCL is consistently towards the northeast. There have been no changes in direction or use of groundwater or identification of a new groundwater divide during this FYR period.

The DCL leachate pumping station effluent sample results were within the discharge permit limits for all parameters from 2015 through 2019.

2.4.3 Site Inspection

The FYR site inspection of DCL and the contributor sites AOC 9, AC 40, and SA 13 was conducted on February 5, 2020. Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). As part of the site inspection the inspector verified appropriate O&M documents and records were available. The inspector verified institutional controls are in place through annual assessment of land use controls reported in annual land use control checklists and associated annual interviews. The sites were visited to verify access and assess the fencing, gates, presence of vandalism, and any changes of land use. The fencing and gates at DCL were not damaged and the site was secured. There was no evidence of vandalism at DCL or the contributor sites. There was no evidence of changes in land use during the on-site inspection of DCL and the contributor sites, photographs from each of the sites are attached to the site inspection. The site inspection at DCL also included visual inspection of the landfill components, leachate pumping system, and monitoring wells, all of which appeared to be adequate. Based on the site inspection, the overall condition of the DCL and contributor sites was satisfactory. The inspection checklist is included in **Appendix D** along with supporting photographs.

Detailed landfill inspections of the DCL are performed annually as part of the LTM and maintenance activities. Inspection results and recommendations for follow-up actions are included in annual reports that are submitted to USEPA and MassDEP and MassDevelopment. The 2019 landfill inspection of DCL did not identify any issues that needed to be addressed.

The LUC inspections of the DCL and the DCL contributor sites (AOCs 9 and 40, and SA 13) were also performed annually from 2015 through 2019. The LUC inspections include interviews to verify LUCs and an on-site inspection is conducted at each site. The on-site inspections verified that there was no evidence of new construction and excavation, there was no evidence of damage to the site, there were no groundwater extraction wells present, that the site was accessible, and there were no signs of increased exposure potential. Photographs of each site taken during the on-site inspection were included with each LUC inspection. The annual LUC inspections revealed no changes in land-use at the individual contributor sites. Per the requirements of the 2006 transfer deed, these contributor sites are not being used, or under development, for residential purposes.

2.5 Technical Assessment

In accordance with EPA's 2001 FYR guidance and Region 1 FY2020 Supplemental Template, human health risks, ecological risks and the general performance of all remedial components will be evaluated to assess protectiveness of all of the selected remedy. To facilitate this evaluation, a technical assessment of the remedy is conducted to answer the following questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary

The DCL is functioning as designed. Groundwater, leachate, and landfill gas monitoring continue to occur in accordance with the 2015 LTMMP with the results reported in annual monitoring reports. No exceedances of cleanup criteria or effluent discharge criteria were recorded during this FYR period. The 2006 Quitclaim deed from Army to MassDevelopment for AOCs 9 and 40 and SA 13 restricts residential development; however, the 2009 ROD did not identify specific ICs. This has been identified as an issue in Section 2.6 below. The Army will prepare an ESD and revised LTMMP and LUCIP to address this issue.

Remedial Action Performance:

As noted above, the DCL is functioning as designed with no exceedances of monitoring criteria reported during the FYR period. The lack of specific ICs for the contributor sites has been identified as an issue and will be addressed by the Army as stated in Section 2.6 below.

System Operations/O&M:

There are no O&M requirements for the contributor sites. Cap monitoring and maintenance of the DCL has been ongoing since the completion of the DCL and has consisted of documenting the cap condition via field notes and photographic record. Maintenance has consisted primarily of mowing and herbicide treatments. Based on the annual need to control and maintain vegetation on the DCL cap, no changes are recommended at this time.

Implementation of Institutional Controls and Other Measures

ICs specifying the restriction of residential development within the DCL Contributor Sites AOCs 9 and 40 and SA 13 were included in the 2006 Quitclaim Deeds transferring ownership of these sites to MassDevelopment because it was agreed that they are necessary to ensure long-term protectiveness of human health. However, the ICs (or FYR requirements) were not specifically identified and/or fully articulated in the CERCLA decision document (i.e. 1999 DCL ROD) for the DCL and/or the Contributor Sites. The 1999 ROD solely identified the need for ICs, without specifying in what form those ICs would be implemented (e.g., deed restrictions), what specific restrictions were necessary to ensure protection of human health and the environment, or the long-term roles and responsibilities for implementing, maintaining and enforcing the ICs/LUCs for the DCL and each of the seven contributor sites (as/if warranted). To address this issue, the Army will prepare and submit a revised comprehensive monitoring program for the DCL and contributor sites that adequately and effectively evaluates remedy performance and protection of human health and the environment (see Section 2.6 below)

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

Question B Summary

As detailed below, there have been changes to exposure assumptions, toxicity data, and cleanup levels since the ROD was signed in 1999. These changes are not expected to alter the protectiveness of the remedy, because LUCs were recorded in the March 2006 deed from Army to MassDevelopment to prevent residential development. Changes to Federal floodplain regulations at 40 CFR Part 6 require preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The 500-year floodplain is likely to inundate AOC 40, possibly impact AOC 9, and is unlikely to impact SA 13 or the DCL itself. Additional evaluation of the remedial actions at AOC 40 and AOC 9 is included in the Other Findings section below.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1999 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location-and action-specific ARARs listed in 1999 ROD have been met since the remedial construction work has been completed. The chemical-specific clean-up standards applied to the soil removals were EPA Region 9 PRGs for residential soil. These were not identified as ARARs in the ROD; therefore, any changes to PRGs since the remedial actions were completed would not be considered a change to ARARs.

At the time the ROD was signed, the construction of the DCL was still an option, along with offsite disposal of the debris removed from the contributor sites. The ROD states that "If constructed, the new cell will be lined and capped, and long-term groundwater quality monitoring will be performed". The ROD did not specify what chemicals to monitor for or establish monitoring criteria. The table below compares the original monitoring criteria specified in the 2004 DCL Annual Report to the current LTM program. Because the monitoring criteria are specified in LTMMPs and not the ROD, changes over time to the LTM program are not considered changes to ARARs (which did not identify monitoring criteria at the DCL).

Table 2-4. Evaluation of Monitoring Criteria for DCL

Chemical of Concern	ROD Monitoring Criteria	MCP GW-1 (2004 DCL Annual Rpt)	Current MCP GW-1	Background	Current MCL	Current Monitoring Criteria
***VPH* (µg/L)**						
C5-C8 Aliphatic Hydrocarbons	-	NS	300	NS	NS	300
C9-C12 Aliphatic Hydrocarbons	-	NS	700	NS	NS	700
C9-C10 Aromatic Hydrocarbons	-	NS	200	NS	NS	200
Methyl tert-butyl ether	-	700	70	NS	NS	70
Benzene	-	5	5.0	NS	5.0	5.0
Toluene	-	1,000	1,000	NS	1,000	1,000
Ethylbenzene	-	700	700	NS	700	700
Xylenes, total	-	6000	10,000	NS	10,000	10,000
Naphthalene	-	20	140	NS	NS	140
***EPH* (µg/L)**	-					
C9-C18 Aliphatic Hydrocarbons	-	NS	700	NS	NS	700

Chemical of Concern	ROD Monitoring Criteria	MCP GW-1 (2004 DCL Annual Rpt)	Current MCP GW-1	Background	Current MCL	Current Monitoring Criteria
C19-C36 Aliphatic Hydrocarbons	-	NS	5,000	NS	NS	5,000
C11-C22 Aromatic Hydrocarbons	-	NS	200	NS	NS	200
***Target PAH Analytes* (µg/L)**						
2-Methylnaphthalene	-	10	10	NS	NS	10
Acenaphthene	-	20	20	NS	NS	20
Acenaphthylene	-	300	30	NS	NS	30
Anthracene	-	600	60	NS	NS	60
Benzo(a)anthracene	-	1	1.0	NS	NS	1.0
Benzo(a)pyrene	-	0.2	0.20	NS	0.2	0.2
Benzo(b)fluoranthene	-	1	1.0	NS	NS	1.0
Benzo(g,h,i)perylene	-	0.5	50	NS	NS	50
Benzo(k)fluoranthene	-	1	1.0	NS	NS	1.0
Chrysene	-	2	2.0	NS	NS	2.0
Dibenzo(a,h)anthracene	-	0.5	0.50	NS	NS	0.50
Fluoranthene	-	100	90	NS	NS	90
Fluorene	-	300	30	NS	NS	30
Indeno(1,2,3-cd)pyrene	-	0.5	0.50	NS	NS	0.50
Naphthalene	-	20	140	NS	NS	140
Phenanthrene	-	50	40	NS	NS	40
Pyrene	-	80	60	NS	NS	60
***Pesticides* (µg/L)**						
Hexachlorobenzene	-	1	1.0	NS	1.0	1.0
4,4’-DDD (p,p'-DDD)	-	0.1	0.20	NS	NS	0.20
4,4’-DDE (p,p'-DDE)	-	0.1	0.05	NS	NS	0.05
4,4’-DDT (p,p'-DDT)	-	0.3	0.30	NS	NS	0.3
Aldrin	-	0.5	0.50	NS	NS	0.5
alpha-BHC	-	500	500	NS	NS	500
beta-BHC	-	100	2.0	NS	NS	2.0
delta-BHC	-	100	100	NS	NS	100
Dieldrin	-	0.1	0.10	NS	NS	0.10
Endosulfan	-	40	10	NS	NS	10

Chemical of Concern	ROD Monitoring Criteria	MCP GW-1 (2004 DCL Annual Rpt)	Current MCP GW-1	Background	Current MCL	Current Monitoring Criteria
Endrin	-	100	2.0	NS	2.0	2.0
Gamma-BHC (Lindane)	-	0.2	0.20	NS	0.20	0.20
Heptachlor	-	0.4	0.40	NS	0.40	0.40
Heptachlor epoxide	-	0.2	0.20	NS	0.20	0.20
Methoxychlor	-	2	40	NS	40	40
Total Chlordane	-	2	2.0	NS	2.0	2.0
Toxaphene	-	100	100	NS	3.0	100
Metals						
Arsenic	-	50	10	NS	10	10
Barium	-	2000	2,000	NS	2,000	2,000
Cadmium	-	5	5.0	NS	5.0	5.0
Chromium	-	100	100	NS	100	100
Copper	-	10,000	NS	NS	1,300	1,300
Iron	-	-	NS	NS	NS	NS
Lead	-	15	15	NS	15	15
Manganese	-	-	NS	NS	NS	NS
Silver	-	7	100	NS	NS	100
Selenium	-	50	50	NS	50	50
Zinc	-	900	5	NS	NS	NA
Mercury	-	1	2.0	NS	2.0	2.0
***PCBs* (µg/L)**						
Arochlor 1016	-	0.3	0.5	NS	0.5	NA
Arochlor 1221	-	0.3	0.5	NS	0.5	NA
Arochlor 1232	-	0.3	0.5	NS	0.5	NA
Arochlor 1242	-	0.3	0.5	NS	0.5	NA
Arochlor 1248	-	0.3	0.5	NS	0.5	NA
Arochlor 1254	-	0.3	0.5	NS	0.5	NA
Arochlor 1260	-	0.3	0.5	NS	0.5	NA
Arochlor 1262	-	0.3	0.5	NS	0.5	NA
Arochlor 1268	-	0.3	0.5	NS	0.5	NA
***Wet Chemistry* (mg/L)**						
Solids, Total Dissolved	-	-	NS	NS	NS	500,000

Chemical of Concern	ROD Monitoring Criteria	MCP GW-1 (2004 DCL Annual Rpt)	Current MCP GW-1	Background	Current MCL	Current Monitoring Criteria
Anions						
Chloride	-	-	NS	NS	NS	250,000
Sulfate	-	-	NS	NS	NS	250,000
Nitrate/Nitrite						
Nitrate/Nitrite (as N)	-	-	NS	NS	10,000	10,000
Alkalinity, Total						
As CaCO3	-	-	NS	NS	NS	NS
***Cyanide* (mg/L)**						
Cyanide, total	-	10	200	NS	200	200
***COD* (mg/L)**						
Chemical Oxygen Demand	-	-	NS	NS	NS	NS

Notes:

NA – Not Applicable (current LTM program does not monitor for PCBs)

NS – No Standard

Arsenic MCL in Groundwater: The ROD stated that "at AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well". On January 22, 2001, EPA adopted a new standard for arsenic in drinking water at 0.01 mg/L, replacing the old standard of 0.05 mg/L. This change does not affect the protectiveness of the remedy as there is currently no exposure to groundwater and ICs are in place to restrict potential future residential development.

Federal Floodplain Management: Federal regulations at 40 CFR Part 6, Appendix A identified in the ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The Army has assessed potential floodplain impacts from a 500-year flood event at AOCs 9 and 40, and SA 13, and the DCL itself. Based on the information provided in OLIVER, the Massachusetts GIS system, the 500-year floodplain would inundate AOC 40, could potentially rise to AOC 9, and would have no impact on SA 13 or the DCL. Section 2.6.1 below includes a recommendation to further evaluate the potential impact of a 500-year flood event on AOCs 9 and 40.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. These changes do not affect the current protectiveness of the remedy because ICs are in place to restrict potential future residential development.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*
  In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks. PFOA and PFOS have been detected in groundwater at AOC 40 as part of the base wide PFAS RI described in Section 12 of this FYR.

- ***2014 PFBS*** *non-cancer toxicity value*
  Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks. PFBS has been detected in groundwater at AOC 40 as part of the base wide PFAS RI described in Section 12 of this FYR.

- ***Lead in Soil Cleanups***

  Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

  EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

  EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

  Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead

soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

The ROD did not identify an action or cleanup level for lead. The 2003 Remedial Action Closure Report (Stone & Webster, 2003) compared post-excavation soil sample data for lead against the EPA Region 9 PRG for residential soil (400 ppm). As part of this FYR, the lead results in confirmation samples collected from AOCs 9, 11, 40, 41, SA 12, and SA 13 **(Appendix D**) were reviewed to determine if average lead concentrations exceeded the updated screening level of 200 ppm for residential exposure. At AOCs 9, 40, 41, SA 12, and SA 13, all of the confirmation samples were less than 200 ppm. At AOC 11, individual results for some of the samples exceeded 200 ppm; however, the average concentration of lead was 198 ppm. Based on this review, no further remedial work is necessary to address remaining lead in soil at AOC11.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs) cancer and non-cancer toxicity values***
  On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values. Benzo(a)pyrene was detected above the EPA Region 9 Residential PRG (0.062 ppm) in confirmatory soil samples from AOCs 9, 11, and 40. This change does not affect the protectiveness of the contributor sites remedy because ICs are in place to restrict potential future residential development.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 1999 ROD and 2015 FYR. As noted above, these changes do not affect the current protectiveness of the remedy because ICs are in place to restrict potential future residential development, thus preventing future residential exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***
  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1999 ROD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014).

- ***2018 EPA VISL Calculator***

  In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

  The ROD did not identify vapor intrusion (VI) as an exposure pathway of concern at the DCL contributor sites. Therefore, the VISL calculator has not been run for these sites.

Expected Progress Towards Meeting RAOs

The selected remedy, as presented in the 1999 ROD, did not adequately identify/evaluate potential risks to human health and the environment posed by exposure to contaminants in all media at the DCL and Contributor Sites, because the remedy assumed complete excavation/removal of landfilled debris from all SAs/AOCs. Some of the final confirmatory samples collected from AOC 9 and AOC 40 had concentrations greater than the cleanup goals, necessitating the need for more specific ICs than those specified in the ROD. The Army will prepare an ESD and revised LTMMP and LUCIP to address this issue.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

2.6 Issues/Recommendations

There were no issues identified that affect the protectiveness of the remedy and therefore no recommendations. However, EPA and Army have identified several additional recommended actions. These are identified below in Section 2.6.1 Other Findings.

2.6.1 Other Findings

The following are EPA requests and other recommendations that were identified during the FYR. It is noted that EPA's requests involve additional documents (ESD, LUCIP, LTMMP) and sampling that will be completed outside of this FYR period. Project documents are administrative in nature and do not affect protectiveness of a remedy. Until the work described in an ESD or workplan has been completed, there is no basis for predetermining how the results will or will not affect performance or protectiveness of the remedy. The results of the requested additional sampling will be provided in future reports and incorporated into the next FYR.

- Prepare/issue an ESD to the 1999 ROD that identifies/includes:

  (1) actual and/or potential future land uses for the DCL and seven contributor sites; (2) actual and potential exposure pathways via all media at the DCL and seven contributor sites; (3) media-specific statutory and/or risk-based standards/cleanup goals applicable to the DCL and seven contributor sites for all suspected and confirmed COCs (based on confirmatory sampling results) via all exposure pathways identified in (2) and all land uses identified in (1); (4) evaluate adequacy/applicability of ROD-specified RAOs to the DCL and the seven Contributor Sites based on (1), (2) and (3) and amend, as/if necessary; and (5) identify ICs/LUCs necessary to ensure attainment of RAOs (as/if amended) and ensure short- and long-term protection of human health and the environment (via current and/or potential future uses (i.e. exposure pathways) at the DCL and each of the seven contributor sites (including SAs 6 and 12 and AOCs 11 and 41); and, (6) the long-term roles and responsibilities for implementing, maintaining and enforcing the ICs/LUCs for the DCL and each of the seven contributor sites (as/if warranted). The ESD shall include a table summarizing the basis of the ICs/LUCs required for the DCL and each AOC/SA (i.e. comparison of confirmatory sample data to applicable cleanup criteria permissible of all current and future potential human health and ecological exposure pathways (i.e., Reg 9 residential PRGs, ecological benchmarks, baseline risk assessment-based criteria, etc.).
- Upon issuance of the ESD, prepare and submit a revised comprehensive long-term monitoring plan for the DCL and Contributor Sites that adequately and effectively evaluates remedy performance and protection of human health and the environment.
- Upon issuance of the ESD, prepare and submit a revised comprehensive LUCIP that clearly and concisely identifies the implementation, monitoring and enforcement of ICs/LUCs required at DCL and Contributor Sites. An amended Annual LUC Inspection checklist will be created for the DCL and each of the AOCs/SAs for use during annual LUC inspections and inclusion in the DCL and Contributor Sites portion of the Annual Main Post LTM Reports.
- Ensure protection of wastes left in place within a floodplain by monitoring, managing and repairing, if necessary, riprap and/or soil covers up to the 500-year flood elevation, in accordance with amended floodplain management and wetland protection regulations.
- Consider preparing an updated baseline risk assessment for regulatory review and concurrence to evaluate attainment of unlimited use/unrestricted exposure (UU/UE) cleanup goals and support removal of ICs prohibiting residential use of these properties.

2.7 Protectiveness Statement

Protectiveness Statement		
Operable Unit: OU02 - DCL and AOC 9, AOC 40, SA13	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at the DCL and contributor sites (AOC 9, AOC 40, and SA 13) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Removal actions at AOCs 9, 40 and SA 13 have achieved the RAOs as specified in the ROD. There is no current exposure of site-related waste to humans or the environment at levels that would represent a health concern. The landfill cover system prevents exposure to the waste material and contaminants within the DCL. LUCs are in effect for the DCL. Annual and FYR site inspections and site interviews confirm that LUCs are enforced.		

2.8 Next Review

The next five-year review for the DCL and contributor sites AOCs 9 and 40 and SA 13 will be conducted five years from the completion of this review (September 2025).

2.9 References

References are included in **Appendix A**.

3 SOUTH POST IMPACT AREA (OU 3 / AOCS 25, 26, 27, and 41 Groundwater)

3.1 Introduction

This section presents the findings of the FYR for the remedy implemented at the South Post Impact Area (SPIA). This is the fifth five-year review for the SPIA. The triggering action for this statutory review is the submittal date of September 26, 2015 for the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE). OU#3 consists of four areas of contamination (AOCs 25, 26, 27 and 41); all of which are addressed in this five-year review.

3.1.1 Site Background

The entire SPIA covers approximately 1,500 acres and is located within the 4,800-acre South Post section of Fort Devens. The SPIA is an active weapons and ordnance discharge area used by the Army, the Massachusetts National Guard, and nearby law enforcement agencies for training purposes. The area is generally bounded by Old Turnpike Road, Firebreak Road, the southern portion of Harvard Road, Trainfire Road, and Dixie Road. The SPIA includes the four AOCs evaluated in the FYR (and discussed below) as well as several SAs, and a number of other firing ranges along Dixie Road and Trainfire Road that are not CERCLA designated AOCs.

AOC 25 (Former Explosives Ordnance Disposal (EOD) Range)

Used for the emergency detonation of explosives and unexploded ordnance (UXO), the EOD Range was located east of Firebreak Road, approximately 2 miles south of the main entrance to the South Post (**Appendix E, Figures E-1, and E-9**). From 1979 to 1992, approximately 1,200 pounds per year of explosives and munitions were disposed of at the disposal area at the east end of the range by either open burning or open detonation. The range was closed as part of the 1996 ROD.

AOC 26 (Zulu Ranges 1 and 2)

The Zulu Range, comprised of Zulu 1 (EOD training) and Zulu 2 (grenade training) is located 2,000 feet north of AOC 25 (EOD Range), approximately 1.6 miles southwest of the main entrance to the South Post (**Figures E-1 through E-3**). The Zulu Ranges cover approximately 16 acres and consist of two adjacent land tracts, Zulu 1 and Zulu 2. Prior to 1979, the range was used for Open Burn/Open Detonation (OB/OD) of waste explosives and associated waste items. Munitions fired at Zulu Ranges 1 and 2 in 2019 included hand grenades, C4, blasting caps, and detonation. The demolition training area is located in the center of Zulu 1. Zulu 2 has been historically used as a practice range for hand grenade training. The grenade training area is located on the eastern end of Zulu 2 and consists of two concrete bunkers, which are used for cover and protections, and two sand pits that are used for receiving grenades.

AOC 27 (Hotel Range)

Used for small arms training, the Hotel Range is located adjacent to Cranberry Pond, approximately 1 mile south of the main entrance to the South Post (**Figures E-1 and E-4**). The Hotel Range covers approximately 23 acres and is currently used exclusively for firing small caliber weapons. The AOC is presently located entirely south of Old Turnpike Road; however, prior to 1979, the Hotel Range extended to the north side of the Old Turnpike Road and was used for M16s and small caliber weapons firing. The range has also used as an M-70 range and after 1989 the range was modified for use as an M60-SAW range.

AOC 41 (Unauthorized Dumping Site)

Located on the former South Post of Fort Devens, approximately one-half mile west of the Still River Gate, on the north shore of New Cranberry Pond (separate from Cranberry Pond), approximately 2 miles southeast of the main entrance to South Post, AOC 41 is the site of a former 6-acrelandfill used up to the 1950s for disposal of nonexplosive military and household debris, including beverage cans, bottles, and motor vehicle parts. Debris volume was estimated to be approximately 1,500 cy. Miscellaneous debris was scattered over a small hill located approximately 75 ft north of New Cranberry Pond (**Figures E-1 and E-10**).

SPIA site location maps showing the locations of AOCs 25, 26, 27 and 41 are provided in **Appendix E** (**Figures E-1** and **E-2**). Site layout views of AOCs 26 and 27 are depicted in **Appendix E Figures E-3** and **E-4**.

A site chronology and additional background information is included in **Appendix E**.

3.2 Response Action Summary

3.2.1 Basis for Taking Action

Groundwater, surface water, sediment and soil samples were collected and analyzed as part of the SPIA RI to characterize the nature and extent of site-related contamination. Various metals (i.e. beryllium, cobalt, copper, iron, manganese, mercury, nickel, selenium, and zinc), nitroglycerine, PCE, DDT, petroleum hydrocarbons and trace levels of PCBs and volatile compounds were detected in soils. Explosive compounds (i.e. RDX, cyclotetramethylene tetranitramine (HMX), pentaerythritol tetranitrate (PETN), and trinitrotoluene (TNT)), several metals (i.e., arsenic and lead) and VOCs (1,1,2,2-TCA, PCE and TCE) were detected in groundwater. Arsenic, lead, RDX and HMX were detected in surface water samples and explosives, pesticides, VOCs, and petroleum hydrocarbons were detected in sediment samples.

Because groundwater in the vicinity of AOCs 25, 26, 27 and 41 was not used as a water supply source (and was not expected to be used for that purpose in the future) and the SPIA was to remain an active training facility for the foreseeable future, risk from groundwater consumption was not considered a viable exposure pathway and was therefore not evaluated in the risk assessment. Any future use of the SPIA monitored-area groundwater, however, will require a human health risk assessment.

Using data from the RI, the Army prepared a Baseline Risk Assessment to determine potential risks to human health and the environment under reasonable exposure assumptions. No unacceptable risks to human health and the environment were found to be associated with the SPIA monitored-area groundwater. No hazardous substances were detected in drinking water well D-1 (which is located near the northeast edge of the SPIA monitored area and used by military personnel during training activities) and no unacceptable ecological risk to surrounding habitats were identified based on the absence of a pathway for any known ecological receptor to access the SPIA monitored-area groundwater.

3.2.2 Response Actions

Based on the “no unacceptable risk” findings in the human health and ecological risk assessments, “no action” was the selected remedy for AOCs 25, 26, 27 and 41. Although no formal remedial action or ICs were required, the Army committed to conduct the following activities in the 1996 ROD:

- Groundwater monitoring will be performed to:
  - (1) monitor potential contaminant migration out of the SPIA monitored area (an area of groundwater in the SPIA);

(2) monitor contaminant concentrations in AOC 25 (EOD Range), AOC 26 (Zulu Ranges), AOC 27 (Hotel Range) and AOC 41; and,

(3) monitor the north, northeast, southeast, and east sides of the SPIA monitored area.

- A Groundwater Monitoring Plan for the South Post will be developed that will include detailed groundwater monitoring at discharge points. The plan may include installing sentinel wells to monitor potential off-site groundwater flow. Details of the plan will be developed jointly by the Army, USEPA-New England, and Massachusetts Department of Environmental Protection (MADEP) within 6 months of ROD signature. The Army will rerun the groundwater model to incorporate data from new sentinel well(s) and ascertain any potential impacts to MCI Shirley;
- Monitoring wells will be sampled for explosives, TCL organics, and TAL metals;
- Well D-1 will be sampled for explosives and federal and state drinking water requirements (MMCLs/MCLs);
- Army will not develop new drinking water sources within the SPIA monitored area;
- An INRMP will be developed and implemented to monitor adverse effects on the ecosystem in the SPIA monitored area. The details of this plan will be developed jointly by the Army, USEPA-New England, U.S. Fish and Wildlife Service, and MADEP within 6 months of the ROD signature;
- Monitoring reports will include a description of site activities and a summary of analytical results. The Army will submit these reports to MADEP and USEPA. If there is an indication of contamination emanating from the SPIA monitored area, the Army will evaluate the need for additional assessment;
- As required by CERCLA, because contaminants remain at the site at levels that are not appropriate for unrestricted land use and unlimited exposure (UU/UE), five-year reviews will be conducted to confirm the No Action remedy remains protective of human health and the environment. The FYR will include an assessment as to whether the no-action remedy is protective of human health and the environment and whether the implementation of alternative remedial actions is needed to ensure adequate protection. If on-site hazardous substances, pollutants, or contaminants that may present an imminent and substantial endangerment to public health and welfare migrate off site, Army will take the necessary and appropriate actions to protect human health and the environment as required under CERCLA. More frequent reviews will be conducted if site conditions change; and,
- Should the Army close, transfer or change the use of this property, an Environmental Baseline Survey (EBS) will be performed, and the "no action" decision of this ROD will be reexamined in light of the changed use following transfer or closure. The EBS will be provided to the USEPA-New England and MADEP for comment.

3.2.3 Status of Implementation

The initial Long-Term Groundwater Monitoring Plan (LTMMP) for the SPIA was issued in May 1997 (SWETS, 1997). The plan detailed the individual wells to be sampled on an annual basis. Perchlorate was added as a contaminant of concern for AOC 26 and incorporated into the monitoring program for drinking water well D-1 in 2006. Additional monitoring wells were installed at AOC 26 and within SPIA to act as sentinel wells. The LTMMP was revised in 2008, 2013 (Sovereign/HGL, 2013) and 2015

(Sovereign/HGL, 2015). The current LTMMP includes:

- AOC 25 – LTM groundwater sampling discontinued in 2004 (no exceedances of federal and/or state MCLs/MMCLs); ten monitoring wells gauged every five years (in conjunction with the FYR);
- AOC 26 – semi-annual sampling of four monitoring wells and five surface water locations for explosives, perchlorate, and TAL total metals; four monitoring wells gauged every five years (for FYR);
- AOC 27 - biennial sampling of four monitoring wells for metals and explosives (sampled in 2018); five monitoring wells gauged every five years (for FYR);
- AOC 41 - LTM groundwater monitoring was discontinued in 2006 (no exceedances of federal and/or state drinking water standards (MCLs/MMCLs); 18 monitoring wells gauged every five years (for FYR);
- South Post Monitored (SPM) Area - annual sampling of seven wells for TAL metals and explosives and one well for perchlorate; eight monitoring wells gauged every five years (for FYR); and,
- Drinking water well D-1 – annual sampling for explosives, federal and State drinking water requirements (MMLs/MMCLs) and perchlorate.

As specified in the ROD, Army, EPA and MassDEP jointly developed and issued an Integrated Natural Resources Management Plan (INRMP) in 1998. In addition to guiding implementation and monitoring of the DFTRA natural resources conservation program, the INRMP was written to monitor impacts of the current land use to ecosystems within the SPIA monitoring area. The four overarching goals of the current INRMP along with the specific objectives used to attain each goal are presented in **Appendix E**. The INRMP is updated every five years; the most recent (for FYs 2020-2024) was issued in September 2019.

3.2.4 Institutional Controls

The 1999 ROD remedy did not include ICs.

3.2.5 Operations and Maintenance / Long-Term Monitoring

The 1999 ROD remedy did not include any system operation or O&M requirements.

3.3 Progress Since The Last Review

This section includes the protectiveness determination and statements from the last (2015) FYR.

Table 3-1 Table 3-1. Protectiveness Determinations Statement from the 2015 FYR

SPIA	Protectiveness Determination	Protectiveness Statement
AOCs 25, 26, 27, & 41	Protective	*The No Action remedy at AOCs 25, 26, 27, and 41 is protective of human health and the environment and exposure pathways that could results in unacceptable risks are being controlled.*

There were no issues and recommendations identified for the SPIA in the last (2015) SPIA FYR.

3.4 Five-Year Review Process

This section summarizes the FYR process for the SPIA sites and the actions taken to complete the review.

3.4.1 Community Notifications, Involvement & Site Interviews

As discussed in the Executive Summary, USACE announced the commencement of the 2020 FYR in local papers and at the January 16, 2020 Devens RAB meeting. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**.

3.4.2 Data Review

The LTM data are provided in annual monitoring reports. The cumulative results from all SPIA annual sampling events through 2019 are included in **Tables E-1 through E-11 in Appendix E. Table E-12** presents a summary of exceedances over time through 2019.

AOC 25 (Former EOD Range)

As previously discussed, LTM sampling was discontinued in 2004. However, water level measurements are collected from ten monitoring well locations every five years (in conjunction with the FYR). Survey data collected in 2017 and annual gauging results from November 2019 suggest that groundwater in the immediate vicinity of AOC 25 flows primarily in an easterly direction with some component of flow potentially to the northeast and southeast. This is reasonably consistent with the 2016 SPIA annual report that stated that groundwater flow from AOC 25 and "…most of the remaining portions of the SPIA flows southeast and east toward the unnamed brook and New Cranberry Pond or to the north of New Cranberry Pond toward the Nashua River and its wetland." The 2020 FYR gauging event occurred on November 26, 2019. Groundwater elevation contours are depicted on **Figure E-9 in Appendix E**.

AOC 26 (Zulu Ranges 1 and 2)

A total of four groundwater monitoring wells and five surface water sampling locations were sampled during the May 2019 semi-annual sampling event for metals, perchlorate and explosives. Eleven monitoring wells and five surface water locations were sampled during the November 2019 annual LTM event for metals, explosives, and perchlorate analyses.

Similar to 2015-2018 results, RDX and perchlorate were detected in several monitoring wells in 2019 at concentrations exceeding applicable drinking water standards. The source of the relatively small area of RDX and perchlorate detections appears to be the Zulu Ranges 1 and 2 impact areas. Arsenic was detected above the MCL at one monitoring location in 2019, but the same monitoring well has had non-detect results from 2015-2018.

Survey data collected in 2017 and annual gauging results from November 2019 suggest that groundwater is discharging to the kettle pond along the southern bank of the pond while surface water along the northern banks discharges back to groundwater.

In May 2019, RDX and HMX were detected at very low concentrations at a surface water monitoring station (i.e. 26SW-16-05) downstream of the Kettle Pond outlet, west of Firebreak Road, just outside of the SPIA boundary. Although RDX was detected in next (farthest) downstream station (i.e. 26W-14-04) in 2017, because 2018 and 2019 results were non-detect, Army felt that installation of a surface water sample station beyond 26W-16-04 was unnecessary at the current time. However, it was agreed that should future sampling results detect explosives in surface water samples downstream from the kettle pond (west of Firebreak Road), Army would (1) establish a new surface water sampling location downstream of 26SW-14-04, (2) conduct a flow/dilution calculation in Slate Rock Brook, and (3) monitor discharge out of the kettle pond (culvert, weir, beaver dam) to see if discharge variations correlate with downstream RDX detections.

Detections of arsenic, iron, and zinc above drinking water standards or background levels in 2015-2018 were significantly lower in 2019 following the removal and replacement of galvanized metal well points with PVC wells in January 2017. While still above drinking water standards, arsenic concentrations decreased from 58.1 µg/L in December 2015 to 16.6 ug/L in November 2019. Lead and zinc concentrations were both reported below their respective drinking water standards in 2019. The total and dissolved metals results for AOC26 are presented in **Table E-1**.

Groundwater sampling results are presented in **Table E-2** and trend graphs are provided in **Figures E-11** and **E-12**. Surface water results are presented in **Table E-3** and the groundwater elevation contours are depicted on **Figures E-6** and **E-7** in **Appendix E**.

AOC 27 (Hotel Range)

Biennial samples were collected from four AOC 27 groundwater wells and submitted for dissolved metals, and explosives in 2016 and 2018. Data trends at AOC 27 remain generally consistent with historic data. Groundwater flow on site is mapped to the north-northwest **(**see **Figure E-8, Appendix F)**. Dissolved metals results were either non-detect or were reported at estimated (J) levels below monitoring criteria in all AOC 27 groundwater wells. RDX and HMX were consistently non-detect in wells 27M-92-01X, 27M-93-05X and 27M-93-08X. RDX and HMX were detected in well 27M-93-06X at RDX levels ranging from non-detect (0.21 µg/L U) to 0.45 µg/L and HMX levels ranging from non-detect (0.21 µg/L U) to 0.32 µg/L. Metals results are presented in **Table E-4** and explosives results are presented in **Table E-5.** None of the AOC 27 wells exceeded the monitoring criteria for metals or explosives during this five-year review period.

AOC 41 (Unauthorized Dumping Site)

As previously discussed, LTM was discontinued in 2006. However, water levels are collected at 18 monitoring well locations every five years (in conjunction with the FYR). Survey data collected in 2017 and annual gauging results from November 2019 suggest that groundwater flow in the immediate vicinity of AOC 41 is towards the east, consistent with previous regional groundwater flow depictions provided in the SPIA annual reports. The 2020 FYR gauging event occurred on November 26, 2019. the groundwater elevation contour is depicted on **Figure E-10** in **Appendix E**.

Groundwater sampling results are presented in **Table E-2** and trend graphs are provided in **Figures E-11** and **E-12**. Surface water results are presented in **Table E-3** and groundwater elevation contours are shown on **Figures E-10** in **Appendix E.**

SPIA Monitored Area

During this FYR period, RDX was detected above the GW-1 standard in monitoring well SPM-93-08X in 2017 (3.0 µg/L compared to the GW-1 standard of 1 µg/L). No other samples exceeded the monitoring criteria for explosives. Arsenic concentrations remained above applicable standards at SPM-93-06X during this five year review period, ranging from 12.2 to 15.9 µg/L. Metals results are presented in **Table E-6** and explosives and perchlorate results are presented in **Table E-7**.

Hydrant D-1

More than 50 percent of the SPIA overlies a medium yield aquifer that is a potential source of drinking water. In accordance with the SPIA ROD, Army agreed to annually collect samples from drinking water well D-l for explosives and Massachusetts and Federal drinking water requirements (MMCLs/MCLs). Perchlorate was added to the annual monitoring program per EPA's request. Army also agreed that no new drinking water sources would be development within the SPIA monitored area.

Hydrant D-1 (DW-02G) is included in the annual SPIA monitoring network and is sampled for total and dissolved metals and explosives. Separately, well DW-02G is also sampled outside of the LTM program for drinking water parameters and perchlorate. The results for RDX and HMX have been non-detect for all samples collected from 2015 through 2019. The total and dissolved arsenic results have been non-detect or less than the GW-1 standard for samples collected through 2019. The results for total and dissolved zinc were above background level of 21 µg/L for all samples, with one exception. The dissolved zinc result from Hydrant D-1 was non-detect (5 µg/L U) in November 2019. Perchlorate was detected in DW-02G in December 2017 at 0.44 µg/L, total and dissolved metals results are presented in **Table E-6**. Explosives results are presented in **Table E-7,** and the DW-02G drinking water results (including perchlorate) are presented in **Table E-8**.

3.4.3 Site Inspection

The FYR site inspection was conducted on February 14, 2020. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001).

Features that were inspected included access roads, signage, monitoring wells, piezometers, and Hydrant D-1. The overall condition of the sites was satisfactory and no issues with remedy performance were identified. Range Control personnel indicated that there is a plan to relocate the firing position and an existing building at Hotel Range closer to the roadway. No additional drinking water sources have been developed within the SPIA monitored area. The inspection checklist is included in **Appendix E** along with supporting photographs.

3.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary

As discussed in Section 3.2.2, while no formal remedial action or ICs were required in the "No Action" ROD, Army agreed to perform long-term monitoring to evaluate concentrations of munitions related contaminants in groundwater and surface water, determine groundwater flow directions, and assess potential off-site migration of groundwater contamination beyond the SPIA monitored area. During the 2015-2019 review period, groundwater monitoring wells and surface water sample stations were sampled in accordance with the 2015 LTMMP and results were documented in 2016, 2017, 2018 and 2019 annual LTM reports.

Remedial Action Performance:

While the 1996 ROD did not include any formal remedial action components, Army agreed to perform several activities to monitor potential groundwater and surface water impacts, confirm groundwater flow directions and ensure that the selected "No Action" remedy remains protective of human health and the environment. From 2015-2019, Army conducted annual, biennial and five-year LTM events and provided groundwater and surface water sample data and updated groundwater flow contours in 2016, 2017, 2018 and 2019 Annual LTM Reports, In addition, the updated (2020-2025) Integrated Natural Resources Management Plan (INRMP) was issued in November 2019.

While overall concentrations of perchlorate, explosives, and metals in AOC 26, AOC 27 and SPIA monitored area groundwater and surface water have remained relatively consistent with results evaluated in the last (2015) FYR (see cumulative summary data tables in **Appendix E**), EPA has requested the establishment of an additional surface water sampling station at AOC 26 to more effectively assess and monitor potential off-site impacts.

System Operations/O&M:

Not applicable. The remedy does not include a treatment system or any O&M requirements.

Implementation of Institutional Controls and Other Measures

The 1996 ROD states that "…no additional institutional controls…" are required under the selected "No Action" remedy. The ROD also states that the Army will not develop new drinking water sources within the SPIA monitored area. There are no current or future plans for installation of additional potable water wells within the SPIA and no other actions are necessary to ensure that immediate threats have been addressed. Access to the SPIA is controlled by Range Control and the Army intends to maintain possession of the SPIA for the foreseeable future.

Although ICs are not specifically required per the "No Action" ROD, IC-type inspections are conducted on site during LTM sampling and remotely by telephone interviews to confirm that SPIA site conditions remain unchanged (i.e. access to controlled by Range Control and property remains under Army control/ownership).

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Question B Summary

The SPIA is a "No Action" site with no established cleanup levels or RAOs. The exposure assumptions and toxicity data established in the 1996 ROD are still valid. Monitoring criteria for a few analytes have changed since the ROD was signed and these are identified in **Table 3-4** below. In addition, COCs were

dropped from the monitoring program in 2006. The human health and ecological risk exposure assumptions discussed in Section 3. 1. 1 remain valid because the Army has retained ownership of the SPIA and continues to use the property in the same manner as was assumed at the time the ROD was signed.

Changes in Standards and TBCs

The ROD did not identify any ARARs. The table below lists the monitoring criteria in effect at the time the ROD was signed compared against current monitoring criteria. Because the ROD did not specify monitoring criteria, the basis for the criteria in effect when the ROD was signed was taken from the 1998 Annual Report (USACE, 1998). The basis for the current MassDEP standards is from the 2015 LTMMP. Groundwater analytical results at SPIA are presently compared to the MCP GW-1 and GW-3 standards for comparison purposes only, as the criteria are not considered "clean-up" standards under a "No Action" ROD.

Table 3-2 Table 3-2. SPIA Monitoring Criteria

Contaminant	In Effect When ROD was Signed		Current MassDEP (µg/L)		Background (µg/L)[1]	Change to Monitoring Criteria Needed?
	MA MCL (µg/L)	EPA MCL (µg/L)	GW-1	GW-3		
VOCs	Various	Various	Various			No. VOCs were removed from the monitoring program in 2006
Metals						
Aluminum	NS	NS	NS	NS	6,870	No
Antimony	6	6	6	8,000	3	No
Arsenic	50	50	10	900	10.5	Yes. Current GW-1 is lower than original MCLs
Barium	2,000	2,000	2,000	50,000	40	No
Beryllium	4	4	4	200	5	No
Cadmium	5	5	5	4	4	No
Calcium	NS	NS	NS	NS	14,700	No
Chromium	100	100	100	300	14.7	No
Cobalt	NS	NS	NS	NS	25	No
Copper	1,300	1,300	NS	NS	8.09	Yes. GW-1/GW-3 standards do not include a value for copper
Iron	NS	NS	NS	NS	9,000	No
Lead	15	15	15	10	4	No
Magnesium	NS	NS	NS	NS	3,481	No

Manganese	NS	NS	NS	NS	291	No
Mercury	2	2	2	20	0.243	No
Nickel	NS	100	100	200	34	No
Potassium	NS	NS	NS	NS	2,370	No
Selenium	50	50	50	100	3	No
Silver	NS	NS	100	7	5	Yes. Monitoring criteria for silver were not in effect at time ROD was signed
Sodium	NS	NS	NS	NS	10,800	No
Thallium	2	2	2	3,000	7	No
Vanadium	NS	NS	30	4,000	11	Yes. Monitoring criteria for vanadium were not in effect at time ROD was signed
Zinc	NS	NS	5,000	900	21.1	Yes. Monitoring criteria for Zinc were not in effect at time ROD was signed
Explosives						
1,3,5-Trinitrobenzene	NS	NS	NS	NS	NS	No
1,3-Dinitrobenzene	NS	NS	NS	NS	NS	No
2,4,6-Trinitrotoluene	NS	NS	NS	NS	NS	No
2,4-Dinitrotoluene	NS	NS	30	50,000	NS	No
2,6-Dinitrotoluene	NS	NS	NS	NS	NS	No
2-Amino-4,6-dinitrotoluene	NS	NS	NS	NS	NS	No
2-Nitrotoluene	NS	NS	NS	NS	NS	No
3-Nitrotoluene	NS	NS	NS	NS	NS	No
4-Amino-2,6-Dinitrotoluene	NS	NS	NS	NS	NS	No
4-Nitrotoluene	NS	NS	NS	NS	NS	No
Cyclonite (RDX)	NS	NS	1	50,000	NS	Yes. Monitoring criteria for RDX were not in effect at time ROD was signed
HMX	NS	NS	200	50,000	NS	Yes. Monitoring criteria for HMX were not in effect at time ROD was signed

Nitrobenzene	NS	NS	NS	NS	NS	No
Tetryl	NS	NS	NS	NS	NS	No
AOC 26 only						
Perchlorate	NA	NS	2	1,000	NS	Yes. Monitoring criteria for perchlorate were not in effect at time ROD was signed

Notes:

[1] Metals background levels were adapted from Devens from Final Remedial Investigation Report Area of Contamination (AOC) 57 Appendix L.

NS = No standard.

New standards should be considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times. " (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Pefluorooctanesulfonate* [OSWER DIRECTIVE 9283. 1-47, Dec. 19, 2019]

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the two PFAS compounds addressed in the EPA LHA (i.e. PFOS and PFOA) to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of all five compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

PFAS Sampling and Analysis

Samples were collected in June 2016 from three water supply wells, DW-01G, DW-02G, and DW-03G and submitted for PFAS analysis. PFAS compounds were not detected in wells DW-01G, DW-02G, and DW-03G. The results of this sampling event are presented in **Table E-9**.

In order to confirm/deny the presence of PFAS in SPIA groundwater, the USEPA requested as part of their comments on the 2016 SPIA Annual Report (Renova, 2017) that groundwater samples be collected for PFAS analysis from eleven perimeter SPM area wells (SPM-93-06X, SPM-93-08X, SPM-93-10X, SPM-93-12X, SPM-93-16X, SPM-97-23X, SPM-97-24X, SPM-93-05X, SPM-93-07X, SPM-93-09X, and SPM-93-11X). Samples were collected in November 2017 and February 2018. One groundwater monitoring well, SPM-93-05X (located west of AOC 27 (Hotel Range) and northeast of AOC 26 (Zulu Ranges 1 and 2) reported a detection of PFOA at 2.5 ng/L in February 2018. PFAS was not detected in other SPM area wells. Based on the results, no additional PFAS sampling was recommended. SPIA PFAS results are presented in **Table E-10**.

Sampling was conducted for PFOS/PFOA in June of 2019 as part of a separate investigation into PFAS in drinking water on Fort Devens. Sampling was conducted on both the Army owned and operated public drinking water supply system on South Post (PWS ID# 2147006) and at other locations on Main Post and the 3400 Area of the post that are served by the MassDevelopment owned and operated public drinking water supply system (PWS ID# 2019001). Samples were collected from the drinking water wells on South Post, including Well 02G which feeds the D-1 hydrant. PFAS compounds were not detected in wells DW-01G, DW-02G, and DW-03G during the June 2019 sampling event. The results of this sampling event are presented in **Table E-11**. The source of the 2017 detection is unknown and no additional PFAS sampling has been recommended. Based on the absence of PFAS detections in 2018, the 2017 results do not affect the protectiveness of the remedy.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing RDX, PFOA and PFOS, and PFBS. As explained below, these changes do not affect the protectiveness of the remedy

- ***2018 Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*** *cancer and non-cancer toxicity values*
  In August 2018, EPA revised the non-cancer oral reference dose (RfD) and the cancer oral slope factor (CSF). These new values indicate that RDX is now less toxic from cancer and non-cancer health effects. These toxicity changes would result in decreased cancer risk and decreased non-cancer hazard from exposure to RDX. Because this change results in a reduction of potential human health risk, it does not affect protectiveness of the remedy.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*
  In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

PFOA was detected at monitoring well SPM-93-05X at an estimated (J) concentration of 2. 5 ng/L in November 2017. Follow-up samples collected in February and November 2018 were non-detect for all PFAS compounds analyzed for. PFAS was not detected in any of the SPIA drinking water wells. Based on the absence of PFAS detections in 2018, the 2017 results do not affect the protectiveness of the remedy. The source of the 2017 detection is unknown, and no additional PFAS sampling has been recommended.

- ***2014 PFBS*** *non-cancer toxicity value*
  Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

PFBS was not detected during the November 2017 sampling nor the February and November 2018 sampling. PFBS was not detected in any of the SPIA drinking water wells. Therefore, the 2014 PFBS non-cancer toxicity value does not affect the protectiveness of the remedy.

- ***Lead in Soil Cleanups***

  Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

  EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

  EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

  Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

As part of this FYR, the lead results in surficial and subsurface soil samples reported in Appendix E of the ROD were reviewed to determine if average lead concentrations exceeded the updated screening level of 200 ppm for residential exposure. None of the soil samples from any of the AOCs exceeded 200 ppm for lead. Based on this review, no further remedial work is necessary to address remaining lead in soil.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*
  On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

As part of this FYR, the cPAHs identified in Appendix E of the ROD were reassessed by comparing maximum and average concentrations detected in soil and sediment against current EPA screening levels for residential soil (cPAHs were not identified in groundwater). The results are summarized below:

Table 3-3 Comparison of cPAH Concentrations at Against Current RSLs

Site / Media	cPAH	Max Conc. (mg/kg)	Avg Conc. (mg/kg) (see notes below table)	Current EPA Residential Soil Screening Level[2] (mg/kg)	Exceedance of Current Screening Level?
AOC 26 Surficial Soil	benzo(a)anthracene	0.29	---	1.1	No
	benzo(a)pyrene	0.38	---	0.11	Yes*
	benzo(b)fluoranthene	0.81	---	1.1	No
	benzo(k)fluoranthene	0.18	---	11	No
	chrysene	0.5	---	110	No
AOC 27 Sediment	benzo(b)fluoranthene	0.33	---	1.1	No
AOC 41 Soil Borings	benzo(b)fluoranthene	0.3	0.11	1.1	No
	benzo(k)fluoranthene	0.2	0.042	11	No
	chrysene	0.24	0.24	110	No

Notes:

1. ROD and RI Report tables only provided max/min concentrations, not the data necessary to calculate average concentration for AOC 26 Surficial Soil and AOC 27 Sediment.
2. AOC 41arithmetic mean concentration was calculated for each chemical using the detected concentration(s), and one-half the sample quantitation limit for non-detect(s).
3. RSL is based on HQ = 0.1. If an HQ=1.0 were applied, the value would increase by 10X.

* Max concentration exceeds RSL; however, frequency of detection was only 1/9.

The only RSL exceedance was benzo(a)pyrene in a single soil sample collected at AOC 26. Because the ROD and RI Report did not include the actual sample data (data was included on a separate diskette when the 1994 RI report was submitted), it was not possible to calculate an average concentration based on one-half of the sample quantitation limit for the non-detect samples. However, because

benzo(a)pyrene was detected in only one of the nine samples, and at a very low concentration, it is possible that the average concentration would be close to or less than 0.11mg/kg. Given that the exposure pathways and receptors have not changed since signing of the ROD, the single low-level detection of benzo(a)pyrene does not affect the protectiveness of the remedy.

Changes in Risk Assessment Methods

The following changes have occurred to EPA's risk assessment methodologies since the 1996 ROD. These changes do not affect the protectiveness of the remedy because the exposure pathways and receptors have not changed since the remedy was selected.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub. epa. gov/ncea/risk/recordisplay. cfm?deid=236917

  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283. 1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use or exposure pathways evaluated in the 1996 ROD that could affect the protectiveness of the remedy. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www. epa. gov/sites/production/files/2015-11/documents/oswer_directive_9200. 1-120_exposurefactors_corrected2. pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200. 1-120. February 6, 2014.)

Expected Progress Towards Meeting RAOs

Although RAOs were not identified in the selected "No Action" remedy, the ROD did specify that Army would monitor drinking water well D-1 for potential exceedances of Federal and State drinking water standards (i.e. MCLs/MMCLs) and monitor groundwater for potential migration of contaminants out of the SPIA monitored-area. In addition, it stated that five-year reviews would be conducted to assess whether the implemented no action alternative remains protective of human health and the environment and whether the implementation of alternative remedial actions are needed to ensure adequate protection. If on-site hazardous substances, pollutants, or contaminants that may present an imminent and substantial endangerment to public health and welfare migrate off site, the Army will take the necessary and

appropriate actions to protect human health and the environment as required under CERCLA.

QUESTION C: Has any other information come to light that could call into question the Protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

3.6 Issues/Recommendations

No issues/recommendations were identified during this Five-Year review.

3.6.1 Other Findings

The following are recommendations that were identified during the FYR, but do not affect current and/or future protectiveness:

- EPA has recommended (in its July 2020 comments on the draft SPIA 2019 Annual Report) that a new, intermediate sample station be established between 26SW-14-04 and 26SW-16-05 to more effectively monitor for potential offsite migration of contaminants in surface water.

3.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU03 – SPIA (AOCs 25, 26, 27, and 41-groundwater)	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy the SPIA (AOCs 25, 26, 27 and 41) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Groundwater and surface water monitoring confirm that there is no off-site migration of site contaminants at concentrations above monitoring criteria. The Army retains ownership of the property, continues to operate it for military training purposes, and effectively monitors unauthorized access (i.e. land use assumptions remain unchanged). The INRMP has been updated for 2020-2025 and has been implemented to monitor adverse effects on the ecosystem in the SPIA monitored area. The FYR site inspection and interviews confirmed that site use is consistent with ROD assumptions (i.e. an active weapons and ordnance discharge area used by the Army and other agencies for training purposes).		

3.8 Next Review

The next five-year review for SPIA is required five years from the completion of this review (September 2025).

3.9 References

References are included in **Appendix A.**

4 BARNUM ROAD MAINTENANCE YARDS (AOCS 44 AND 52)

4.1 Introduction

This section presents the findings of the FYR for the remedy implemented at the Barnum Road Maintenance Yards, consisting of AOC 44s and 52. This is the fifth five-year review for these AOCs.

4.1.1 Site Background

The Barnum Road Maintenance Yards (AOCs 44 and 52) are former Army vehicle storage and maintenance yards located approximately 1,200 feet west of Cold Spring Brook. Originally, surface water from the Maintenance Yards drained into part of the Fort Devens stormwater collection system which discharges to Cold Spring Brook (subsequently the storm water collection system was revised, and the current storm water discharges to detention areas and not to Cold Spring Brook). These sites were combined administratively under one ROD because of their proximity and similar petroleum releases.

The sites are situated in the northeast corner of the former Main Post on Barnum Road, approximately ½ mile southwest of the former Barnum Road Gate. The total area of the Barnum Road Maintenance Yards is approximately 8.8 acres (**Appendix F, Figure F-1**). The Maintenance Yards are bordered to the north by Massachusetts Army National Guard (MANG) property, which is used for similar vehicle storage activities as the Barnum Road Maintenance Yards. Boston and Maine Railroad property and Barnum Road border the site to the west and east, respectively. Building 3713 (now demolished), was part of the maintenance yards infrastructure and was located adjacent to the south end of the yards. Through early 2009, the Maintenance Yards were fenced, paved, and were used for military vehicle parking. The soils of the site were exposed to possible vehicle crankcase releases over a long duration. Gasoline, motor oil, and other automotive fluids were also likely released during vehicle dismantling operations. The site has undergone reconstruction and is used as an Armed Forces Reserve Center (AFRC). The former maintenance yards were removed during reconstruction activities. Construction activities included building demolition and construction of an AFRC building, maintenance shops, a multi-purpose classroom building, and a new parking area. Site reconstruction was initiated in March 2009 and completed in 2011.

A site chronology and additional site background information are included in **Appendix F**.

4.2 Response Action Summary

4.2.1 Basis for Taking Action

As documented in the ROD (EPA, 1995), a Quantitative Human Health Risk Evaluation and a Preliminary Ecological Risk Evaluation were performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Maintenance Yards. The HHRA concluded that exposure to surface soils (top two feet) for a working lifetime posed a threat to human health. The predominate contaminants driving the risk in the top two feet of soil were carcinogenic polynuclear aromatic hydrocarbons (cPAHs).

The Preliminary Ecological Risk Evaluation determined that there was no significant habitat at the site and no rare or endangered species were known to occur in the vicinity of the Maintenance Yards.

Therefore, it was concluded that the contaminants found within the Maintenance Yards were unlikely to impact ecological receptors.

4.2.2 Response Actions

A ROD was signed in March 1995 (EPA, 1995) documenting asphalt batching as the final selected remedy for cleanup of contaminated surface soils and soils associated with two known releases at AOCs 44 and 52 (USAEC, 1995). Remedial Action Objectives (RAO) for the selected cleanup remedy at AOCs 44 and 52 include:

- Minimize direct contact/ingestion and inhalation with Maintenance Yards surface soils, which are estimated to exceed the USEPA Superfund target range of one in 10,000 to one in 1,000,000 excess cancer risks for carcinogens;
- Reduce off site run-off of contaminants that may result in concentrations in excess of Ambient Surface Water Quality standards and background concentrations in sediments; and,
- Reduce or contain the source of contamination to minimize potential migration of contaminants of concern (COC), which may result in groundwater concentrations in excess of the federal drinking water maximum contaminant levels (MCL).

The selected remedial alternative relied on cold mix asphalt batching soils to control site risks. The following were the major components of the remedy.

- Excavate surface soil (top 2 ft across the site);
- Excavate the two hot spot areas (a reported release of MOGAS and leakage from a former waste oil UST).
- Stockpile soils for sampling and analysis;
- Cold mix asphalt batch soils exceeding site cleanup levels of 7 ppm (average) total carcinogenic polycyclic aromatic hydrocarbons (cPAH) and 500 ppm TPH compounds;
- Backfill excavations with uncontaminated stockpiled soil and then place the asphalt batched material;
- Apply a pavement-wearing course;
- Expand the existing stormwater collection system;
- Perform groundwater monitoring; and
- As a precautionary measure, institute the following deed restrictions:
    - Prohibit residential development/use of the Maintenance Yards;
    - Minimize the possibility of long-term (working lifetime) exposure to subsurface soils; and
    - Require management of soils resulting from construction related activities.

The soil cleanup level for cPAHs (7 ppm) was developed assuming all cPAHs are as toxic as benzo(a)pyrene [EPA's B(a)P approach], which was EPA Region I's standard approach for computing risk estimates for cPAHs at the time the quantitative risk evaluation was performed for AOC 44/52. Although not required to do so under CERCLA or the NCP, the Army has agreed, with MassDEP approval, to establish TPH compounds cleanup levels for soils at the Maintenance Yards based on guidance from the MCP. The cleanup level for TPH was the S-1/GW-1 standard at the time of the ROD of 500 ppm.

Table 4-1 Contaminants of Concern Cleanup Levels in Soil AOC 44 and 52 from the ROD

Contaminant of Concern	Cleanup Levels (ppm)	Basis
cPAH	7	Risk based
TPH	500	MCP Method 1 S-1/GW-1

4.2.3 Status of Implementation

Remedy implementation consisted of completion of a remedial design and the remedial action, performing groundwater monitoring (discussed in **Appendix F**) and enforcing ICs. Remedial construction was completed by April 1996. The Remedial Action Completion Report was issued on June 1996 (Weston, 1996).

Pre-design field activities commenced July 1994 in anticipation that the ROD would be signed prior to completion of the remedial design. Pre-design field activities consisted of excavating test pits, evaluating the existing storm water system, and performing a site topographic survey

Construction commenced in August 1995 and consisted of excavation and sampling of over 30,000 cy of soils. The top two feet of soils exceeding the cleanup level of 7 ppm for cPAH and 500 ppm for TPH were excavated. During the excavation, a total of three hot spots were excavated below the 2 ft surface soil depth. These areas included the suspected batch contaminated sub-base soil at the UST over-excavated area and the MOGAS spill area. Sampling of soils from in situ and stockpiles from these areas revealed that TPH concentrations were below the site cleanup level of 500 ppm.

Treatment was performed by cold mix asphalt batching 11,800 cy of contaminated soils and then backfilling/compacting both the uncontaminated excavated soils and the asphalt batched material as a sub-base material in the excavation. The top 9 inches of backfilled material consisted of batched material and the bottom 15 inches consisted of uncontaminated backfill soil. Four inches of bituminous pavement was placed over this sub-base material to complete a pavement wearing course for Army vehicle parking.

In addition to the excavation, a drainage system was installed throughout the Maintenance Yards to collect stormwater from the new paved surface. A detention pond was constructed to store accumulated rainfall and minimize flow at the outfall at Cold Spring Brook during heavy storm events. In addition, an oil/water separator was installed as part of the storm drain system. The detention pond was constructed in the area of a suspected acid leaching pit associated with the TDA Building, SA 38D. The leaching pit was not located during construction activities. Remedial construction was completed by April 1996.

The 2009 construction activities removed the pavement and the oil water separator. The drainage system was modified to be compatible with the new site lay out. The detention pond located southeast of Barnum Road was not modified. The construction activities were performed in accordance with an Environment Protection Plan (EPP) for the AFRC reconstruction to meet the requirements of the ROD for remedy protectiveness during construction and to and ensure the remedy maintained its intended protectiveness after construction activities were complete (GeoInsight, Inc., 2009).

Groundwater Monitoring

The last groundwater monitoring event was in December 2003. Comparison of the 2003 data to MCLs at the time revealed no COC exceedances.

Land Use Controls

The AOC 44 and 52 remains owned and under the control of Army. There are no current or future plans for transfer of property from Army ownership at this time. The LUCs were developed for AOCs 44 and 52 are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (Appendix G of the 2015 LTMMP) (Sovereign/HGL, 2015). Any proposed that affect the property must consider the following ROD requirements:

- Assure the Property is not used for residential purposes. If the Army transfers this property by lease or deed, an Environmental Baseline Assessment will be conducted to ensure that the remedy remains protective by incorporating all necessary environmental protection provisions within the FOST and the property transfer deed.
- Maintain the existing paved areas and storm water collection systems to prevent long-term worker exposure to residual oil contaminated soils 2-5 feet below ground surface associated with AOC 44/52 remedy.
- Assure that Soil Management Plans and Health and Safety Plans are prepared and executed prior to subsurface excavations.
- Any intrusive construction work must consider that residual soil contamination has been documented for AOC 44/52 and that such actions should be coordinated with the DPW, the BRAC Environmental Office and the BCT.

4.2.4 IC Summary Table

The ICs detailed in the ROD included ICs in the form of deed restrictions to prevent circumstances which may result in risk of harm to health, safety, public welfare or the environment. The ICs include a prohibition on residential development/use of the property, prohibition on the removal of the existing 2-foot cover (or asphaltic barrier) (with exemptions/specific requirements for certain activities), and development/implementation of health and safety plan and soil management when excavating soils > 2 feet.

The former Maintenance Yards (AOCs 44/52) property is currently owned by Army. Should Army decide to sell (i.e. transfer) the property in the future, however, the ICs detailed in the ROD will be included in the Finding of Suitability to Transfer (FOST) and property transfer deed. The current LUCs developed for AOCs 44 and 52 are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (Appendix G of the 2015 LTMMP) (Sovereign/HGL, 2015).

Table 4-2 AOCs 44 and 52 Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Soil	Yes	Yes	AOC 44 AOC 52	1. Prohibit residential development/use of the Maintenance Yards. 2. Prohibit removal of the 2-ft cover or asphalt barrier (to prevent surface soil exposure to existing subsurface soils (2-5 feet below ground surface). 3. Require Health and Safety Plan and Soil Management Plan for excavations > 2 feet;	Addendum to 1999 Real Property Master Plan Long Range Component for Devens Reserve Forces Training Area - September 2007 Deed restriction (planned when/if property transferred)

4.2.5 System Operations/Operation and Maintenance

Suggested maintenance of the drainage system is detailed in Appendix E, Operation and Maintenance of the Drainage System, *Final Remedial Action Completion Report for the Remediation of Barnum Road Maintenance Yards AOCs 44 & 52* (Weston, 1996). Maintenance records for O&M activities were not available for review.

4.3 Progress Since the Last Review

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 4-3 Protectiveness Determinations Statement from the 2015 FYR

OU	Protectiveness Determination	Protectiveness Statement
AOC 44 & 52	Protective	*"The remedy at Area 44 and 52 is protective of human health and the environment because institutional controls are enforced, and no exposures are currently occurring or imminent."*

There were no issues and recommendations in the last (2015) FYR.

4.4 Five-Year Review Process

This section summarizes the FYR process for AOCs 44 and 52 and the actions taken to complete the review.

4.4.1 Community Notification, Involvement & Site Interviews

As discussed in the Executive Summary , the USACE announced the commencement of this Five-

Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments regarding the overall cleanup of Devens are provided in the Executive Summary. There were no AOC-specific comments related to the Barnum Road Maintenance Yards.

4.4.2 Data Review

The remedial action consisting of soil excavation, asphalt-batching of contaminated soil, repaving, and installation of a stormwater collection system was completed in April 1996. The last round of groundwater data was collected in December 2003 and evaluated in the 2005 Five-Year review. Based on results of the 2003 sampling event, which revealed limited PAH detections, all below GW-1 standards, it was agreed that groundwater monitoring could be discontinued. Thus, no data was required/collected 2015-2019.

4.4.3 Site Inspection

A FYR site inspection was conducted at AOCs 44 and 52 on February 12, 2020. In attendance was Melissa Miller of KGS. Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). As part of the site inspection the inspector indicated there was no vandalism or changes of land use. The site is within a secured facility with fences and gates. The inspector noted the roads were adequate (i.e., the asphalt cover). Based on the site inspection, the overall condition of the site was satisfactory. The site inspection checklist is included in **Appendix F** along with supporting photographs.

4.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" and EPA Region I's FY2020 Supplemental Technical Assessment Template, the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

<u>Question A Summary</u>

Yes, in accordance with the ROD, over 30,000 cubic yards of surface (upper two feet) and hot-spot soil were excavated from AOCs 44 and 52 in 1995. Approximately 11,800 cubic yards of the excavated soils exceeding the risk-based cleanup level of 7 ppm for cPAH and Massachusetts Contingency Plan (MCP) S-1 standards for total petroleum hydrocarbons (TPH) were treated via cold mix asphalt batching and backfilled/compacted with uncontaminated

excavated soils for use as a sub-base material in the excavation. Four inches of bituminous pavement was placed over this sub-base material to complete a pavement wearing course for Army vehicle parking. Required upgrades to the storm water collection system were completed in 1996 and groundwater monitoring was discontinued in 2003 after analytical results showed that concentrations of contaminants of potential concern were well below MCP GW-1 standards. Land use controls were developed and are documented in the September 2007 Addendum to the Real Property Master Plan (RPMP) (and included as an appendix to the 2015 LTMMP).

Remedial Action Performance

The excavation and asphalt batching of contaminated soils has been effective at immobilizing the petroleum related contaminants and has met the objectives of the remedial action (minimizing contact/ingestion and inhalation of contaminated surface soils by human receptors; reducing the probability of surface run-off of contaminants; and minimizing the potential migration of contaminants to groundwater). The cover over the untreated subsurface soils remains in place. Groundwater monitoring has confirmed that migration of surface soil contaminants to the aquifer following the historic releases at the site, or because of remedial activities, has not occurred.

System Operations/Operation and Maintenance

Suggested maintenance of the drainage system is detailed in Appendix E, Operation and Maintenance of the Drainage System, *Final Remedial Action Completion Report for the Remediation of Barnum Road Maintenance Yards AOCs 44 & 52* (Weston, 1996). Maintenance records for O&M activities were not available for review.

Implementation of Institutional Controls and Other Measures

The ICs detailed in the ROD included ICs in the form of deed restrictions to prevent circumstances which may result in risk of harm to health, safety, public welfare or the environment. The ICs include a prohibition on residential development/use of the property, prohibition on the removal of the existing 2-foot cover (or asphaltic barrier) (with exemptions/specific requirements for certain activities), and development/implementation of health and safety plan and soil management when excavating soils > 2 feet.

Because the former Maintenance Yards (AOCs 44/52) property is currently owned by Army, the ICs have not been recorded as deed restrictions. The LUCs developed for AOCs 44 and 52 to meet the objectives of the ICs detailed in the ROD are in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (Appendix G of the 2015 LTMMP) (Sovereign/HGL, 2015). Monitoring of land-use control implementation is presented in the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015).

The FYR site inspection confirmed the land use of the site has not change; there is no residential development/use of the property and the asphaltic barrier is in place.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. There have been changes in changes in toxicity values and changes in methods of evaluating risk assessment methods since issuance of the 1995 ROD. The changes as described below are not expected to alter the protectiveness of the remedy because of various reasons discussed below.

Question B Summary

There are no changes to the soil cleanup levels. The cPAH soil cleanup level was risk based and the TPH cleanup level was not an ARAR. The S-1/GW-1 for TPH was used as a soil cleanup level. The S-1/GW-1 for TPH is higher now compared to when the ROD was issued. EPA has published updated policy addressing PFAS in drinking water as described further below. These changes do not affect the current protectiveness of the remedy because the PFAS concentrations are below the EPA HA.

The changes to Federal floodplain regulations at 40 CFR Part 6 require preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. These changes are not applicable to AOCs 44 and 52 because these AOCs are not within the 500-year floodplain.

There have been changes in PFAS toxicity values. These changes do not affect the current protectiveness of the remedy because the remedy relies on LUCs to prohibit residential development and minimize exposure to soil.

Changes in toxicity of PAHs does not affect the protectiveness of the remedy. EPA's B(a)P approach was used to calculate the risk estimate for PAHs. The current toxicity of PAHs is less stringent then when the risk assessment was conducted, therefore the risk associated with PAHs, at the time of the risk assessment, is potentially overestimated. Also, the risk-based soil cleanup level selected for cPAHs (7 ppm) would result in a cancer risk of $6.4x10^{-05}$ (within EPA's risk management range) using the current RSL for benzo(a)pyrene (most toxic carcinogenic PAH) of 0.11 mg/kg (residential RSL for $1x10^{-06}$, May 2020).

Changes in toxicity of lead in soil is not expected to alter the protectiveness of the remedy. The average lead concentration in soil were less than 200 ppm.

Changes in risk assessment methods do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to prohibit residential development and minimize exposure to soil.

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the ROD. There have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

Vapor intrusion (VI) was not recognized as an exposure pathway of concern at AOC 44/52 in the ROD.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1995 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location-and action-specific ARARs listed in 1995 ROD have been met since the remedial construction work has been completed. There were no chemical specific ARARs identified related to the soil cleanup levels. The soil cleanup levels are no longer applicable because the remedial construction work has been completed and the clean-up levels have been attained.

The cleanup levels for soil presented in the ROD are below.

Table 4-4 Evaluation of Contaminants of Concern Cleanup Levels in Soil AOC 44 and 52

Contaminant of Concern	Cleanup Levels (ppm)	Basis	Current Standard	Basis	Change to Cleanup Level Needed?
cPAH	7	Risk based	None	Not applicable	no
TPH	500	MCP Method 1 S-1/GW-1	1000	MCP Method 1 S-1/GW-1	no

There are no groundwater cleanup levels specific in the ROD. The ROD required monitoring of groundwater to assess potential migration of COCs, which may result in groundwater concentrations in excess of the federal drinking water maximum contaminant levels (MCL). The last groundwater monitoring event was in December 2003. Comparison of the 2003 data to MCLs at the time revealed no COC exceedances. The MCLs for the COCs have not changed since 2003.

Table 4-5 Evaluation of MCLs at AOC 44 and 52

Contaminant of Concern	MCL in 2003 (µg/L)	Current MCL (µg/L)
Lead	15[1]	15[1]
PAHs [Benzo(a)pyrene]	0.2	0.2
Benzene	5	5
Toluene	1,000	1,000
Ethylbenzene	700	700
Xylenes	10,000	10,000

[1] Action Level

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information

on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS*:* In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the PFAS compounds included in EPA's LHA (i.e. PFOA and PFOS)to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of the five PFAS compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

Soil and groundwater within the boundary of AOC 44/52 were sampled during the base wide PFAS RI currently underway (see Section 12). PFAS was detected in groundwater at concentrations below the EPA HA.

Federal Floodplain Management: Federal regulations at 40 CFR Part 6, Appendix A identified in the ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The Army has assessed potential floodplain impacts from a 500-year flood event on AOCs 44/52. Based on the information provided in OLIVER, the Massachusetts GIS system, AOCs 44/52 are outside of the area indicated on the FEMA National Flood Hazard Layer as having a 0.2 percent annual chance of flooding (i.e., the 500-year floodplain). Because the Army has not identified any protectiveness issues at this time, it did not include a recommendation to add this requirement as an ARAR in a future determination.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. Lead was not detected above the new screening criteria. Changes in toxicity of PAHs does not affect the protectiveness of the remedy. EPA's B(a)P approach was used to calculate the risk estimate for PAHs. The current toxicity of PAHs is less stringent then when the risk assessment was conducted, therefore the risk associated with PAHs, at the time of the risk assessment, is potentially overestimated. Also, the risk-based soil cleanup level selected for cPAHs (7 ppm) would result in a cancer risk of 6.4×10^{-05} (within EPA's risk management range) using the current RSL for benzo(a)pyrene (most toxic carcinogenic PAH) of 0.11 mg/kg (residential RSL for 1×10^{-06}, May 2020). These changes do not affect the current protectiveness of the remedy because LUCs are in place to restrict potential future residential development and exposure to soil. Also, there is no exposure to groundwater at the site. Water is supplied to the site via the Devens municipal water supply.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*

In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD)

of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

Groundwater within the boundary of AOC 44/52 were sampled during the base wide PFAS RI currently underway (see Section 12). PFAS was detected in groundwater at concentrations below the EPA HA.

- ***2014 PFBS*** *non-cancer toxicity value*

Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***Lead in Soil Cleanups***

Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively. e

As part of this FYR, the SI lead results reported in the 1995 ROD were reviewed to determine if average lead concentrations exceeded the updated screening level of 200 ppm for residential exposure. All lead

concentrations were less than 200 ppm. Based on this review, no further remedial work is necessary to address remaining lead in soil.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*

  On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors for different age groups. The cancer potency of other carcinogenic cPAHs is adjusted by the use of relative potency factors, which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

Per the ROD, the soil cleanup level was developed assuming all cPAHs are as toxic as benzo(a)pyrene [EPA's B(a)P approach], which was EPA Region I's standard approach for computing risk estimates for cPAHs at the time the quantitative risk evaluation was performed for AOC 44/52. As the toxicity used for benzo(a)pyrene was greater at the time the risk assessment was conducted, the risk related to PAHs, at the time of the risk assessment, was likely overestimated.

At AOC 44/52, a risk-based soil cleanup level for cPAHs for 7 ppm was selected, which achieved the 1x10-4 excess cancer risk level for the protection of human health from the incidental ingestion and dermal contact with surface soils (0 to 2 feet) at the time of the ROD. Using the 7 ppm cleanup level and the RSL for benzo(a)pyrene (most toxic carcinogenic PAH) of 0.11 mg/kg (residential RSL for 1x10-06, May 2020), the cancer risk of the cleanup level would be 6.4x10-05, which is within EPA's risk management range. The toxicity change does not affect the protectiveness of the remedy because the soil cleanup level remains within the EPA's risk management range.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 1995 ROD. These changes do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development, thus preventing future exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1995 ROD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator**.**

Vapor intrusion (VI) was not recognized as an exposure pathway of concern at AOC 44/52 in the ROD. The VISL calculator has not been run for this site.

Expected Progress Towards Meeting RAOs

The RAOs have been met via the remedial action of asphalt batching and implementation of LUCs. The asphalt batching and the implementation of LUCs has minimized direct contact/ingestion and inhalation with Maintenance Yards surface soils. The asphalt batching has reduced off-site run-off of contaminant that might result in concentrations in excess of ambient surface water quality standards and background concentrations and has reduced/contained the source of contamination to minimize potential migration of COCs, which may result in groundwater concentrations in excess of the MCLs. Groundwater monitoring confirmed there were no groundwater concentrations in excess of the MCLs.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

4.6 Issues/Recommendations

None.

4.6.1 Other Findings

None.

4.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU04 - Barnum Road Maintenance Yards AOC 44 and 52	*Protectiveness Determination*: Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at AOC 44 and 52 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. The Army retains control of the property. Land use controls are in place that prevent exposure to soil that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent. The RAOs have been achieved through 1) excavation, cold mix asphalt batching soils and paving; and 2) implementations of LUCs. Groundwater monitoring has confirmed there were no exceedances of COCs in groundwater. The FYR site inspection and interviews confirmed that site remains controlled by the Army, there is no residential development of the site and the asphalt barrier is in place.		

4.8 Next Review

The next FYR for AOCs 44 and 52 is required five years from the completion of this review (September 2025).

4.9 References

References are included in **Appendix A**.

5 DEFENSE REUTILIZATION AND MARKETING OFFICE AREA OF CONTAMINATION 32 AND 43A

5.1 Introduction

This section presents the findings of the FYR for the remedy implemented at the at Defense Reutilization and Marketing Office (DRMO) Yard (AOC 32) and former Petroleum, Oils, and Lubricants (POL) Storage Area (AOC 43A). This is the fifth five-year review for AOCs 32 and 43A. The triggering action for this statutory review is the completion date of the 2015 FYR (September 26, 2015). The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

5.1.1 Site Background

AOCs 32 and 43A are historically contaminated locations within the former Fort Devens property. AOC 32, the Defense Reutilization and Marketing Office Yard (DRMO) was located on the west side of Cook Street (West Yard). AOC 43A, the former petroleum, oils, and lubricants (POL) Storage Area was located to the south of AOC 32, across from the former Market Street. Market Street was removed during construction of a distribution warehouse. The warehouse is currently occupied. It is currently owned and operated by Ozark Automotive Distributors, Inc., a division of O'Reilly Automotive, Inc. LUCs were established to limit the potential exposure to the contaminated soil and groundwater under both the existing and future site conditions and were incorporated into the deed upon transfer to MassDevelopment, then to subsequent owners. **Figure G-1** in **Appendix G** shows current conditions with new buildings and roads.

AOC 32 (DRMO Yard) was an active materials storage facility from approximately 1964 to 1995. It consisted of three fenced areas where various materials were processed and stored and contained a former waste oil UST (UST #13). AOC 43A (POL Storage Area) served as the central distribution point for all gasoline stations at Fort Devens during the 1940s and 1950s and was subsequently used to store fuels for various purposes.

A site chronology and additional site background information are included in **Appendix G**.

5.2 Response Action Summary

5.2.1 Basis for Taking Action

As documented in the ROD, human health and ecological risk assessment were performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the AOCs 32 and 43A.The results of the human health and ecological risk assessments are presented below.

AOC 32

The exposure pathways evaluated for the human health risk at AOC 32 are listed below:

- Direct contact (dermal contact and incidental ingestion) with contaminants in asphalt, surface soil, or sediment (sediments were not quantitatively evaluated)
- Inhalation of contaminant vapor emissions from the asphalt and soil by site workers and visitors
- Direct contact with contaminants in subsurface soils near underground utility lines by utility workers (not quantitatively evaluated)
- Inhalation of airborne soil particles by utility workers (not quantitatively evaluated)

- Inhalation of vapors that have diffused via the soil gas to indoor air of a new building (UST #13)
- Ingestion of contaminants in drinking water

Surface soil and asphalt

The maximum estimated potential cancer risk to contaminants at AOC 32 for a site worker exposed to asphalt paving and surface soil under current conditions is $9.2x10^{-5}$, which is within the acceptable USEPA target risk range of $1x10^{-6}$ to $1x10^{-4}$. The maximum estimated potential cancer risk associated with soil and asphalt under future conditions, when the higher contaminated subsoil could be exposed during construction, is $1.3x10^{-4}$. The cancer risks are associated with PCBs, arsenic, and beryllium.

The only hazard index (HI) exceeding 1.0 under current site conditions is associated with worker soil exposure. The HI for dermal absorption and ingestion is 4.4 for PCBs and 0.9 for lead. Under future conditions associated with soils, HIs exceed 1.0 for construction workers and site workers. These exceedances are primarily due to PCBs and lead and, to a lesser degree, arsenic, mercury, and chromium.

Groundwater

At AOC 32, the estimated cancer risk from consuming unfiltered groundwater is $6.0x10^{-3}$, which exceeds the acceptable range. Almost all of the risk is associated with ingesting arsenic and beryllium, which are found in groundwater with high suspended sediments. When metals data from filtered groundwater samples are used, the estimated cancer risk is reduced to $5.7x10^{-5}$, which is within the USEPA target risk range of $1x10^{-6}$ to $1x10^{-4}$.

Future consumption of filtered and unfiltered groundwater at AOC 32 yields HIs above 1.0. The contaminants associated with the unfiltered groundwater scenario are arsenic, manganese, and lead. The HI for filtered groundwater is solely due to manganese. However, any future use of area groundwater as a drinking water source is unlikely because of the existing public water supply system and the aquifer's low yield.

In the former UST #13 area, the estimated cancer risk from consuming unfiltered groundwater is $5.2x10^{-3}$, which exceeds the acceptable range. Almost all of the risk is associated with ingesting arsenic, with additional risk from PCBs and 1,4-dichlorobenzene. When metals data from filtered groundwater samples are used, the estimated cancer risk is reduced to $6.2x10^{-4}$.

Future consumption of filtered and unfiltered groundwater at the former UST # 13 site yields HIs above 1.0. The contaminants associated with both groundwater scenarios are arsenic, PCBs, and manganese. The HI for filtered groundwater is solely due to manganese. However, any future use of area groundwater as a drinking water source is highly unlikely because of the existing public water supply system and the aquifer's very low yield.

Ecological

The only COPCs selected in the media potentially affected by activities at AOC 32 were cadmium and nickel in sediments of the drainage ditch. The AOC 32 site lacks vegetation because of human activities. The site consists of paved areas that are surrounded or bordered by grass strips and a gravel parking lot. The drainage ditch is the only area of the site that is not directly affected by human activity. The ecological assessment addressed incidental contact and ingestion, as well as uptake of these contaminants in the food chain for the drainage ditch and adjacent habitats. Levels of cadmium and nickel exceed reference values for invertebrates, but these exceedances are not likely to be ecologically

significant, due to the limited extent of contamination. Potential risks of contaminants to wildlife species, such as small mammals and carnivores, are minimal. Therefore, no action to further investigate or to mitigate ecological risks of sediment contamination at the site is considered to be necessary at AOC 32.

AOC 43A

The exposure pathways evaluated for the human health risk at AOC 43A are listed below:

- Direct contact (dermal contact and incidental ingestion) with contaminants in surface soil
- Direct contact with contaminants in subsurface soils near underground utility lines by utility workers (not quantitatively evaluated)
- Inhalation of airborne soil particles by utility workers (not quantitatively evaluated)
- Ingestion of contaminants in drinking water

Surface Soil

The maximum estimated potential cancer risk to contaminants at the AOC 43A is 2.1×10^{-5} for a site worker under current conditions, which is within the acceptable USEPA target risk range. For AOC 43A, most of the estimated cancer risk is due to ingestion and dermal absorption of arsenic (85%) and ingestion of carcinogenic PAHs (15%). The noncarcinogenic HIs are less than 1.0 for the exposure scenarios under the current site conditions. For future construction workers exposed to surface soil contaminants, estimated cancer risks are 2.2×10^{-5} and 3.0×10^{-6} for the average case, which also fall within the acceptable range. The majority of this risk (85%) is due to arsenic. Approximately 17% of the total cancer risk is due to carcinogenic PAHs, which was considered for ingestion and inhalation pathways only. Noncancer HIs total 4.7. Most total is due to ingestion and dermal absorption of arsenic, with a total HI of 4.1. Arsenic was the only COPC with an HI greater than 1.0.

Groundwater

At AOC 43A, estimated potential cancer risks from consuming groundwater based on data from unfiltered groundwater samples are 1.9×10^{-4} (above the USEPA acceptable range). More than 99% of the risk is associated with ingesting beryllium. The highest concentrations of beryllium detected in unfiltered groundwater are associated with high levels of suspended sediments, levels that would not be present in groundwater actually used as drinking water.

It should be noted that the cancer slope factor (SF) for beryllium was derived from the laboratory using soluble salts; however, beryllium at AOC 43A is mostly in an insoluble and inactive form. Therefore, these risk estimates are probably unrealistic.

Total HIs for noncarcinogenic effects from consuming groundwater at AOC 43A, based on data from unfiltered groundwater samples, are 21. The HI due to manganese is 16 and lead is 3.0. The measured concentration of many metals in groundwater is due to high levels of suspended sediments. Using metals from filtered groundwater, total HIs drop to 2.7. Manganese was the only COPC in filtered groundwater with an HI greater than 1.0.

The highest estimated soil risks are for workers in the future, and the highest estimated groundwater risks are for unfiltered groundwater. The risk is mostly from ingesting groundwater. Any future use of area groundwater as a drinking water source is unlikely because of the existing public water supply

system and the low yield of the aquifer. Therefore, the most realistic risks in the future are those for the site worker from potential exposure to soil contaminants alone.

Ecological

A few metals and organic chemicals were detected in soils and groundwater at AOC 43A at levels exceeding background and ecological criteria. However, none of these contaminants are considered to be COPCs for ecological receptors due to the minimal chance of exposure. No ecologically significant receptors or pathways are present at AOC 43A and, therefore, no risks from site contamination were identified for this site.

5.2.2 Response Actions

AOCs 32 and 43A were combined administratively under one ROD but are described separately in the following subsection for clarity.

At AOC 32, after submission of the Army's Proposed Plan and receipt of public comments on the preferred remedial alternatives, the Army issued a ROD, documenting the final choice of remedy for cleanup of soils by excavation with off-site disposal and cleanup of groundwater by monitored natural attenuation. The ROD was signed in February 1998.

At AOC 43A, following submission of the Army's PP and receipt of public comments on the preferred remedial alternatives, the Army issued a ROD to document the final choice of a remedy for cleanup of groundwater by MNA. The ROD was signed in February 1998.

In the ROD, AOC 32 and AOC 43A were addressed as three operable units. The three operable units included:

- AOC 32 Soils Operable Unit
- AOC 32 (Underground Storage Tank #13) Groundwater Operable Unit
- DRMO/POL (AOC 32/43A) Groundwater Operable Unit.

The RAOs for surface and subsurface soils were:

- Prevent direct and indirect contact, ingestion, and inhalation of the soil contaminated with COCs at levels that could pose risks to human and ecological receptors.
- Prevent erosion and migration of soil contaminated with COCs to storm sewers and surface water bodies.
- Prevent COC migration to the groundwater at levels that could adversely affect human health and the environment.

The RAOs for groundwater included the following:

- Prevent off-site migration of COCs at levels that could adversely affect flora and fauna.
- Prevent lateral and vertical migration of COCs at levels that could adversely affect potential and existing drinking water supply aquifers.
- Prevent seepage of groundwater from AOC 32 and 43A that could result in surface water concentrations in excess of ambient water quality standards.

The major components of the selected soil remedy for AOC 32 in the ROD included the following:

- Excavate contaminated soil and collect confirmation samples prior to backfilling.
- Transport soils to an off-site, non-hazardous landfill for disposal.
- Backfill the excavated area with clean material and re-vegetate the area.

- Monitor groundwater on an annual basis and review the site at five-year intervals for 30 years or until contamination is reduced to remedial goals.

The major components of the selected groundwater remedy for AOC 32 and AOC 43A in the ROD included the following:

- Establish ICs to prevent intrusion into or installation of wells into the known area of contamination in the bedrock.
    - Deed restrictions would limit land use and development. The land would be limited to restricted development, including a ban on drinking water well installation. The land is currently slated for industrial use by the Massachusetts Government Land Bank, which will control development upon the Army's release of the property. Therefore, no further zoning alternations would be required.
- Install additional groundwater monitoring wells.
- Collect data on MNA, assess the data, and performing groundwater modeling;
- Perform groundwater LTM on a semiannual basis.
- Review the site at five-year intervals for 30 years or until contamination is reduced to remedial goals.
- Provide annual data reports to USEPA and MassDEP.
- Incorporate data into groundwater flow and transport models. Field data and model predictions were to be reviewed as part of the Five-Year Review.

The Main Post soil cleanup goals were developed from numerous sources and were presented in the ROD. For all contaminants except PCBs, the values calculated from the risk assessment were used as candidate cleanup goals. For PCBs, an ARAR that existed from TSCA was selected as the cleanup goal. For any compounds not addressed by these two sources, the lower value of the USEPA Region III risk-based concentrations (RBCs) or the RCRA corrective action levels was selected as the candidate cleanup goal.

Table 5-1 Contaminants of Concern Cleanup Goals in Soil AOCs 32 and 43A

Contaminant of Concern	ROD Cleanup Goals (mg/kg)	Basis
PCBs	2	TSCA
Arsenic	24	HHRA Levels Concentrations Corresponding to 10-05 risk or HI = 1
Lead	426	HHRA Levels Concentrations Corresponding to 10-05 risk or HI = 1
DDD	3	RCRA Action Levels (Residential)[1]
DDE	2	RCRA Action Levels (Residential) [1]
DDT	2	RCRA Action Levels (Residential) [1]

[1] Calculated RCRA CMS Action Level as outlined in 55FR30798: 27 July 1990, corresponding to a hazard

index of 0.2 in compliance with MDEP for residential soil.

The Main Post groundwater cleanup goals were developed from numerous sources and were presented in the ROD. These cleanup goals were used to screen groundwater data from both AOC 32 (UST #13) and AOCs 43A (POL). When available, the most stringent of the ARARs was selected as a potential candidate cleanup goal. If no risk values were established, then the most stringent of the USEPA Office of Drinking Water Health Advisories, USEPA Region III tap water criteria, or the MassDEP Office of Research and Standards Guidance Levels, for chemicals for which MMCLs have not been promulgated, was selected. If measurable concentrations were below background values, the background concentrations were established as the goal. Because cleanup goals were not established in the ROD for EPH/VPH, the MCP GW-1 standard was used as the effective cleanup goal. Site-specific cleanup goals were also developed for cis-1,2-dichloroethene (*cis*-1,2-DCE), 1,1,1 trichloroethene, and C19-C36 aliphatics after the ROD was issued.

Table 5-2 Contaminants of Concern Cleanup Goals in Groundwater AOCs 32 and 43A

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis
Trichloroethene (TCE)	5	NA	MCL
Benzene	5	NA	MCL
1,2-dichlorobenzene (1,2-DCB)	600	NA	MCL
1,3-dichlorobenzene (1,3-DCB)	600	NA	EPA Drinking HA
1,4-dichlorobenzene (1,4-DCB)	75	NA	MCL
Total 1,2-dichloroethene	55	NA	EPA Region III Tap Water Risk-Based Concentration
Alpha-Benzenehexachloride	0.011	NA	EPA Region III Tap Water Risk-Based Concentration
DDT	0.5	NA	MCL
PCB1260	0.5	NA	MCL
1,3-dinitrobenzene	1.0	NA	EPA Drinking Water HA
1,3,5-Trichlorobenzene	1.8	NA	EPA Drinking Water HA
Bis-(2-ethylhexyl)phthalate	6	NA	MCL
Aluminum	390	NA	Background
Arsenic – total	50	NA	MCL
Iron	320	NA	Background
Manganese - total	3,500	NA	Background
Sodium	28,000	NA	MA ORSG

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis
Thallium	0.5	NA	MCL Goal
Cleanup Goals Established after the ROD			
trans-1,2-dichloroethene(*trans*-1,2-DCE)	NA	100	MCL
cis-1,2-dichloroethene(*cis*-1,2-DCE)	NA	55	unknown
1,1,1-trichloroethane	NA	5	unknown
1,1,2-trichloroethane	NA	5	MCL
Chlorobenzene	NA	100	MCL
Vinyl Chloride	NA	2	MCL
Ethylbenzene	NA	700	MCL
Toluene	NA	1,000	MCL
Total Xylenes	NA	10,000	MCL
C_5-C_8 Aliphatics (adjusted)[2]	NA	400	MA GW-1
C_9-C_{12} Aliphatics (adjusted)[2]	NA	4,000	MA GW-1
C_9-C_{10} Aromatics[2]	NA	200	MA GW-1
C_9-C_{18} Aliphatics[2]	NA	4,000	MA GW-1
C_{19}-C_{36} Aliphatics[2]	NA	5,000	MA GW-1
C_{11}-C_{22} Aromatics[2]	NA	200	MA GW-1

[1] MA GW-1 are not ARARs but can be used as monitoring criteria.

[2] No cleanup goal was established for this analyte in the Record of Decision. The Massachusetts Contingency Plan GW-1, standard is being used in lieu of a cleanup goal, per the Final Monitored Natural Attenuation Assessment Report, Stone & Webster 2000.

5.2.3 Status of Implementation

AOC 32 excavation, disposal, and restoration activities were completed between October 1998 and December 1998, as summarized in the USACE *Final Soils Remedial Action Operable Unit Completion Report: Soil, Asphalt, and Debris Removal* (Weston, 2000) and outlined below:

- Removal and disposal of approximately 50 cy of metal debris.
- Removal and disposal of approximately 1,200 cy of petroleum-contaminated soil.
- Removal and disposal of approximately 800 cy of non-hazardous soil with shredded tire scrap.
- Removal and disposal of approximately 400 cy of soil contaminated with lead and containing

shredded tire scrap.

- Removal and disposal of approximately 600 cy of soil and asphalt contaminated with low levels of PCBs and pesticides.
- Excavation confirmatory sampling was conducted prior to backfilling confirming site cleanup goals had been met.
- Backfilling was completed with clean material.
- The metal debris and excavated soils were transported offsite for recycling and disposal.

The LUCs were recorded as deed restrictions. The 2003 Quitclaim Deed indicates compliance with LUCs required by the ROD is required. The LUCs in the ROD indicate the land is limited to restricted development and a ban on drinking water well installation within AOCs 32/43A. Monitoring of land-use control implementation is conducted in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The monitoring is conducted on an annual basis via interviews with site representative and on-site visits. The annual monitoring is documented in the Main Post Annual Report.

Additional monitoring wells were installed. Semiannual long-term groundwater sampling was initiated in the spring of 2002.

Groundwater modeling, as described in the *2004 Annual Report Area of Contamination (AOC) 32 and 43A Long Term Groundwater Monitoring, Devens, Massachusetts* (USACE, 2006) consists of plotting and contouring groundwater elevations and contaminant concentrations, is performed on an annual basis. The contoured groundwater elevations and the plotted contaminant concentrations are included in annual reports.

Five-year reviews were completed in 2000, 2005, 2010, and 2015.

5.2.4 ICs Summary Table

Table 5-3 AOC 32/43A - Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	AOC 32 AOC 43A	Prevent intrusion into or installation of wells into the known area of contamination in the bedrock.	March 20, 2003 Quitclaim Deed – Parcel A1b, A.3a, A.10 and Portion of A.24 (see Attachment D: Institutional Controls) Final Record of Decision for the Defense Reutilization and Marketing Office Yard (AOC 32) and Petroleum, Oil, and Lubricants Storage Area (AOC 43A). February 1998.

5.2.5 Systems Operations/Operation & Maintenance

There are no active systems to operate and maintain at AOCs 32/43A.

5.3 PROGRESS SINCE LAST REVIEW

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 5-4 Protectiveness Statement from the 2015 FYR

AOC	Protectiveness Determination	Protectiveness Statement
32 and 43A	Protective	*"The remedy at AOCs 32 and AOC 43A is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Post construction groundwater flow patterns have been defined and no new potential receptors have been identified. ICs that prohibit access to the site's groundwater for residential or commercial use are in place".*

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in Appendix L of the Final 2015 Five Year Review (KGS, 2015).

5.4 Five-Year Review Process

This section summarizes the FYR process for AOCs 32/43A and the actions taken to complete the review.

5.4.1 Community Notifications, Involvement & Site Interviews

As discussed in Section 1.4, the USACE announced the commencement of this Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in Section 1.4 regarding the overall cleanup of Devens. There were no AOC-specific comments related to the DRMO sites.

5.4.2 Data Review

The LTM and performance monitoring data for AOC 32 are provided in annual monitoring reports (groundwater sampling was discontinued at AOC 43A in 2004). Historical exceedances of the cleanup goals from 2006 through 2019 are summarized in **Table G-1**, and a summary of the cleanup goal exceedances from 2002 to 2019 for source area well 32M-01-18XBR is presented in **Table G-2**. Graphical and statistical analyses of selected wells are also presented in **Appendix G**. Statistical analyses were compared to a 95% confidence level.

The monitoring program has been revised numerous times since it was initiated. The current program (Sovereign/HGL, 2015) consists of annual sampling of AOC 32 monitoring wells 32M-01-13XBR, 32M-01-14XOB, 32M-01-17XBR, and 32M-01-18XBR and water level measurements at AOCs 32 and 43A. At the request of USEPA, two additional bedrock monitoring wells (32M-01-15XBR and 32M-01-16XBR) were sampled in October 2019. The samples were analyzed for VOCs, metals, and VPH. Monitoring locations are shown on **Figure G-1** in **Appendix G**. No AOC 43A wells are sampled due to an absence of contaminant exceedances since 2002.

A major contributor to the decrease in COC concentrations in groundwater is the February 2009 sodium persulfate injection performed near source area monitoring well 32M-01-18XBR. Prior to the 2009 injection, COC concentrations, primarily dichlorobenzene (DCB) isomers, exhibited seasonal fluctuations and no definitive concentration trend. Post injection monitoring reveals COC concentration reductions with values below pre-injection levels. The spring 2018 data indicated increases in DCB concentrations, although still below previous historical high values. The spring 2019 data identified notable decreases for all DCB compounds. DCB concentration trends will continue to be monitored in future LTM events. No additional persulfate injections are currently planned because of the overall, long-term trend of diminishing COC concentrations. As shown in **Table G-2**, trichloroethene (TCE)

concentrations at source area well 32M-01-18XBR have remained below the monitoring criterion since fall 2004 and have largely remained non-detect or detected at trace levels (estimated values below the laboratory detection limit) since October 2007. Bromodichloromethane at well 32M-01-18XBR has been non-detect since October 2006.

The target VOCs 1,2-DCB, 1,3-DCB, and 1,4-DCB had been detected above their respective cleanup goals in groundwater at well 32M-01-18XBR from 2002 to 2009. Following the February 2009 sodium persulfate injection, the three isomers have exhibited concentration declines.

Concentrations of the three isomers have exhibited inter-related trends that fluctuated from event to event that is likely the result of sequential microbial dechlorination and degradation reactions. 1,2-DCB at 32M-01-18XBR had been generally at or below the cleanup goal since May 2010 with an increase to greater than the goal in 2018 (840 µg/L). The concentration decreased again to less than the goal in 2019 (250 J µg/L).

Similarly, 1,3-DCB had been below the cleanup goal since June 2014 and had shown a statistically significant downward concentration trend following the injection in 2009 through 2017, but was detected at a concentration (159 µg/L) greater than the goal in 2018, followed by a concentration (41 J µg/L) less than the goal in 2019. Only 1,4-DCB has been detected consistently above its cleanup goal (5 µg/L) at source well 32M-01-18XBR, including for the 2019 sample (29 J µg/L). 1,4-DCB concentrations have shown a statistically significant downward trend ($p < 0.001$). In spite of the 2018 increases in concentrations for all DCB compounds, both 1,3-DCB and 1,4-DCB at 32M-01-18XBR were found to have overall statistically significant downward trends for the long-term dataset through 2019.

Arsenic has been periodically detected above the 10 µg/L cleanup goal at AOCs 32 and 43A wells since monitoring began in 2006 (**Table G-2**); however, since the fall 2010 sampling event, the only well with arsenic detections above the cleanup goal has been sentry well 32M-01-14XOB. The current arsenic concentration in well 32M-01-14XOB (29 µg/L) is greater than the cleanup goal, but is well below the historical high of 90 µg/L in 2015; however, no statistically significant trend in the arsenic concentration data was identified for this well ($p = 0.124$). Arsenic at source well 32M-01-18XBR (3.4 µg/L) was below the cleanup goal in 2019; no statistically significant trend ($p=0.374$) was identified in the long-term dataset.

Sentry well 32M-01-14XOB is located adjacent to Shepley's Hill Landfill; however, the ROD point of compliance is the Zone II boundary located approximately 2,000 feet to the east of AOC 32. Monitoring beyond well 32M-01-14XOB is not practical as this would place any downgradient well within the Shepley's Hill Landfill. Data obtained from such a well would provide data reflective of landfill conditions and not groundwater conditions generated from the area of AOCs 32 and 43A. The migration of arsenic or 1,4-DCB to the Zone II boundary at concentrations exceeding cleanup goals is not likely due to the low level of the observed exceedances and the overall decrease in source area contaminant concentrations following the 2009 persulfate injection. The Army expects inorganic contaminants, including arsenic and manganese, to return to naturally occurring background levels as the anthropogenic carbon is further reduced from the persulfate treatment and natural degradation.

Chlorobenzene and VPH in groundwater have been detected at concentrations above the applicable monitoring criteria at well 32M-01-18XBR. There has been a variable chlorobenzene concentration trend at 32M-01-18XBR since December 2003, mirroring the fluctuating trends noted for the dichlorobenzene (DCB) isomers. However, just as for the DCB isomers, due to the February 2009 injection, chlorobenzene has exhibited a definitive concentration decline. The VPH C_9-C_{10} aromatics concentrations depict a distinct and sustained downward trend from when monitoring started in 2002 to

2010. From 2010 to 2019, concentrations have fluctuated from non-detect to 760 µg/L. However, the overall decreasing trend indicates that no new C_9-C_{10} aromatic depositions have occurred since the peak concentration in May 2004, and that the microbial community has degraded all of the formerly available fraction.

Manganese concentrations have remained below the cleanup goal (background level) since 2012, with the exception of an elevated level of manganese (8,400 µg/L) detected at source area well 32M-01-18XBR during 2018). This was followed by a decrease in the 2019 sample to a concentration (2,200 J µg/L) less than the cleanup goal (**Table G-6**).

The annual reports for 2015 – 2019 indicate that groundwater generally flows to the south/southwest in the overburden and the bedrock, with a component of southeasterly flow on the east side of the area. There have been no changes in direction or use of groundwater or identification of a new groundwater divide during this FYR period.

5.4.3 Site Inspection

The FYR site inspection was conducted on February 10, 2020. In attendance was Melissa Miller of KGS. Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). The inspector verified the roads are in good condition. The sites were visited to verify access and assess the presence of vandalism, and any changes of land use. Both AOC 32 and 43A were accessible and there was no evidence of vandalism. There was no evidence of changes in land use during the on-site inspection, photographs from both sites are attached to the site inspection. The inspector verified the monitoring data is submitted routinely on time, the data indicate contaminant concentrations are declining, and the monitoring wells are secured, routinely sampled, and are in good condition. Based on the site inspection, the overall condition of AOCs 32 and 43A was satisfactory. The inspection checklist is included in **Appendix D** along with supporting photographs.

As part of the Five-Year Review process, the existing land-use was evaluated to ensure that the control requirements identified for the site are being met. The 2003 Quitclaim Deed indicates compliance with LUCs required by the ROD is required. The LUCs in the ROD indicate the land is limited to restricted development and a ban on drinking water well installation within AOCs 32/43A. Compliance with the LUCs was verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The results of the annual monitoring are presented in the Main Post annual reports.

5.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" and EPA Region I's FY2020 Supplemental Technical Assessment Template, the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes. In accordance with the ROD for the AOC 32 soil remedial alternative, contaminated soil was excavated, confirmatory sampling was performed prior to backfilling, soils were transported offsite for disposal, the excavated area was backfilled with clean material. Also, in accordance with the ROD a groundwater monitoring program was established, and monitoring has been conducted annually and the site has been reviewed every five years.

In accordance with the ROD the groundwater remedial alternatives for AOCs 32/43A LUCs were established; additional groundwater monitoring wells were installed; data on monitored natural attenuation was collected and assessed; long-term groundwater monitoring was conducted, the site was reviewed every five years, and annual data reports were provided.

Remedial Action Performance

The excavation and off-site disposal of contaminated soils have been effective at removing any contaminant source soils and has met the objectives of the remedial actions (minimizing contact/ingestion and inhalation of contaminated surface soils by human or ecological receptors; reducing the probability of surface run-off of contaminants; and minimizing the potential migration of contaminants to groundwater).

An evaluation of monitored natural attenuation was performed for AOC 32. The Monitored Natural Attenuation Assessment (MNAA) Report (SWETS, 2000b) summarized the data collected from MNA field activities that began in January 1999, and presented the final assessment and recommendations concerning natural attenuation effectiveness based on ROD criteria. The report concluded that natural attenuation, supplemented with long-term groundwater monitoring and establishment of LUCs, would be an effective remedial action at AOC 32.

An evaluation of the remedial actions was performed. As documented in the Final Demonstration of Remedial Actions Operating Properly and Successfully Report (Stone and Webster Environmental Technology & Services [SWETS], 2000a), the selected remedial actions for the AOC 32 soil operable unit satisfied the cleanup goals and remedial action objectives established in the ROD.

A separate (from AOC 32) MNA evaluation was performed for AOC 43A. The MNAA Report (SWETS, 2000c) summarized the data collected from MNAA field activities that began in January 1999 and presented the final assessment and recommendations concerning natural attenuation effectiveness based on ROD criteria. The report concluded that natural attenuation, supplemented with long-term monitoring and establishment of LUCs, would be an effective remedial action at AOC 43A.

Based on LTM analytical data a residual hydrocarbon “hot spot” remained within AOC 32 groundwater in a source area well near the former UST #13. An ISCO injection was proposed and accepted and a total of 1,800-gallons of water/sodium persulfate solution was injected into four injection wells in February 2009. Sodium hydroxide was used as the catalyst with the sodium persulfate to form sulfate radicals. Groundwater analytical data indicates significantly diminished COC concentrations as a result of the February 2009 persulfate injection event.

Groundwater monitoring is performed in accordance with the LTMMP (Sovereign/HGL, 2015). Groundwater sampling was discontinued at AOC 43A in 2004 due to two consecutive years of contaminant non-detections within groundwater wells at this AOC. Groundwater gauging is performed at AOC 43A on an annual basis. Beginning in 2010, four LTM monitoring wells at AOC 32 have been sampled annually during the spring monitoring event. At EPA's request, two additional bedrock monitoring wells (32M-01-15XBR and 32M-01-16XBR) were sampled in October 2019.

Analysis of groundwater data indicates that off-site migration is not occurring. Concentrations of contaminants of concern generally declined between 2015 and 2019. A spike in concentrations was observed in the sample from well 32M-01-18XBR in April 2018; however, these results appears to be an outlier as they are significantly higher than concentrations detected in recent preceding years and were not repeated in the 2019 dataset. The current (April 2019) groundwater analytical data for well 32M-01-18XBR indicates significantly diminished COC concentrations compared to the pre-February 2009 persulfate injection event. The time frame estimated to achieve the remedial goals outlined in the ROD is still estimated to be in compliance with the 2026 goal.

As noted above, annual LTM and performance monitoring events continued through 2019. Based on the site data, a reduction in LTM sampling from annual to once every five years (coincident with five-year reviews) is proposed.

System Operations/O&M

There are no active treatment systems or applicable operations and operations and maintenance for AOCs 32 and 43A.

Implementation of Institutional Controls and other Measures

The ROD required LUCs at AOCs 32/43A include a prohibition on intrusion into or installation of wells into the known area of contamination in the bedrock. Deed restrictions limit land use and development. The land is limited to restricted development, including a ban on drinking water well installation. The 2003 Quitclaim Deed indicates compliance with LUCs required by the ROD is required. The LUCs in the ROD indicate the land is limited to restricted development and a ban on drinking water well installation within AOCs 32/43A.

Monitoring of land-use control implementation is conducted in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The monitoring is conducted on an annual basis via interviews with site representative and on-site visits. The annual monitoring is documented in the Main Post Annual Report.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. There have been changes in standards, toxicity data, risk assessment methods, exposure parameters since the 1998 ROD was issued as discussed below. As discussed below, the changes as described below are not expected to alter the protectiveness of the remedy.

<u>Question B Summary:</u>

Changes to a number of standards and guidelines for AOCs 32 and 43A cleanup goals have changed and become more stringent than cleanup levels identified in the ROD. As discussed below, these changes are not expected to alter the protectiveness of the remedy. The PFAS drinking water regulations do not affect protectiveness of the remedy because LUCs prevent use of groundwater.

Changes in toxicity do not affect protectiveness of the remedy. The average lead concentration in the post-excavation confirmatory samples collected after the soil excavation was below the new screening level of 200 ppm. Changes in toxicity of PAHs are not expected to alter the protectiveness of the remedy, because the risk assessment was conducted using EPA Region I's standard approach for computing risk estimates for cPAHs at the time (i.e., assuming all cPAHs are as toxic as benzo(a)pyrene [EPA's B(a)P approach]) and as such is a more conservative estimate of risk compared to risk assessments using the 2017 cPAH toxicity values. Also, a screening-level review of soil cleanup levels used during the soil removal action shows that the cleanup levels remain valid for cPAHs. Changes in toxicity of PFAS do not affect protectiveness of the remedy because LUCs are in place to restrict potential future residential development and use of the groundwater.

Changes in risk assessment methods do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the ROD. There have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

Vapor intrusion (VI) was recognized as an exposure pathway of concern at AOC 32. The risk to indoor workers from vapor intrusion was below the EPA risk management range.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1998 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location- and action-specific ARARs listed in 1998 ROD have been met since the remedies have been implemented. Chemical-specific ARARs and TBCs considered at the time of the ROD to derive soil and groundwater cleanup levels.

For the excavation and disposal portion of the remedy no chemical-specific ARARs were identified, only chemical-specific TBCs were identified. The chemical specific TBCs were used to develop the risk based site-specific soil cleanup goals for arsenic and lead. The RCRA Corrective Action Levels 55 FR 30798 (July 1990) was used to calculate the cleanup levels for DDD, DDE, and DDT. The RCRA Corrective Action Levels 55 FR 30798 (July 1990) was withdrawn by EPA in October 1999. The soil cleanup levels are no longer applicable because the remedial construction work has been completed and the clean-up levels have been attained.

Table 5-5 Evaluation of Chemical of Concern Soil Cleanup Levels, AOCs 32/43A

Contaminant of Concern	ROD Cleanup Goals (mg/kg)	Basis	2020 Standard (mg/kg)	Basis	Change to Cleanup Goal Needed?
PCBs	2	TSCA	10	TSCA [40 CFR 761.125 (c) (4)]	No
Arsenic	24	HHRA Levels Concentrations Corresponding to 10-05 risk or HI = 1	Not applicable	Not applicable	No
Lead	426	HHRA Levels Concentrations Corresponding to 10-05 risk or HI = 1	Not applicable	Not applicable	No
DDD	3	RCRA Action Levels (Residential)[1]	Not applicable	Not applicable	No
DDE	2	RCRA Action Levels (Residential) [1]	Not applicable	Not applicable	No
DDT	2	RCRA Action Levels (Residential) [1]	Not applicable	Not applicable	No

[1] Calculated RCRA CMS Action Level as outlined in 55FR30798: 27 July 1990, corresponding to a hazard index of 0.2 in compliance with MDEP for residential soil.

Changes to chemical-specific ARARs and cleanup goals determined after the ROD for the monitored natural attenuation portion of the remedy are summarized below. The chemical specific ARARs consist of the National Primary Drinking Water Standards and the Massachusetts Drinking Water Standards are considered relevant and appropriate and the USEPA references does and the USEPA health advisories are considered to be considered. Because cleanup goals were not established in the ROD for EPH/VPH, the MCP GW-1 standard was used as the effective cleanup goal. After the ROD was issued, site-specific cleanup goals were developed for cis-1,2-dichloroethene (*cis*-1,2-DCE), 1,1,1 trichloroethene, and C19-C36 aliphatics.

The changes in chemical specific ARARs and cleanup goals will result in extending the time to reach cleanup, but these changes are not expected to alter the protectiveness of the remedy due to implementation of LUCs.

Table 5-6 Evaluation of Chemical of Concern Groundwater Cleanup Levels, AOCs 32/43A

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis	2020 Standard (µg/L)	Basis	Change to Cleanup Goal Needed?
Trichloroethene (TCE)	5	NA	MCL	5	MCL	No
Benzene	5	NA	MCL	5	MCL	No

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis	2020 Standard (µg/L)	Basis	Change to Cleanup Goal Needed?
1,2-dichlorobenzene (1,2-DCB)	600	NA	MCL	600	MCL	No
1,3-dichlorobenzene (1,3-DCB)	600	NA	EPA Drinking HA	600/100	EPA Drinking HA / MA GW-1	No. The EPA Drinking HA is the ARAR. The MA GW-1 can be used as monitoring criteria as it is not an ARAR.
1,4-dichlorobenzene (1,4-DCB)	75	NA	MCL	75/5	MCL/MMCL	Yes, an MMCL has been developed since the ROD was issued and MMCLs are ARARs.
Total 1,2-dichloroethene	55	NA	EPA Region III Tap Water Risk-Based Concentration	See cleanup goal for trans- and cis-1,2-dichloroethene below		
Alpha-Benzenehexachloride	0.011	NA	EPA Region III Tap Water Risk-Based Concentration	0.72	EPA RSL Tap Water	No
DDT	0.5	NA	MCL	0.3	MA GW-1[1]	Yes. MCL was remanded and there are no other ARARs for DDT. The MA GW-1 is not an ARAR can be used as a monitoring criteria.
PCB1260	0.5	NA	MCL	0.5	MCL	No

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis	2020 Standard (µg/L)	Basis	Change to Cleanup Goal Needed?
1,3-dinitrobenzene	1.0	NA	EPA Drinking Water HA	1.0	EPA Drinking Water HA	No
1,3,5-Trichlorobenzene	1.8	NA	EPA Drinking Water HA	40	EPA Drinking Water HA	No, revised ARAR is higher
Bis-(2-ethylhexyl)phthalate	6	NA	MCL	6	MCL	No
Aluminum	390	NA	Background	50-200	SMCL and SMMCL	No, SMCL and SMMCLs are not ARARs.
Arsenic – total	50	NA	MCL	10	MCL	Yes
Iron	320	NA	Background	300	SMCL and SMMCL	No, SMCLs and SMMCLs are not ARARs.
Manganese - total	3,500	NA	Background	50	SMCL and SMMCL	No, SMCLs and SMMCLs are not ARARs.
Sodium	28,000	NA	MA ORSG	20,000	EPA Drinking Water HA and MA ORSG	Yes, the revised ARAR is lower.
Thallium	0.5	NA	MCL Goal	0.5	MCL Goal	No
Cleanup Goals Established after the ROD						
trans-1,2-dichloroethene(*trans*-1,2-DCE)	NA	100	MCL	100	MCL	No
cis-1,2-dichloroethene(*cis*-1,2-DCE)	NA	55	unknown	70	MCL	No, revised ARAR is higher

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Post-ROD Cleanup Goals (µg/L)	Basis	2020 Standard (µg/L)	Basis	Change to Cleanup Goal Needed?
1,1,1-trichloroethane	NA	5	unknown	200	MCL	No, revised ARAR is higher
1,1,2-trichloroethane	NA	5	MCL	5	MCL	No
Chlorobenzene	NA	100	MCL	100	MCL	No
Vinyl Chloride	NA	2	MCL	2	MCL	No
Ethylbenzene	NA	700	MCL	700	MCL	No
Toluene	NA	1,000	MCL	1,000	MCL	No
Total Xylenes	NA	10,000	MCL	10,000	MCL	No
C_5-C_8 Aliphatics (adjusted)[2]	NA	400	MA GW-1	300	MA GW-1	No[2]
C_9-C_{12} Aliphatics (adjusted) [2]	NA	4,000	MA GW-1	700	MA GW-1	No[2]
C_9-C_{10} Aromatics[2]	NA	200	MA GW-1	200	MA GW-1	No[2]
C_9-C_{18} Aliphatics[2]	NA	4,000	MA GW-1	700	MA GW-1	No[2]
C_{19}-C_{36} Aliphatics[2]	NA	5,000	MA GW-1	14,000	MA GW-1	No[2]
C_{11}-C_{22} Aromatics[2]	NA	200	MA GW-1	200	MA GW-1	No[2]

[1] MA GW-1 are not ARARs but can be used as monitoring criteria.

[2] No cleanup goal was established for this analyte in the Record of Decision. The Massachusetts Contingency Plan GW-1, standard is being used in lieu of a cleanup goal, per the Final Monitored Natural Attenuation Assessment Report, Stone & Webster 2000.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information

on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS: In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the PFAS compounds included in EPA's LHA (i.e. PFOA and PFOS)to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of the five PFAS compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

The presence of PFAS in groundwater and soil at AOCs 32/43A is being investigated to address PFAS at former Fort Devens. The on-going base wide PFAS remedial investigation is discussed in Section 12 of this FYR. Land use controls are in place to prevent exposure to groundwater.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. Lead was not identified in soil at concentrations greater than the new screening level. The PAH toxicity does not affect the protectiveness of the remedy because the risk assessment was conducted using EPA Region I's standard approach for computing risk estimates for cPAHs at the time and as such is a more conservative estimate of risk compared to risk assessments using the 2017 cPAH toxicity values. Also, a screening-level review of soil cleanup levels for cPAHs shows that the cleanup levels remain valid for the cPAHs. The new PFAS toxicity values do not affect the current protectiveness of the remedy because LUCs are in place to restrict the use of the groundwater.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*

  In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2014 PFBS*** *non-cancer toxicity value*

  Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed

based on site conditions and may also affect total site risks.

- ***2016 Lead in Soil Cleanups***

Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

The ROD identified a cleanup level of lead in soil of 426 parts per million. The lead cleanup level was achieved via soil excavation. The post-excavation confirmatory samples in the *Final Soils Remedial Action Operable Unit Completion Report: Soil, Asphalt, and Debris Removal* (Weston, 2000) were reviewed to determine if average lead concentrations exceeded the updated screening level of 200 ppm for residential exposure. The average lead concentration was below 200 ppm. During the remedial investigation, 2 cubic yards of stained soil intermingled with oil filters, cans, glass bottles, and other debris was excavated during trenching of the former UST #13 excavation area. Three excavation confirmation soil samples were collected from this area. One of the samples had lead in soil of 1,100 µg/g. The feasibility study indicated the soil near the UST with the sample of elevated lead concentrations were removed (Ecology and Environment, Inc., 1997). Based on this review, no further remedial work is necessary to address remaining lead in soil.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors for different age groups. The cancer potency of

other carcinogenic cPAHs is adjusted by the use of relative potency factors, which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

Per the RI, the risk assessment was conducted using EPA Region I's standard approach for computing risk estimates for cPAHs at the time (i.e., assuming all cPAHs are as toxic as benzo(a)pyrene [EPA's B(a)P approach]) and as such is a more conservative estimate of risk compared to risk assessments using the 2017 cPAH toxicity values.

Soil cleanup levels for PAHs were not developed in the ROD but were developed in support of the soil removal action and are in the *Final Soils Remedial Action Operable Unit Completion Report Soil, Asphalt, and Debris Removal at Area of Contamination (AOC) 32, Devens, Massachusetts* (Weston, 2000). As shown in Appendix G, a screening-level review of soil cleanup levels for cPAHs shows that the cleanup levels remain valid for the cPAHs.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 1998 ROD These changes do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1998 ROD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of

Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator**.**

Vapor intrusion (VI) was recognized as an exposure pathway of concern at AOC 32. The risk to indoor workers from vapor intrusion was below the EPA risk management range. The Army conducted vapor intrusion modeling since the second five-year review and concluded that there is no vapor intrusion pathway or risk attributable to a vapor intrusion pathway (HGL, 2010). The 2018 VISL calculator has not been run for this site.

Expected Progress Towards Meeting RAOs

The RAOs for surface and subsurface soils were achieved through the excavation of soil.

The groundwater cleanup levels have been achieved at AOC 43. Groundwater COC concentrations have decreased below the groundwater cleanup levels in all of the AOC 43 wells.

At AOC 32 the groundwater RAOs have been met. Analysis of groundwater data indicates that off-site migration is not occurring that could adversely affect flora and fauna and result in surface water concentrations in excess of ambient water quality standards. Analysis of groundwater data indicates that there is no migration of COCs at levels that could adversely affect potential and existing drinking water supply aquifers.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

5.6 Issues/Recommendations

None.

5.6.1 Other Findings

Based on the data presented in **Appendix G**, the Army proposes to reduce the sampling frequency at AOC 32 to once every five years, coincident with the FYR schedule.

5.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU05 - DRMO Yards AOC 32 and 43A	*Protectiveness Determination*: Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at AOCs 32 and AOC 43A is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent. The RAOs have been achieved through 1) excavation and disposal of contaminated soil and 2) reduction of groundwater contamination through natural attenuation and persulfate injections. At AOC 43A, contaminated groundwater concentrations have decreased below the groundwater cleanup levels. At AOC 32, groundwater monitoring has confirmed migration of contaminated groundwater at concentrations that could adversely affect human health and the environment has not occurred. The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains industrial.		

5.8 Next Review

The next FYR for AOC 32 and 43A is required five years from the completion of this review (September 2025).

5.9 References

References are included in **Appendix A**.

6 HISTORIC GAS STATION AREAS OF CONTAMINATION 43G AND 43J

6.1 Introduction

This is the fifth five-year review conducted for AOCs 43G and 43J. The five-year review is required due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited used and unrestricted exposure.

6.1.1 Site Background

Both AOCs 43G and 43J are historic gas stations located within the former Fort Devens in the Town of Harvard, Massachusetts. AOC 43G is located on Queenstown Road in the central portion of the former Main Post (**Figure 7.1, Appendix H**) AOC 43J is located on Patton Road in the southern portion of the former Main Post (**Figure 7.2, Appendix H**).

A summary of site background is provided below. Additional details and a site chronology are included in **Appendix H**.

AOC 43G Background

AOC 43G consists of a decommissioned Army Air Force Exchange Service (AAFES) gas station and historic gas station G. For purposes of field investigation, AOC 43G was divided into three areas. Area 1 is the former location of historic gas station G. Areas 2 and 3 are associated with the AAFES gas station and represent the locations of former gasoline USTs and the former waste oil UST/sand and gas trap, respectively.

The original study area (SA 43G [Area 1]) was the historic gas station, which was used as a motor vehicle pool to support military operations during World War II.

The location of the former AAFES gasoline station is approximately 120 ft northeast of the site of historic gas station G. At the time of the 1992 SI and 1993 SSI, it consisted of a service station (Building 2008), which housed three vehicle service bays and the AAFES store. It also included three 10,000-gallon USTs, associated pump islands, and a sand and gas trap (Area 3).

The AAFES gas station was added to investigate the distribution of contamination observed during the removal of three former 9,000-gallon (removed in 1990) and two former 10,000-gallon gasoline USTs (removed in 1996). Although soil samples were collected from the walls of the excavation, no samples were collected from the base of the excavation. Contamination was also identified during the removal of a 500-gallon waste oil UST (completed in 1992). Impacted soils were not removed due to the close proximity of Building 2008.

The AOC 43G property remains owned and under the control of Army.

AOC 43J Background

At the time of base closure in 1996, the area around AOC 43J was used as a vehicle storage yard and maintenance facility (former Buildings T-2446 and T-2479) for a Special Forces Unit of the Army. The AOC 43J area was used in the 1940s and 1950s as a gas station/motor pool (historic gas station J). After WWII, it became a vehicle storage yard and maintenance facility (former Buildings T-2466 and T-2479). Multiple USTs were used at the site to store gasoline and maintenance wastes. No records were located regarding the decommissioning of the motor pool or removal of the associated USTs. A 1,000-gallon UST used for storage of maintenance wastes was located just south of former Building T-2446. The yard and maintenance facility

are paved with asphalt and surrounded by a chain-link fence with a locked gate located at the northern side of the yard. AOC 43J is within the Shabokin Supply Well Zone II.

AOC 43J property was transferred from the Army to MassDevelopment in June 2006. All ROD and ESD requirements were included in the June 2006 Grant of Environmental Restriction and Easement (GERE) issued by MassDEP and recorded with the deed at the appropriate Registry of Deeds. The AOC 43J property is currently owned by Bristol Myers Squibb.

6.2 Response Action Summary

6.2.1 Basis for Taking Action

In 1991 and 1993, Army conducted a site investigation (SI) and supplemental SI, respectively, at AOCs 43G and 43J to more fully evaluate fuel-related compounds, principally benzene, toluene, ethylbenzene, and xylenes (BTEX), detected in soils and install monitoring wells to investigate potential impacts to groundwater. Based on the data collected and results of the preliminary risk evaluation, the AOCs were moved into the CERCLA RI/FS process to better define the nature and extent of contamination, assess current and potential future risks to human health and the environment, and evaluate possible remedial alternatives, if warranted. The RI at each AOC was completed in 1994 and the Final RI report for both AOCs was issued in February 1996. FS reports were issued in June 1996 that identified and evaluated several groundwater remediation alternatives.

AOC 43G

The 1993 SSI identified fuel related compounds, principally benzene, toluene, ethylbenzene, and xylenes (BTEX), in site soil and groundwater within Area 2 and 3. Due to the presence of soil and groundwater impacts, a RI and subsequent FS were recommended for Areas 2 and 3.

The HHRA completed for the RI identified no unacceptable threats to human health from exposure to contaminated soil but did find potential threats to human health from future exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives for the groundwater contamination at AOC 43G.

A human health risk assessment was conducted to evaluate potential health risks to individuals under current or foreseeable future site conditions at AOC 43G. A commercial/industrial worker scenario was used to assess potential human health risks associated with contaminants detected in soil, sediment and groundwater because the future reuse of this area will remain similar to its present use. Because of the urbanized nature of this site and the lack of exposure pathways (the site is paved), an ecological risk assessment was not performed.

Potential human health risks associated with exposure to subsurface soil at Areas 2 and 3 of AOC 43G were evaluated in the RI report. Potential human health risks associated with exposure to subsurface soil in Area 1 were evaluated in the Final SI report and were not presented in the RI risk assessment. The evaluated exposure scenario was for a utility/maintenance worker. Estimated carcinogenic risks did not exceed the USEPA target risk range or MADEP Massachusetts Contingency Plan (MCP) risk management level. Similarly, potential noncarcinogenic risks did not exceed the USEPA and MADEP MCP target level.

Risks associated with exposure to groundwater were evaluated for unfiltered groundwater representing the source area and for unfiltered groundwater identified as downgradient. The receptor evaluated was a future commercial/industrial worker. Estimated carcinogenic risks were at the upper end or exceeded the USEPA risk range of $1x10^{-4}$ to $1xl0^{-6}$ for exposure to source area groundwater. Arsenic and benzene were the primary

contributors to the excess risk. At maximum concentrations both arsenic and benzene produced individual risks above $1x10^{-4}$. In downgradient groundwater, exposure to maximum concentrations produced a cancer risk exceeding the USEPA range. Arsenic contributed 94 percent of the risk of $2x10^{-4}$.

Risks were estimated for commercial/industrial worker exposure to filtered groundwater assuming that concentrations of organic COPCs remain the same as in unfiltered groundwater. Estimated carcinogenic risks were at the upper end or exceeded the USEPA target risk range of $1x10^{-4}$ to $1xl0^{-6}$ for exposure to COPCs in source area filtered groundwater. Arsenic and benzene were the primary contributors to the excess risk. Both arsenic and benzene produced individual risks above $1x10^{-4}$. In downgradient filtered groundwater, exposure to groundwater produced risks within the USEPA range.

If the modified cancer slope factor (CSF) for arsenic was used to estimate excess lifetime cancer risks, the cancer risks associated with exposure to both average and maximum concentrations of arsenic in filtered and unfiltered groundwater would fall below $1x10^{-4}$.

Estimated noncarcinogenic risks exceeded the USEPA target level of 1 for both source area and downgradient unfiltered groundwater. Hazard Indices (HI) for the source area were above the USEPA target level. Benzene, manganese, iron, and arsenic are the primary risk contributors for source area groundwater. HIs for downgradient groundwater were above the USEPA target level. Manganese and benzene are the primary contributors for downgradient groundwater. Individual hazard quotients (HQ) for the primary contributors in both source area and downgradient groundwater all exceed the USEPA target level of 1.

For filtered groundwater, estimated noncarcinogenic risks exceeded the USEPA target level of 1 for both source area and downgradient groundwater. Benzene, manganese, iron, and arsenic are the primary contributors for source area groundwater. Manganese and benzene are the primary contributors for downgradient groundwater. Individual HQs for the primary contributors in both source area and downgradient groundwater all exceed the USEPA target level of 1.

AOC 43J

In 1993, an SSI was performed to investigate the soil impacts observed during the SI and to install groundwater monitoring wells. The 1993 SSI investigations detected fuel related compounds, principally BTEX, in site soil and groundwater. Because of the presence of soil and groundwater contamination, a RI and subsequent FS were recommended. The site designation for SA 43J was administratively changed to AOC 43J at that time. The HHRA completed for the RI identified no unacceptable threats to human health from exposure to contaminated soil but did find potential threats to human health from future exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives that addressed the groundwater contamination at AOC 43J. In October1996, the ROD was signed.

Another site, AREE 61 AF, also known as the 10th Special Forces Headquarters Motor Pool Building, is located directly adjacent to AOC 43J. Various studies and removal actions have been previously performed at the site. The monitoring wells included in the AOC 43J LTMP are distributed across a major portion of AREE 61 AF. An NFA designation was approved by the USEPA in late 2003.

A human health risk assessment has been conducted to evaluate potential health risks to individuals under current or foreseeable future site conditions at AOC 43J. Because of the urbanized nature of this site and the lack of exposure pathways (the site is paved), an ecological risk assessment was not performed.

The subsurface soil exposure scenarios were for a utility/maintenance worker and a construction worker. Estimated carcinogenic risks did not exceed the USEPA risk range or MADEP MCP risk level. Similarly, potential noncarcinogenic risks did not exceed the USEPA and MADEP MCP target level.

Risks associated with exposure to unfiltered and filtered groundwater were evaluated for groundwater representing the source area and for groundwater identified as downgradient. The receptor evaluated was a future commercial/industrial worker. Estimated carcinogenic risks for unfiltered groundwater exceeded the USEPA target risk range for exposure to source area groundwater. Arsenic was the primary contributor to risk exceeding the $1x10^{-4}$ risk level. Assuming exposure to maximum concentrations, benzene and carbon tetrachloride produced individual risks above $1x10^{-5}$.

In unfiltered downgradient groundwater, estimated carcinogenic risks were within the USEPA target risk range. Risks were estimated for commercial/industrial worker exposure to filtered groundwater assuming that concentrations of organic COPCs remain the same as in unfiltered groundwater. Estimated carcinogenic risks exceeded the USEPA target risk range for exposure to source area groundwater ($5x10^{-4}$). Arsenic, benzene, and carbon tetrachloride were primary contributors. In downgradient groundwater, exposure to groundwater produced risks within the USEPA range.

If the modified CSF for arsenic was used to estimate excess lifetime cancer risks, then the cancer risks associated with exposure to arsenic in unfiltered and filtered groundwater would fall below $lxl0^{-4}$.

Estimated noncarcinogenic risks exceeded the USEPA target level of 1 for both source area and downgradient unfiltered groundwater. Benzene, manganese, iron, and arsenic are the primary contributors for source area groundwater. Manganese and benzene are the primary contributors for downgradient groundwater. Individual HQs for the primary contributors in both source area and downgradient groundwater all exceed the USEPA target level of 1.

For filtered groundwater, estimated noncarcinogenic risks exceeded the USEPA target level of 1 for both source area and downgradient groundwater. Benzene, manganese, and arsenic are primary contributors of filtered source area groundwater. Manganese is the only contributor with an HQ exceeding 1.

6.2.2 Response Actions

Army issued the ROD for AOCs 43G and 43J on October 16, 1996. The selected remedial alternative combined components of different source control and management of migration alternatives to control the migration of contaminants in groundwater, reduce contaminant concentrations, and control potential groundwater use.

The following remedial response [action] objectives were developed for AOCs 43G and 43J to mitigate existing and future potential threats to human health and the environment:

- Protect potential commercial/industrial receptors located on Army [AOCs 43G and 43J] property from exposure to groundwater having chemicals in excess of maximum contaminant levels (MCLs);
- Protect potential commercial/industrial receptors located off Army [AOCs 43G and 43J] property from exposure to groundwater having chemicals in excess of MCLs; and,
- Prevent contaminated groundwater having chemicals in excess of MCLs from migrating off Army property.

Because future use of the AOCs was expected to remain unchanged, human health risks associated with exposure to contaminants in soil, sediment and groundwater were only evaluated for the commercial/industrial worker exposure pathway. In addition, because of the urbanized nature of the

properties and the lack of exposure pathways (the site is paved), an ecological risk assessment was not performed.

At AOC 43G, the remedial goals (RG) for benzene, ethylbenzene, xylenes, and nickel in source area groundwater are the MCLs and MMCLs in effect at the time. The RGs for iron and manganese in source area groundwater are Devens background concentrations, because background concentrations exceeded the risk-based concentrations derived from available RfD values at the time of the RI/FS. In the downgradient groundwater, the RGs for benzene is the MCL and the RG for manganese is background.

Table 6-1 Table 6-1. Contaminants of Concern Cleanup Goals in Groundwater AOC 43G

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Source Area	Downgradient
Iron	9,100	Background	Yes	No
Manganese	291	Background	Yes	Yes
Nickel	100	MCL	Yes	No
Benzene	5	MCL	Yes	Yes
Ethylbenzene	700	MCL	Yes	No
Xylenes	10,000	MCL	Yes	No

At AOC 43J, the RGs for benzene, carbon tetrachloride, ethylbenzene, toluene, and arsenic in source area groundwater are the MCLs and MMCLs in effect at the time. The RGs for iron and manganese are Devens background concentrations because background concentrations exceeded the risk-based concentrations derived from available RfD values. In the downgradient groundwater, the RGs for benzene is the MCL and the RG for manganese is background.

Table 6-2 Contaminants of Concern Cleanup Goals in Groundwater AOC 43J

Contaminant of Concern	Cleanup Goals (µg/L)	Basis	Source Area	Downgradient
Arsenic	50	MCL	Yes	
Iron	9,100	Background	Yes	
Manganese	291	Background	Yes	Yes
Nickel	100	MCL	Yes	
Benzene	5	MCL	Yes	Yes
Carbon Tetrachloride	5	MCL	Yes	
Ethylbenzene	700	MCL	Yes	
Toluene	1,000	MCL	Yes	

In the ROD, Alternative 2A was selected for AOC 43G and Alternative 2 was selected for AOC 43J as the remedies for the sites. The remedial components identified in the 1996 ROD to address groundwater contamination at AOCs 43G and 43J are as follows:

1. Intrinsic bioremediation;
2. Intrinsic bioremediation assessment data collection and groundwater modeling;
3. Installation of additional groundwater monitoring wells;
4. Groundwater LTM;
5. Annual data reports to USEPA and MassDEP; and
6. Five-year reviews.

If the intrinsic bioremediation assessment results at AOC 43G and 43J indicate that: 1) the groundwater contaminant plume may increase in size on Army property and/or, 2) the groundwater contaminant plume remains the same size, but cannot be remediated within 30 years; a soil vapor extraction (SVE) system will be installed at the existing AOC 43G source area, and an additional cleanup action will be implemented at AOC 43J. Furthermore, if at any time during this remedy there is an indication that contaminants are migrating off Army property or an area located sufficiently inside the boundary in which compliance will be determined, according to cleanup criteria stated in the ROD, that at minimum will meet drinking water standards; then the Army will implement an additional remedial action which will be protective of human health and the environment.

To ensure continued protection of human health and the environment and future integrity of the selected remedy following the early transfer of AOC 43J property to MassDevelopment, Army issued an Explanation of Significant Difference (ESD) to the 1996 ROD in June 2006 to incorporate LUCs into the remedy with the objective of prohibiting (1) residential development/use, (2) groundwater usage, and (3) unauthorized soil disturbance or construction.

Specifically, the following LUCs, to be implemented as deed restrictions and/or use restrictions, were added to the AOC 43J remedy:

- Prohibition on residential development/use (i.e. single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12).
- Prohibition on the extraction, consumption and/or use of groundwater underlying the AOC 43J property for any purpose, including without limitation, extraction for potable, industrial, irrigation or agricultural use;
- Prohibition on the excavation, removal, or disposal of soil or other ground intrusive work on all areas of the AOC 43J Property without the prior approval of the Army, USEPA and MADEP.

As a condition of granting such approval, the Army, USEPA and MADEP may require the property owner to prepare the following plans and perform the following technical evaluations to provide assurance that site development will not interfere with or impede the completion of the CERCLA cleanup on the Property and that the remedy remains protective of human health and the environment:

(1) prepare a soil management and health and safety plan;

(2) perform a technical assessment to evaluate potential risk associated with the inhalation of vapors migrating from the subsurface into the indoor air of any proposed structures; and,

(3)prepare a technical evaluation for the construction of a new stormwater recharge management system that have the potential to modify the contaminated groundwater plume.

6.2.3 Status of Implementation

AOC 43G

Remedial Component 1 (intrinsic bioremediation) is ongoing at AOC 43G. The progress of the remediation is monitored through remedial component 4 and is reported in remedial component 5.

Remedial Component 2 [intrinsic remediation assessment (IRA) and groundwater modeling) and was completed by SWETS and HLA between 1998 and 1999. The results of the IRA and the groundwater modeling associated field efforts are detailed in a Final IRA Report (SWETS, 1999a).

BIOSCREEN modeling suggested that even with continuing residual sources the extent of the contamination as defined by the remedial goals would be limited to about 25 ft from one of the source area wells at AOC 43G (HGL, 2010). This distance puts the furthest predicted extent of the groundwater contamination (above RGs) within the existing Devens site boundary.

Results from the BIOPLUME II modeling were used to estimate remedial duration and contamination migration potential (HGL, 2010). Modeling demonstrated an unlikely potential for benzene contamination migration off Army property and general agreement with regression analysis results. The modeling also considered added demands from other competitors (non-BTEX petroleum hydrocarbons). It revealed that this additional demand added only about 2 years to the time to reach remedial goals. The benzene criterion at AOC 43G was estimated to be achieved approximately in the years 2007 to 2009, or between 11 to 13 years total following signing of the ROD, which is compliant with the 30-year criterions in the ROD. The BIOPLUME II modeling determined that aerobic degradation was the overriding process at these sites (HGL, 2010).

Remedial Component 3 (installation of additional groundwater monitoring wells) was completed by SWETS and HLA between 1998 and 1999. The field efforts are detailed in a Final IRA Report (SWETS, 1999a).

Remedial Component 4 (long-term monitoring) started after the ROD continues with annual sampling. The sampling is currently conducted in accordance with the 2015 LTMMP (Sovereign/HGL, 2015). As part of a supplemental sampling event conducted in winter 2020, three additional groundwater monitoring wells were installed in areas downgradient of the original UST area. These wells, and an existing upgradient piezometer were sampled for dissolved manganese and iron in February 2020.

Remedial Component 5 (annual data reports to USEPA and MassDEP) have been completed.

Remedial Component 6 (five-year reviews) were completed in 2000, 2005, 2010, and 2015.

The LUCs were developed for AOC 43G are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (Appendix G of the 2015 LTMMP) (Sovereign/HGL, 2015).

- Assure that the Property is not used for residential purposes and prohibit the use of groundwater beneath the site. If the Army changes the land-use within the AOC, then additional assessment and/or possible remedial action may be needed based upon the possible resultant changed risk factors.
- If the Army transfers this property by lease or deed, an Environmental Baseline Assessment (EBS) will be conducted to ensure that the remedy remains protective by incorporating all necessary environmental protection provisions within the Finding of Suitability to Transfer (FOST) and the property transfer deed.
- Any intrusive construction work must consider that residual soil and groundwater contamination has been documented for AOC 43G and that such actions should be coordinated with the DPW, the BRAC Environmental Office and the BRAC Clean-up Team (BCT).

Compliance with the LUCs is verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The results of the annual monitoring are presented in the Main Post annual reports.

AOC 43J

Remedial Component 1 (intrinsic bioremediation) is ongoing at AOC 43J. The progress of the remediation is monitored through remedial component 4 and is reported in remedial component 5.

Remedial Component 2 (IRA and groundwater modeling) and was completed by SWETS and HLA between 1998 and 1999. The results of the IRA and the groundwater modeling associated field efforts are detailed in a Final IRA Report (SWETS, 1999b).

BIOSCREEN modeling suggested that even with continuing residual sources the extent of the contamination as defined by the remedial goals would be limited to about 90 ft from the assumed center of the source area at AOC 43J (HGL, 2010). This distance puts the furthest predicted extent of the groundwater contamination (above RGs) within the existing Devens site boundary.

Results from the BIOPLUME II modeling were used to estimate remedial duration and contamination migration potential (HGL, 2010). Modeling demonstrated an unlikely potential for benzene contamination migration off Army property and general agreement with regression analysis results. The modeling also considered added demands from other competitors (non-BTEX petroleum hydrocarbons). It revealed that this additional demand added only about 2 years to the time to reach remedial goals. Benzene criterion at AOC 43J is predicted to be achieved between 7 to 9 years total (from the baseline event in 1997), or about in the years

2004 to 2006, which is compliant with the 30-year criterion in the ROD. The BIOPLUME II modeling determined that aerobic degradation was the overriding process at these sites.

Remedial Component 3 (installation of additional groundwater monitoring wells) was completed by SWETS and HLA between 1998 and 1999. The field efforts are detailed in a Final IRA Report (SWETS, 1999b).

Remedial Component 4 (long-term monitoring) started after the ROD and continues with annual sampling. The current program is detailed in annual reports.

Remedial Component 5 (annual data reports to USEPA and MassDEP) have been completed.

Remedial Component 6 (five-year reviews) were completed in 2000, 2005, 2010, and 2015.

The ICs were developed for AOC 43J are detailed in the Grant of Environmental Restriction and Easement (GERE), Devens Parcel C, June 16, 2006. The following are the restricted uses and activities:

A. (i) residential use for any single family or multi-family residences, nursing homes or assisted living facilities; (ii) facilities for child care or any type of educational purpose for children/young adults in grades kindergarten through 12; and/or (iii) community centers for ages 18 and under;

B. extraction, consumption or utilization of ground water, as defined in section 101(12) of CERCLA, underlying the Property for any purpose, including without limitation extraction for potable, industrial, irrigation or agricultural use;

C. excavation, removal, storage or disposal of any soil, including without limitation loam, peat, gravel, sand, rock or other mineral or natural resource, or other ground intrusive work;

D. excavation, removal or disturbance of any pavement, building foundation or slab;

E. construction of storm water management systems; and/or

F. disturbance of, or interference with, the implementation, effectiveness, integrity, operation, or maintenance of the ground water monitoring wells implemented or to be implemented as part of the Selected Remedy or the FOSET response actions. Reference is made to the Long Term Monitoring Plan prepared by the Army, as it may be amended from time to time, including without limitation the Annual Reports, both of which are on file at the Army's BRAC Environmental Office located at 30 Quebec Street, Unit 100, Devens, Massachusetts 01432, which provide information about the location and engineering details of components of the Selected Remedy and the FOSET response actions

The GERE does not provide details pertaining to the implementation and monitoring of these restrictions.

6.2.4 ICs Summary Table

Table 6-3 AOCs 43G & 43J – Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	AOC 43G, 43J	43G Restriction on residential development and groundwater usage. 43J • Prohibit residential development/use • Prohibit extraction, consumption, and/or use of groundwater • Prohibit excavation, removal or disposal of soil or other ground intrusive work	September 2007 Addendum to the 1999 Real Property Master Plan Long Range Component for Devens Reserve Forces Training Area. Grant of Environmental Restriction and Easement, Devens Parcel C, June 16, 2006.

6.2.5 System Operations/Operations and Maintenance

There are no active systems to operate and maintain at AOCs 43G and 43J.

6.3 Progress Since the Last Review

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 6-4 Protectiveness Statements from the 2015 FYR

AOC	Protectiveness Determination	Protectiveness Statement
43G	Protective	*"The remedy at AOC 43G is currently protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. Human health is not currently at risk at 43G because groundwater is not used as a drinking water source".*
43J	Protective	*"The remedy at AOC 43J is currently protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled".*

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in Appendix L of the Final 2015 Five Year Review (KGS, 2015).

6.4 Five Year Review Process

This section summarizes the FYR process for AOC 43G/AOC 43J and the actions taken to complete the review.

6.4.1 Community Notifications, Involvement and Site Interviews

As discussed in the Executive Summary, USACE announced the commencement of this Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers.

During the FYR process, interviews were conducted to document any perceived programs or successes with the remedy that has been implemented to date. Results of the interview conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in the Executive Summary regarding the overall cleanup of Devens.

During a FYR interview with a representative of MassDevelopment, information relevant to the protectiveness determination for AOC 43J was discussed. Specifically, it was revealed that an IC breach had occurred at AOC 43J in October 2019. Bristol Meyers Squibb (BMS) had hired a contractor to perform geotechnical borings around the property but not near the contaminated areas. The Army, EPA and MassDEP were not notified of the boring activity prior to start of the boring program. The issue was resolved by

notifying EPA and MassDEP and getting approval from the regulatory agencies. No additional borings were drilled after regulatory approval. The breach apparently occurred because of a BMS staffing change and failure to notify the new employee of the ROD/GERE-specified restrictions/requirements. BMS has indicated that they are aware of the LUCs.

6.4.2 Data Review

AOC 43G

Per the 2015 LTMMP, groundwater samples are analyzed for VPH, total metals (iron and manganese, only), and alkalinity. Groundwater exceedances of select cleanup goals and monitoring goals since 1999 are provided in **Table H-1** in **Appendix H**. Mann-Kendall trend analysis graphs for selected wells are also provided in **Appendix H**. From 2015-2019, iron and manganese were the only COCs that had exceedances of the groundwater cleanup levels.

Benzene concentrations at wells AAFES-2, XGM-93-02X, and XGM-97-12X have remained below the cleanup goal (5 µg/L) for five sampling events during the period 2015-2019.

Total manganese concentrations at six of eight AOC 43G wells sampled in Fall 2019 exceeded the 375 µg/L cleanup goal; manganese at two of six wells were associated with high total iron concentrations (AAFES-02 and XGM-93-02X). Manganese concentrations at downgradient wells XGM-94-06X, XGM-94-07X and XGM-94-08X were greater than the cleanup goal. Concentrations of manganese in wells XGM-94-07X and XGM-94-08X were similar to levels identified in monitoring periods prior to 2015, indicating that manganese levels in the groundwater at these wells have remained stable (well XGM-94-06X had not been sampled prior to Fall 2019). Statistically significant downward trends for manganese were identified for three of four wells (75%) evaluated in 2019: AAFES-2 ($p = 0.003$), XGM-93-02X ($p = 0.005$), and XGM-97-12X ($p = 0.003$). No statistically significant trends were identified for manganese at well AAFES-7 ($p=0.320$) and XGM-94-04X ($p = 0.225$). Statistically significant downward trends in iron concentrations were identified for three wells in 2019: AAFES-2 ($p = 0.017$), XGM-93-02X ($p = 0.008$) and XGM-97-12X ($p = 0.039$).

Total iron was detected above the 9,100 µg/L cleanup goal level at 2 of the 8 (25%) monitoring wells: AAFES-2 (20,000 µg/L), and XGM-93-02X (9,300 µg/L).

VPH monitoring criteria were established by the Army to evaluate intrinsic remediation at AOC 43G. The ROD does not include VPH as a cleanup goal, but the analysis is used to gauge the cleanup of the site and to determine whether a risk-based standard needs to be developed. VPH concentrations are evaluated against MCP standards for comparison purposes.

The historical dataset through 2019 (**Appendix H**) for wells located in the source area and in the area of the historical extent of groundwater impacts identify fluctuations in VPH C_9-C_{10} aromatics concentrations through the period of record. At well AAFES-2, C_9-C_{10} aromatics concentrations increased from 730 µg/L in 2016 to 1,100 J µg/L in 2017, followed by a decrease to 990 µg/L in 2018 and an increase to 1,400 µg/L in 2019. For well XGM-97-12X C_9-C_{10} aromatics increased from 340 µg/L in 2016 to 1,000 µg/L in 2018, followed by a decrease to 340 µg/L in 2019. At well XGM-94-04X C_9-C_{10} aromatics increased from 320 µg/L in 2016 to 410 J µg/L in 2017, decreased to non-detect in 2018 and increased to 830 µg/L in 2019. No statistically significant trends were identified for VPH C_9-C_{10} aromatics at well XGM-94-04X ($p = 0.149$). However, the long-term dataset identifies statistically significant decreasing trends for wells AAFES-2 ($p < 0.001$), XGM-93-02X ($p < 0.001$) and XGM-97-12X ($p < 0.001$).

Data for the VPH C_5-C_8 aliphatic carbon fractions appear to indicate a general downward trend for some monitoring wells following the historical highs observed in November 2005; however, fluctuations

periodically occur. This cyclic pattern may be caused by seasonal fluctuations of the water table with extreme high or low precipitation events. For the 2019 sampling event, groundwater at wells AAFES-2 (1,200 µg/L), XGM-94-04X (590 µg/L) and XGM-97-12X (350 µg/L) contained VPH C_5-C_8 aliphatic hydrocarbon above the 300 µg/L monitoring criterion. A statistically significant downward data trend since the beginning of the monitoring program was noted for well XGM-97-12X ($p = 0.009$). Well XGM-94-04X ($p = 0.031$) was noted with a statistically significant upward data trend since the beginning of the monitoring program. No significant trends were identified for AAFES-2 ($p = 0.512$) and XGM-93-02X ($p = 0.249$).

The VPH C_9-C_{12} aliphatic concentrations have fluctuated since 1999. The VPH C_9-C_{12} concentrations have been below the 700 µg/L monitoring criterion since 2014, with the exception of AAFES-2 (790 µg/L) in 2019. No statistically significant trend was identified for AAFES-2 ($p=0.125$) as well as for XGM-93-02X ($p=0.223$) and XGM-97-12X ($p=0.336$).

The annual reports for 2015 – 2019 indicate that groundwater generally flows from the west to the east, which is consistent with the site's surface topography and historical flow patterns. There have been no changes in direction or use of groundwater or identification of a new groundwater divide during this FYR period.

<u>2020 Supplemental Sampling</u>

Supplemental groundwater sampling activities at AOC 43G conducted in February 2020 consisted of the sampling of three monitoring wells and one piezometer for dissolved iron and manganese (**Table H-2**). The supplemental sampling was initiated by requests from EPA for the Army to obtain additional groundwater data regarding the extent of COCs in groundwater to support the ongoing 2020 Five-Year Review for Fort Devens. The objectives of the supplemental sampling effort were to verify that manganese and iron concentrations in groundwater are stable or decreasing and/or are attenuating over time within the initial impacted area and are not migrating beyond the downgradient point of compliance for the site, as indicated by the CSM. The supplemental sampling results at AOC 43G confirm that the horizontal extent of manganese concentrations greater than the site-specific cleanup goal (375 µg/L) downgradient of the fuel release has been determined.

Dissolved manganese concentrations exceeded the cleanup goal (375 µg/L) at one of three new monitoring wells installed in 2020 to monitor downgradient groundwater flow to areas northeast of the former underground storage tank (UST) area. The detected concentration at XGM-20-03A (400 µg/L) was slightly above the cleanup goal. However, the dissolved manganese concentrations at the two additional downgradient wells installed in the northeastern flow path was less than the cleanup goal. In addition, the total manganese concentration at sentinel well AAFES-7, located to the east of the former UST area and downgradient of XGM-20-03A, was less than the cleanup goal during the fall 2019 LTM event at AOC 43G. These data indicate that the downgradient transport of groundwater with manganese concentrations greater than the cleanup goal to offsite areas is not likely. These conclusions are consistent with the current CSM for AOC 43G.

The identification of dissolved manganese at upgradient monitoring point 43GPZ-19-01 at a concentration of 1.5 J µg/L, which is less than the cleanup goal, indicates that the upgradient extent of manganese impacts from the former UST area has been delineated.

Interpretive water-table elevations for the winter 2020 gauging event at AOC 43G are presented on **Figure H-2**. The 2020 groundwater elevation data identified groundwater flow to be in a west-to-east direction, which is consistent with the site's surface topography and historical flow patterns. Additional groundwater

elevation data for monitoring points to the northeast of AOC 43G suggest that the shallow groundwater in the northern portions of AOC 43G trends slightly toward the northeast. The shallow groundwater flow pattern in the central portion of AOC 43G is generally toward the Robbins Pond drainage area, located approximately 450 feet to the east of sentinel well AAFES-7. A groundwater gradient of 0.0452 ft/ft (Gradient Line A-A', **Figure H-2**) was calculated for the winter 2020 supplemental sampling event. The flow line used to calculate the gradient is believed to be representative of groundwater flow at the site.

AOC 43J

Groundwater monitoring is conducted in accordance with the AOC 43J Annual Groundwater Monitoring Program. Groundwater results since 2013 are provided in **Table H-2** in **Appendix H**.

A 2008 Report evaluating four quarters of groundwater monitoring concluded that MNA at AOC 43J without augmentation was unlikely to be successful in attaining remediation goals by 2026. A sulfate injection pilot study was conducted in December 2009 and 2010 to address this concern. The sulfate tests were followed by an injection of OBC™ in May 2012. In addition, an oxygen emitter pilot test was conducted in 2018. Ethylbenzene and benzene were the only two VOCs that exceeded the ROD cleanup goal in the 2015-2018 period (the 2019 data were unavailable at the time this FYR was prepared). EPA and MassDEP approved removing carbon tetrachloride from the analyte list after several years of annual monitoring in which it was not detected (Haley and Aldrich, 2020). The 2018 exceedances of both compounds were collocated with elevated VPH concentrations in the source area. The ROD does not include VPH as a cleanup goal, but the analysis is used to gauge the cleanup of the site. VPH concentrations are evaluated against MCP standards for comparison purposes. Elevated petroleum concentrations persist in the source area despite long term decreasing concentration trends. The highest detected concentration of ethylbenzene in 2018 was observed in overburden piezometer XJP-94-01X (1,260 µg/L). The highest detected value of benzene in 2018 was observed in bedrock well XJM-97-12X (17.7 µg/L).

Since the OBC™ injection in May 2012, BTEX concentrations have decreased over time in most monitoring wells; however, VPH C5-C8 aliphatics and C9-C10 aromatics concentrations continue to fluctuate. Between 2015 and 2016, concentrations declined in well 2446-02, but they increased slightly in 2017, followed by a decrease in 2018. Concentrations in 2018 also increased in source-area overburden well HA-1S, and bedrock wells HA-6B, HA-1B, and XJM-97-12X. Concentrations decreased in overburden source-area well XJM-94-05X, likely because the well is one of two overburden wells used for pilot-testing of the oxygen emitters. VOC and VPH concentrations in these and other source-area wells are, however, well below historical highs. One or more of the three COC metals – dissolved arsenic, iron, and manganese – were detected at concentrations exceeding ROD cleanup goals in wells in or near the source area, including 2446-03, 2446-04, and oxygen-emitter monitoring wells HA-101(TW), HA-103(MW), and HA-104(MW). Metals are expected to attenuate below ROD cleanup goals as groundwater migrates to areas that have higher DO levels. For example, in most of the sentinel wells (XJM-93-04X, XJM-94-06X, XJM-94-07X and well clusters HA-3 and HA-4), arsenic, iron, and manganese do not exceed the respective ROD cleanup goals. Compared to wells near the source area, VPH concentrations in these wells are considerably lower (generally not detected), and DO concentrations are higher, ranging from approximately 1 to 6 mg/L.

The annual reports for 2015 – 2019 indicate that groundwater generally flows to the east, with southeasterly and northeasterly flow components through the overburden and bedrock. There have been no changes in direction or use of groundwater or identification of a new groundwater divide during this FYR period.

6.4.3 Site Inspection

AOC 43G consists of an inactive car wash, with paved and wooded areas. AOC 43J consists of a paved lot

with perimeter landscaping and adjacent wooded areas. Both of the FYR site inspections were conducted on February 10, 2020. In attendance was Melissa Miller of KGS. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. The inspections were documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). At AOC 43G and 43J, the inspector verified the roads are in good condition. The sites were visited to verify access and assess the presence of vandalism, and any changes of land use. Gates were secured at both AOC 43G and AOC 43J. Both AOC 43G and 43J were accessible and there was no evidence of vandalism. There was no evidence of changes in land use during the on-site inspections, photographs from both sites are attached to the site inspection. The inspector verified the monitoring data is submitted routinely on time, the data indicate contaminant concentrations are declining, and the monitoring wells are secured, routinely sampled, and are in good condition. Based on the site inspection, the overall condition of AOCs 43G and 43J was satisfactory. The inspection checklist is included in **Appendix D** along with supporting photographs.

As part of the Five-Year Review process, the existing land-use was evaluated to ensure that the control requirements identified for the sites are being met. For AOC 43G the LUCs are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (included in Appendix G of the 2015 LTMMP) and compliance with the LUCs is verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The results of the annual monitoring are presented in the Main Post annual reports.

There is no mechanism for implementation, monitoring and/or enforcement of these restrictions detailed in the GERE for AOC 43J.

6.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" and EPA Region I's FY2020 Supplemental Technical Assessment Template, the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

<u>Question A Summary</u>

Yes. RAOs were achieved and the remedy is protective of human health. Concentrations of groundwater COCs have decreased and are not migrating offsite at concentrations above the cleanup goals. The time to achieve the groundwater cleanup goals is longer than estimated in the ROD.

Remedial Action Performance

AOC 43G

Intrinsic bioremediation is occurring at AOC 43G. Groundwater COC concentrations have decreased and groundwater COCs are not migrating offsite at concentrations greater than the cleanup goals. Benzene, ethylbenzene, and xylene concentrations are less than the groundwater cleanup goals. Nickle was eliminated from the long-term monitoring program. Manganese and iron have continued to exceed their respective cleanup goals and are unlikely to achieve the cleanup goals by 2026. Concentrations of manganese and iron are not migrating offsite at concentrations greater than the cleanup goals. Although not a groundwater COC, VPH continues to exceed the MassDEP monitoring criteria selected for comparison purposes.

Based on the data presented in **Table H-1**, at AOC 43G the Army proposes to reduce the sampling frequency to once every five years, coincident with the Five-Year Review schedule. The Army further proposes to collect all iron and manganese samples as dissolved (filtered) as these will provide better representation of actual metals concentrations in groundwater.

AOC 43J

A 2008 Report evaluating four quarters of groundwater monitoring concluded that MNA at AOC 43J without augmentation was unlikely to be successful in attaining remediation goals by 2026.

A sulfate injection pilot study was conducted in December 2009 to address the concerns of the intrinsic remediation remedy likely not meeting the remedial duration timeline in the ROD. Samples were collected prior to and following the 2009 sulfate injection. The effects of the initial injection test were unclear, so an additional sulfate injection was performed in 2010 followed by the annual groundwater monitoring event.

It was concluded after evaluation of the 2009 and 2010 results, that enhanced anaerobic degradation by sulfate was a slow process that showed minimal effects on residual concentrations of VPH. An alternate amendment was proposed and OBC™, a proprietary sodium persulfate/calcium peroxide product manufactured by Redox Tech, LLC, was injected into the source area in May 2012. The details of this remedial strategy are presented in the 2014 Devens Annual Report and Remedial Strategy Evaluation – AOC43J (*Haley and Aldrich, Inc, April 2015*).

To expedite plume degradation with the goal of achieving ROD cleanup levels by 2026, MassDevelopment pilot-tested oxygen emitters to restore aerobic conditions in the plume. The oxygen emitter pilot test was conducted from December 2017 through Spring 2019 to evaluate the feasibility of using diffusive oxygen-emitter technology for enhanced bioremediation of residual petroleum hydrocarbons at the Site. As stated in the 2018 annual report (H&A, 2020), the pilot test successfully conveyed oxygen into the saturated zone, with results indicating that the oxygen emitters stimulated bacterial populations that are degrading the contaminants of concern. The DO trends indicate oxygen introduced by the emitters is being consumed, likely by aerobic petroleum degraders, downgradient of the emitter wells. As residual petroleum hydrocarbon mass decreases over time, the effects and extent of oxidation will likely increase.

The 2018 annual report (H&A 2020) further stated that multiple lines of evidence indicate oxygen emitters stimulated biodegradation in the subsurface, locally creating conditions that are conducive to biological degradation without showing evidence of biofouling or encrustation of the wells or emitter equipment. Pilot test results indicate enhanced bioremediation of the AOC 43J plume may be achieved by scaling up the application of emitters to target key segments of the plume. Other technologies such as bio-sparging may

also be feasible and effective in introducing oxygen to the subsurface, but likely at considerably higher cost due to the additional infrastructure required to convey oxygen to the subsurface.

As stated in the 2018 annual report for AOC 43J (H&A, 2020), MassDevelopment is assessing whether augmenting the MNA remedy at AOC 43J with oxygen emitters would expedite remediation such that ROD-required cleanup goals can be reached over the entire plume by 2026, or conversely whether an extension to the ROD deadline is needed. The ongoing assessment will include predicting time required to return the plume to an aerobic state to reduce concentrations of the redox by-products generated by degradation of residual petroleum hydrocarbons – arsenic, iron, and manganese. The assessment is also reviewing the potential remedy from a cost-benefit perspective, weighing the investment in additional emitter wells, the emitters and associated appurtenances, with the reduced remedial timeframe and associated cost savings in monitoring and reporting.

From the standpoint of protectiveness, the ROD-approved MNA remedy, augmented by the recent remedial-amendment programs, is meeting the OPS goal of maintaining a stable plume, preventing potential exposure to off-site receptors. Accordingly, for AOC 43J, MassDevelopment proposes to reduce the annual monitoring to 11 sentinel wells for Site COCs. Monitoring these selected wells will ensure that the remedy continues to be protective as the sentinel wells should confirm the trends established with existing data, namely that the plume is stable and the COC concentrations are stable or declining. To assess the rate of biodegradation within the plume, and progress of the MNA remedy toward ROD cleanup goals, MassDevelopment proposes to monitor the 11 additional wells within the plume for Site COCs and field parameters once every five years beginning in 2024.

System Operations/O&M

There are no active treatment systems or applicable operations and operations and maintenance for AOC 43G and AOC 43J.

Implementation of Institutional Controls and Other Measures

The LUCs for AOC 43G are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (included in Appendix G of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). Compliance with the LUCs was verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The monitoring is conducted on an annual basis via interviews with site representative and on-site visits. The annual monitoring is documented in the Main Post Annual Report.

In 2006, AOC 43J was combined with other adjacent properties and transferred to MassDevelopment to provide for a large redevelopment parcel for the Bristol-Myers Squibb facility. When the property transfer occurred, the LUCs were incorporated into the property deed and are detailed in the Grant of Environmental Restriction and Easement, Devens Parcel C, June 16, 2006. The deed can be located at the BRAC office library. There is no mechanism for implementation, monitoring and/or enforcement of these restrictions detailed in the GERE for AOC 43J.

There was a potential IC and GERE breach at AOC 43J discussed in Section 6.4.1.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. There have been changes in standards, toxicity data, risk assessment methods, exposure parameters since the ROD was issued as discussed below. The changes as described below are not expected to alter the protectiveness of the remedy because of various reasons discussed below.

Question B Summary

At AOC 43G, although the MCL for nickel was remanded in 1995, the cleanup goal remains the same as the EPA drinking water health advisory is also an ARAR and the value is unchanged. At AOC 43J, the reduction in the MCL for arsenic is a change to a cleanup goal. As discussed below, this change is not expected to alter the protectiveness of the remedy. The PFAS drinking water regulations do not affect protectiveness of the remedy because LUCs prevent use of groundwater.

Changes in toxicity do not affect protectiveness of the remedy. All of the lead concentrations in soil presented in the ROD for both AOC 43G and AOC 43J were below the new screening level for lead in soil of 200 ppm. Changes in toxicity of PAHs is less stringent then when the risk assessment was conducted, therefore the risk associated with PAHs, at the time of the risk assessment, is potentially overestimated. Changes in toxicity of PFAS do not affect protectiveness of the remedy because LUCs are in place to restrict the use of the groundwater.

Changes in risk assessment methods do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the ROD. There have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

Vapor intrusion (VI) was not recognized as an exposure pathway of concern at AOCs 43G and 43J in the ROD and land use controls will prevent a change of land use.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1997 ROD newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location- and action-specific ARARs listed in 1997 ROD have been met since the remedies have been implemented. There are additional action specific ARARs associated with AOC 43G related to implementation of a soil vapor extraction system, but these are not applicable at this time because a soil vapor extraction system has not been installed at AOC 43G.

The chemical specific ARARs consist of the National Primary Drinking Water Standards and the Massachusetts Drinking Water Standards are considered relevant and appropriate and the USEPA references does and the USEPA health advisories are considered to be considered. Changes to chemical-specific ARARs for AOC 43G and AOC 43J and other groundwater cleanup levels presented in the ROD are summarized below. There are no proposed changes to the values of the groundwater cleanup levels and therefore the groundwater levels remain protective.

Table 6-5 Chemical of Concern Source Area Groundwater Cleanup Levels, AOC 43G

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Current Federal Criteria (µg/L)	Current MA Criteria (µg/L)	Change to Cleanup Goal Needed?
Iron	9,100	Background	300[2]	300[3]	No, background was the basis for the CG
Manganese	291 (changed to 375 in 2008[1])	Background	50[2]	50[3]	No, background was the basis for the CG
Nickel	100	MCL	100[4]	100[5]	Yes. MCL remanded in 1995. The value of the CG remains unchanged, but the basis has changed to EPA drinking water health advisory.
Benzene	5	MCL	5[6]	5[7]	No
Ethylbenzene	700	MCL	700[6]	700[7]	No
Xylenes	10,000	MCL	10,000[6]	10,000[7]	No

[1] Long-Term Monitoring Plan Former Fort Devens Army Installation, HGL, 2008

[2] Secondary Maximum Contaminant Level (MCL).

[3] Secondary Massachusetts Maximum Contaminant Level (MMCL).

[4] EPA drinking water lifetime health advisory.

[5] Massachusetts Drinking Water Guideline.

[6] MCL

[7] MMCL

Table 6-6 Chemical of Concern Source Area Groundwater Cleanup Levels, AOC 43J

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Current Federal Criteria (µg/L)	Current MA Criteria (µg/L)	Change to CG Needed?
Arsenic	50	MCL	10[5]	10[6]	Yes, Current MCL and MMCL is lower than CG
Iron	9,100	Background	300[1]	300[2]	No, background was the basis for the CG

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Current Federal Criteria (µg/L)	Current MA Criteria (µg/L)	Change to CG Needed?
Manganese	291	Background	50[1]	50[2]	No, background was the basis for the CG
Nickel	100	MCL	100[3]	100[4]	Yes. MCL remanded in 1995. The value of the CG remains unchanged, but the basis has changed to EPA drinking water health advisory.
Benzene	5	MCL	5[5]	5[6]	No
Carbon Tetrachloride	5	MCL	5[5]	5[6]	No
Ethylbenzene	700	MCL	700[5]	700[6]	No
Toluene	1,000	MCL	1,000[5]	1,000[6]	No

[1] Secondary Maximum Contaminant Level (MCL).

[2] Secondary Massachusetts Maximum Contaminant Level (MMCL).

[3] EPA drinking water lifetime health advisory.

[4] Massachusetts Drinking Water Guideline.

[5] MCL

[6] MMCL

Table 6-7. Chemical of Concern Downgradient Area Groundwater Cleanup Levels, AOC 43G and 43J

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Current Federal Criteria (µg/L)	Current MA Criteria (µg/L)	Change to CG Needed?
Manganese	291 (changed to 375 at AOC 43G in 2008[1])	Background	50[2]	50[3]	No, background was the basis for the CG
Benzene	5	MCL	5[4]	5[5]	No

1 Long-Term Monitoring Plan Former Fort Devens Army Installation, HGL, 2008.

2 Secondary Maximum Contaminant Level (MCL).

3 Secondary Massachusetts Maximum Contaminant Level (MMCL).

4 MCL.

5 MMCL.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS*:* In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the PFAS compounds included in EPA's LHA (i.e. PFOA and PFOS) to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of the five PFAS compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

The presence of PFAS in groundwater, soil, and surface water and sediment at AOC 43G and AOC 43J is being investigated to address PFAS at former Fort Devens. The on-going base-wide PFAS remedial investigation is discussed in Section 12 of this FYR. Land use controls are in place to prevent exposure to groundwater.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. Lead was not identified in soil at concentrations greater than the new screening level. As the toxicity used for benzo(a)pyrene was greater at the time the risk assessment was conducted, the risk related to PAHs, at the time of the risk assessment, was likely overestimated. PAHs were not identified as COCs and cleanup levels were not determined for PAHs. The other changes do not affect the current protectiveness of the remedy because LUCs are in place to restrict use of the groundwater.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*

  In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2014 PFBS*** *non-cancer toxicity value*

  Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2016 Lead in Soil Cleanups***

  Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

  EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have

an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

All of the lead concentrations in soil presented in the ROD for both AOC 43G and AOC 43J were below 200 ppm.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors for different age groups. The cancer potency of other carcinogenic cPAHs is adjusted by the use of relative potency factors, which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

The risk assessment included an evaluation of PAHs. As the toxicity used for benzo(a)pyrene was greater at the time the risk assessment was conducted, the risk related to PAHs, at the time of the risk assessment, was overestimated. PAHs were not identified as COCs and cleanup levels were not determined for PAHs.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 1996 ROD. These changes do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

This Directive provides recommendations to develop groundwater EPCs. The recommendations to

calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1996 ROD. As further discussed below, there have been changes to exposure parameters, but as discussed below these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals (USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator.

https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator**.**

The VISL calculator has not been run for this site. Vapor intrusion (VI) was not recognized as an exposure pathway of concern at AOCs 43G and 43J in the ROD and thus there is no change to the protectiveness of the remedy.

Expected Progress Towards Meeting RAOs

All of the RAOs at AOCs 43G and 43J have been met. Land use controls protect commercial/industrial receptors located on AOCs 43 G and 43J properties. The groundwater COCs in excess of MCLs is limited to the AOCs 43G and 43J properties and is not migrating off the properties and thus there is no exposure to commercial/industrial receptors located off the AOCs 43 G and 43J properties.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

6.6 Issues/Recommendations

None.

6.6.1 Other Findings

Based on the data presented in **Table H-1**, the Army proposes to reduce the sampling frequency at 43G to once every five years, coincident with the FYR schedule. The Army further proposes to collect all iron and manganese samples as dissolved (filtered) as these will provide better representation of actual metals concentrations in groundwater.

MassDevelopment proposes to reduce the annual monitoring at 43J to 11 sentinel wells for site COCs . Monitoring these selected wells will ensure that the remedy continues to be protective as the sentinel wells should confirm the trends established with existing data – namely that the plume is stable and the COC concentrations are stable or declining. To assess the rate of biodegradation within the plume, and progress of the MNA remedy toward ROD cleanup goals, MassDevelopment proposes to monitor the 11 additional wells within the plume for site COCs and field parameters once every five years beginning in 2024.

The GERE does not provide details pertaining to the implementation and monitoring of these restrictions. A land use control implementation and monitoring plan should be written for AOC 43J.

6.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU06 - Former Gas Station AOC 43G and 43J	*Protectiveness Determination*: Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: **AOC 43G** The remedy at AOC 43G is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. The Army retains control of the property. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent. The RAOs have been achieved through 1) implementation of LUCs which prevent exposure to groundwater and 2) reduction of groundwater contamination through natural attenuation. Groundwater monitoring at AOC 43G has confirmed many of the contaminants of concern concentrations have decreased below cleanup levels and migration of contaminated groundwater at concentrations greater than the MCLs off Army property is not occurring. The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains controlled by the Army, there is no residential use, and groundwater is not being used from the site. **AOC 43J** The remedy at AOC 43J is protective of human health and the environment.		

Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent.

The RAOs have been achieved through 1) implementation of LUCs which prevent exposure to groundwater and 2) reduction of groundwater contamination through natural attenuation and various in-situ treatments. Groundwater monitoring at AOC 43J has confirmed many of the contaminants of concern concentrations have decreased below cleanup levels and migration of contaminated groundwater at concentrations greater than the MCLs offsite is not occurring.

The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains industrial, there is no residential use, and groundwater is not being used from the site.

6.8 Next Review

The next FYR for AOC 43G and 43J is required five years from the completion of this review (September 2025).

6.9 References

References are included in **Appendix A**.

7 FORMER ELEMENTARY SCHOOL SPILL SITE AREA OF CONTAMINATION (OU 7 / AOC 69W)

7.1 Introduction

This section presents the findings of the FYR for the remedy implemented at AOC 69W (OU#7). This is the fifth five-year review for AOC69W. The triggering action for this statutory review is the submittal date of September 26, 2015 for the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

7.1.1 Site Background

AOC 69W is located at the northeast corner of the intersection of Jackson Road and Antietam Street on the northern portion of what was formerly the Main Post at Fort Devens. AOC 69W consists of the Former Fort Devens Elementary School (Building 215), the associated parking lot, and adjacent lawn extending approximately 300 ft northwest to Willow Brook. The building is currently home to the Francis W. Parker Charter Essential School, which was opened in September 2000. Impacts at AOC 69W are attributed to two separate releases of No. 2 heating oil in 1972 and 1978. It is estimated that 7,000 to 8,000 gallons of No. 2 heating oil were released into soil from each event.

A Remedial Investigation (RI) was performed beginning in 1995 and the RI report issued in 1998. The purpose of the RI was to determine the nature and extent of contamination at AOC 69W, assess human health and ecological risks, and assess whether additional response actions were necessary. The RI data showed that fuel-related compounds, primarily TPHC and SVOCs were present in soils extending from the boiler room to approximately 300 ft northwest. Fuel-related VOCs, SVOCs, TPHC, and inorganics comprised the observed groundwater contaminants. The Army performed a removal action in 1997-1998 as part of the RI and excavated approximately 3,500 cy of petroleum-contaminated soil associated with the 1972 fuel oil leak. The 10,000-gallon fuel oil UST, oil recovery system's 250-gallon vault, and associated piping were also removed. Confirmatory soil sampling in excavated areas indicated that EPH and VPH concentrations immediately adjacent to the school still exceeded MCP S-1/GW-1 soil standards after the removal action.

A removal action was performed in 1998 that included the removal of approximately 3,500 cubic yards of petroleum-contaminated soil, the oil recovery system's 250-gallon underground vault and its associated piping, and the 10,000-gallon UST.

A site map showing various features is included as **Figure I-1**. A site chronology and additional site background information are included in **Appendix I**.

7.2 Response Action Summary

7.2.1 Basis for Taking Action

Based on the results of the RI and Removal Action, the Army, along with the USEPA and MADEP, concluded that under current conditions and uses, including re-use as a school, AOC 69W did not present unacceptable risks to human health or the environment and that a feasibility study to evaluate remedial action alternatives was not needed.

The Proposed Plan detailing the Army's plan for Limited Action at AOC 69W was issued in April

1999 for public comment. A ROD was signed in June 1999 documenting "Limited Action" as the selected remedy for AOC69W consisting of long-term groundwater monitoring and institutional controls. As stated in

the ROD: "AOC 69W currently poses no unacceptable risks to human health or the environment. Further, previous removal actions have eliminated underground storage tanks (USTs) and the majority of contaminated soils that would otherwise be a continuing source of downgradient groundwater contamination. Risks associated with hypothetical future potable use of AOC 69W groundwater exceed levels considered acceptable by USEPA. Implementation of institutional controls either through deed and/or use restrictions will limit potential future exposure to contaminated soil and groundwater. Long-term groundwater monitoring will ensure that any residual contamination does not migrate off-site."

The ROD required that the Army monitor for MassDEP EPH/VPH and arsenic (monitoring for arsenic and manganese were subsequently added to the LTM program but were not specified in the ROD). The ROD-specified monitoring program is summarized in the table below.

Table 7-1 AOC 69W ROD-specified Contaminants of Concern and Monitoring Levels

Contaminants of Concern	Cleanup Level (µg/L)	Selection Basis
VPH		
C_5-C_8 Aliphatics	300	MCL
C_9-C_{12} Aliphatics	700	MCL
C_9-C_{10} Aromatics	200	MCL
EPH		
C_9-C_{18} Aliphatics	700	MCL
C_{19}-C_{36} Aliphatics	14,000	MCL
C_{11}-C_{22} Aromatics	200	MCL
Metals (dissolved)		
Arsenic	50	MCL
Iron	9,100	MNA
Manganese	375	Background

Human Health Risk Assessment

The human health risk assessment (HHRA) described in the 1998 RI report evaluated the probability and magnitude of potential human health effects associated with exposure to contaminated media at AOC 69W. The HHRA evaluated post-removal action conditions for surface soil and subsurface soil and pre-removal conditions for groundwater, sediment, and indoor air. Chemicals of potential concern (CoPCs) were identified and included metals, SVOCs, VOCs and petroleum-related compounds including TPHC, EPH, VPH and PAH. Among these CPCs, only the petroleum-related compounds are directly associated with the release of fuel oil at AOC69W.

Possible health risks were quantified for carcinogenic and non-carcinogenic effects, for both reasonable maximum and central tendency exposures. Estimated cancer and non-cancer risks associated with possible current and future land use exposures to surface soil, subsurface soil sediment, groundwater discharge to

surface water and indoor air were within acceptable levels established by the EPA. Estimated cancer and non-cancer risks associated with hypothetical exposures to AOC 69W groundwater used as a residential drinking water source exceeded levels generally considered acceptable to the EPA. However, these risks are primarily due to the presence of arsenic in the groundwater, which is not interpreted to be directly related to the release of fuel oil at AOC 69W.

Based on the conclusions of the risk assessment, there are no unacceptable human health risks associated with soils, sediment, groundwater discharge, or indoor air. The risk estimates presented in the risk assessment are worst-case estimates that are unlikely to be exceeded under conceivable land-use conditions. The only risks that exceed EPA thresholds are associated with the hypothetical use of groundwater as a source of residential drinking water.

Ecological Risk Assessment

The Baseline Ecological Risk Assessment (BERA) evaluates the actual and potential adverse effects to ecological receptors associated with exposure to contamination from ACO 69W. The BERA utilizes surface soil, sediment, and groundwater test data to evaluate potential risks to ecological receptors. Chemicals of potential concern that were identified in these media included metals, pesticides, polychlorinated biphenyls, SVOCs, VOCs, and petroleum-related compounds including TPHC, EPH/VPH, and PAHs.

The following exposure pathways were evaluated in the ecological risk assessment:

- Small mammal and bird, predatory mammal, terrestrial plant, and soil invertebrate exposures to surface soil.
- Small mammal and bird, predatory mammal, and aquatic receptor exposures to sediment in Willow Brook.
- Aquatic receptors exposures to groundwater that seasonally discharges to Willow Brook.

The ecological risk assessment for aquatic receptors is highly conservative as Willow Brook is only seasonally inundated and is generally characterized as a degraded ditch habitat.

In general, there are no risks to ecological receptors except in few cases where negligible risks were estimated. Risks to terrestrial plants may occur at one surface soil sample location (ZWS-95-42X) due to the presence of lead. However, the presence of lead at this location may be associated more with road run-off or lawn mower maintenance than from the fuel oil release. Risks to the plants would be localized and are not likely to result in population-level effects.

Risks to aquatic organisms were also identified for certain metals; however, the soil removal action has likely mitigated the reducing conditions in the subsurface soils that may have mobilized the metals in groundwater. Adverse effects were observed for aquatic organisms exposed to sediment in toxicity tests; however, these adverse effects are likely related to the poor habitat and substrate quality, rather than the presence of site-related chemicals. This is supported by the fact that exposure point concentrations for chemicals detected in sediment only slightly exceeded sediment benchmarks.

Based on the conclusions of the ecological risk assessment, there are no unacceptable risks associated with site-related fuel oil contamination at AOC 69W.

7.2.2 Response Actions

A ROD was signed in June 1999 documenting “Limited Action” as the selected remedy for AOC 69W consisting of long-term groundwater monitoring and institutional controls. The RAOs, as stipulated in the

1999 ROD included:

- Restore the aquifer to drinking water standards within a reasonable period.
- Monitor potential future migration of groundwater contamination.
- Eliminate risk from potential consumption of groundwater.
- Reduce or eliminate the direct contact threat of contaminated soils.

The Limited Action alternative for AOC 69W included the following key components:

- ICs, including deed and/or use restrictions, would be established and enforced to restrict or prevent potential human exposure to site soil and groundwater contaminants left in place.
- A LTMP would be developed to monitor for any potential off-site migration of contaminants and to verify that elevated concentrations decrease overtime. The LTMMP details the installation of groundwater monitoring wells in the source area and downgradient sentry wells to monitor for off-site migration.
- Five-year reviews would be performed to review the data collected and assess the effectiveness of the remedy.

A Limited Action ROD was signed in 1999. The Limited Action consists of groundwater LTM and ICs to limit the potential exposure to contaminated soils and groundwater under both the existing and future site conditions. The Limited Action ROD has been in effect since 1999.

The former Fort Devens Elementary School was reopened in September 2000 as the Parker Charter School and currently occupies the site. The Army finalized the Findings of Suitable Transfer (FOST) for AOC 69W in November 2006 and the property was formally transferred from Army ownership to MassDevelopment in August 2007. The current property owner, Francis Parker Charter School, is abiding by the LUCs imposed on the property, and annual groundwater sampling continues as recommended in the current LTMMP.

7.2.3 Status of Implementation

The final post-ROD LTMP for AOC 69W was issued in October 2000. The first round of groundwater LTM was performed in the spring of 2000 with semiannual sampling performed through 2005. Annual sampling was initiated in 2006 and a revised LTMMP was prepared in 2015 (Sovereign/HGL, 2015). VPH was dropped from the monitoring program in 2014 after several rounds of non-detect results.

MassDevelopment currently supplies potable water to the school. The Excavated Soil Management Area (ESMA) is monitored during sampling events for broken ground or excavations.

LUCs are currently in place which were enforced in the transfer of the property from the Department of the Army to MassDevelopment in 2007. Specifically, the LUCs include educational, institutional and open space use restriction, groundwater restriction, soil excavation restriction, modification or release of environmental protection provisions, and project notifications if any of the above restrictions are modified. The deed included a parcel boundary map that encompasses the restrictions. The LUCIP for AOC 69W is included in Section 4.0 of the 2015 LTMMP.

7.2.4 Institutional Controls Summary Table

Table 7-2 AOC 69W - Summary of Land Use Controls

Media, Engineered Controls,	ICs Needed	ICs Called for in the	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date

and Areas that do not Support UU/UE Based on Current Conditions		Decision Documents			
Soil Groundwater	Yes	Yes	AOC 69W	Restrict or prevent potential human exposure to site soil and groundwater contaminants left in place.	August 2007 Quitclaim Deed; September 2007 Addendum to the 1999 Real Property Master Plan Long Range Component for Devens Reserve Forces Training Area.

7.2.5 Systems Operations/O&M

The 1999 ROD remedy did not include any system operation or O&M requirements.

7.3 Progress Since The Last Review

This section includes the protectiveness determination and statements from the last (2015) FYR.

Table 7-3 Protectiveness Determinations Statement from the 2015 FYR

AOC	Protectiveness Determination	Protectiveness Statement
69W	Protective	*"The remedy at AOC 69W is protective of human health and the environment and exposure pathways that could result in unacceptable risk are being controlled. All soil and groundwater contamination remains within the confines of this AOC and ICs are in place that limits exposure to the soil and groundwater at the site".*

There were no recommendations in the 2015 FYR.

7.4 Five Year Review Process

This section summarizes the FYR process for AOC 69W and the actions taken to complete the review.

7.4.1 Community Notifications, Involvement & Site Interviews

As discussed in Section 1.4, USACE announced the commencement of this Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in Section 1.4 regarding the overall cleanup of Devens. A representative of the Francis W. Parker Charter School indicated that the Army has been responsive and informative regarding the environmental cleanup work at Devens. This individual felt informed about the site's activities and progress. They indicated that the school is aware of and complying with LUCs and that there were no plans to drill wells on the property. A representative of MassDevelopment indicated that the school expanded the building footprint with an addition in the past five years and coordinated with MassDevelopment for the LUCs.

7.4.2 Data Review

The LTM data for AOC 69W are reported in annual monitoring reports. These data were reviewed for this Five-Year Report and are discussed below. Tables in **Appendix I** summarize the AOC 69W COCs that have

exceeded the monitoring criteria from the 2015 though 2019 annual sampling events.

The current LTMMP program for AOC 69W (Sovereign/HGL, 2015) identifies the groundwater COCs as MassDEP EPH carbon fractions and arsenic, with the monitoring criteria based upon the lower of the site-specific monitoring criteria or the MCP GW-1 standard (310 CMR 40 Subpart P). Manganese and iron (not COCs) are also tracked over the course of the LTM program as a byproduct of groundwater conditions created by the COC degradation. Sampling for VPH was discontinued after the 2014 annual monitoring event.

The EPH concentrations, specifically the C11-C22 aromatic carbon fraction concentrations in wells 69W-94-13, ZWM-99-22X, ZWM-99-23X, and ZWM-95-15X have remained relatively constant since November 2002. Over time, the EPH compounds may have sequestered within the soil organic matter, either as the original molecular structure or as the by-products of microbial utilization. Since the November 2002 event, wells ZWM-99-23X and ZWM-95-15X have maintained C11-C22 aromatic fraction concentrations of non-detect or below the 200 µg/L monitoring criterion, whereas well 69W-94-13 has fluctuated slightly and has been above or below criterion since 2015. By comparison, well ZWM-99-22X has generally maintained a C11-C22 aromatic fraction concentration slightly above the monitoring criterion since fall 2008 with the exception of detection slightly below the monitoring criterion in fall 2017. All other sampled AOC 69W wells have yielded EPH carbon fraction results below the respective monitoring criterion since monitoring began.

All arsenic results have generally remained above the 10 µg/L monitoring criterion since May 2000 in wells 69W-94-13, ZWM-99-22X, and ZWM-99-23X. Well ZWM-99-22X continues to have the highest detections of arsenic, above the monitoring criterion, with a high of 190 µg/L in fall 2017 to 125 µg/L in fall 2015. Well ZWM-95-15X has experienced periodic arsenic detections above or below the criterion ranging from 19.3 µg/L in fall 2015 to 3.7 µg/L in fall 2016. The arsenic concentrations in well ZWM-99-25X have maintained arsenic concentrations of non-detect or detections below the 10 µg/L monitoring criterion.

The manganese concentrations in source wells 69W-94-13 and ZWM-99-22X and sentry wells ZWM-95-15X, ZWM-99-23X and ZWM-01-25X have primarily remained above the monitoring criterion of 375 µg/L. Manganese was generally detected at well point 69WP-08-01 below the monitoring criterion with a second detection exceeding the criterion in fall 2019 at 1,300 µg/L. Well 69WP-13-01 has maintained detections of manganese concentrations below the 291µg/L monitoring criterion.

To determine the arsenic and manganese mobilization mechanism in the groundwater, ORP was evaluated against concentration. If fuel compound biodegradation was mobilizing natural arsenic and manganese, then consistently low ORP values would be expected with some correlation between fuel oils and metals concentrations downgradient from the historic fuel contamination. There does not seem to be a significant correlation between ORP and arsenic or manganese. There does, however, appear to be a correlation between elevated petroleum and manganese concentrations. AOC 69W exceedances from 2014 to 2019 are presented in **I-7 in Appendix I.** As shown in the table, monitoring wells in which arsenic and manganese are regularly exceeded are the same wells where fuel hydrocarbons also exceed monitoring criteria. These observations suggest that metals mobility in groundwater is controlled by the geochemical changes caused by the biodegradation of the fuel hydrocarbons. This apparent inconsistency, in which high manganese concentrations are not correlated with low ORP values, but are correlated with elevated petroleum concentrations, may be due to ORP readings and manganese concentrations being disproportionately affected by seasonal variations in geochemistry.

7.4.3 Site Inspection

The FYR site inspection was conducted on February 5, 2020. The objective of the site inspection was to evaluate current land-use to ensure that the selected remedial action remains protective and to confirm that the control requirements identified for the site are being met. For AOC 69W, these include restricting or preventing potential human exposure to site soil and groundwater contaminants left in place.

The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). The entire area of AOC 69W was walked and photo-documented. Features that were inspected included the asphalt areas, access road, monitoring wells and piezometers. The overall condition of the site was satisfactory. The inspection checklist and supporting photographs are provided in included in **Appendix I**.

7.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

<u>Question A Summary:</u>

Yes. The RAOs to restore the aquifer to drinking water standards within a reasonable period and to monitor potential future migration of groundwater contamination are achieved via the LTM program. Annual groundwater monitoring confirms that contaminated groundwater is not migrating offsite at concentrations above monitoring criteria. The RAOs to eliminate risk from potential consumption of groundwater and to reduce or eliminate the direct contact threat of contaminated soils are achieved via LUCs that are incorporated into the deed between Army and MassDevelopment.

Remedial Action Performance

Based on the review of 2015 through 2019 data, groundwater concentrations for EPH are stable or decreasing over time and sentry wells indicate no off-site migration. Sampling results at AOC 69W sentry wells indicate that EPH and arsenic are not migrating off site in groundwater. No evidence of increased exposure potential was observed during the 2015 through 2019 LTM events. The remedy continues to be protective of human health and the environment.

System Operations/O&M

Not applicable. The remedy did not include a treatment system.

Implementation of Institutional Controls and Other Measures

The property was transferred in August 2007 from Army ownership to MassDevelopment, where deed covenants were included in the deed to prevent potable use of groundwater and prevent unrestricted use of the property. There are no current or future plans for installation of potable water wells at AOC 69W.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Question B Summary:

While most of the exposure assumptions, toxicity data, and cleanup levels used at the time of the remedy selection are still valid, there have been changes as discussed below. These changes do not affect protectiveness of the remedy because LUCs are in effect that eliminate risk from potential consumption of groundwater and reduce or eliminate the direct contact threat of contaminated soils, and the LTM program confirms that contaminated groundwater is not migrating offsite at concentrations above monitoring criteria.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 1999 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy. Changes to chemical-specific ARARs are summarized below.

Table 7-4 Chemicals of Concern Monitoring Levels, AOC 69W

Chemical of Concern	ROD Monitoring Goal (µg/L)	Basis	Current MCL (µg/L)	Current MassDEP MMCL (µg/L)	Change to Monitoring Goal Needed?
EPH C_9-C_{18} Aliphatics	NS	310 CMR 22.00	None	700	No
EPH C_{19}-C_{36} Aliphatics	NS	310 CMR 22.00	None	14,000	No
EPH C_{11}-C_{22} Aromatics	NS	310 CMR 22.00	None	200	No
VPH C5-C8 Aliphatics	NS	310 CMR 22.00	None	300	No. VPH was removed from program after 2014 sampling event
VPH C_9-C_{12} Aliphatics	NS	310 CMR 22.00	None	700	No. VPH was removed from program after 2014 sampling event
VPH C_9-C_{10} Aromatics	NS	310 CMR 22.00	None	200	No. VPH was removed from program after 2014 sampling event

Arsenic	50	MCL	10	10	Yes. Current MCL and MMCL is lower than Monitoring Goal
Manganese	NA	Action Level	50[1]	50[1]	No
Iron	NA	Background	300[1]	300[1]	No

Notes:
NS: Not Specified in ROD
NA: Not Applicable (analyte added after ROD was finalized)
[1] Secondary MCL or MMCL.

New standards should be considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

Changes in Toxicity and Other Contaminant Characteristics

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

The risk assessment is documented in the 1998 RI Report (HLA, 1998). Table 9-2 of the RI Report documents the selection of COPCs. As stated in the report, the risk assessment did not select any cPAHs as COPCs for any of the media because the maximum concentrations were less than the "…EPA Region III risk-based concentrations (RBCs) commonly used as TBC information at CERCLA sites". The RI Report

does not discuss any detections of benzo(a)pyrene. As part of this FYR, the cPAHs identified in Table 9-2 of the RI Report were reassessed by comparing maximum and average concentrations detected in soil and sediment against current EPA screening levels for residential soil (Table 9-2 of the RI Report did not identify any cPAHs in groundwater). The results are summarized below:

Table 7-5 Comparison of cPAH Concentrations in Soil Against Current RSLs

Media	cPAH	Max Conc. (mg/kg)	Avg Conc.[1] (mg/kg)	Current EPA Residential Soil Screening Level[2] (mg/kg)	Exceedance of Current Screening Level?
Surface Soil	benzo(a)anthracene	2	1.09	1.1	Yes for max. concentration; no for average concentration
	Chrysene	5	2.04	110	No
Subsurface Soil	benzo(a)anthracene	0.1	0.27	1.1	No
	benzo(b)fluoranthene	0.06	0.26	1.1	No
	Chrysene	0.08	0.27	110	No
Sediment	benzo(k)fluoranthene	0.40	0.23	11	No
	Chrysene	2	0.86	110	No

Notes:

[1] As stated in the RI Report, "the arithmetic mean concentration was calculated for each chemical using the detected concentration(s), and one-half the sample quantitation limit for non-detect(s)." This results in average concentrations exceeding maximum concentrations in some instances.

[2] RSL is based on HQ = 0.1. If an HQ=1.0 were applied, the value would increase by 10X.

Changes in Risk Assessment Methods

Because the exposure pathways and receptors have not changed since the remedy was selected, changes in risk assessment methods would not affect the protectiveness of the remedy.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-

intrusion-screening-level-calculator.

The VISL calculator has not been run for this site. As discussed in Appendix C of the ROD (Responsiveness Summary), "…indoor air sampling was performed in October of 1997 during a time that the school building was inactive and sealed. This represents a worst-case scenario insofar as any contaminant vapors present would be allowed to collect within the school building without being ventilated. Only three analytes (ethylbenzene, 2-methylheptane, and xylene) were detected in indoor air that are potentially attributed to subsurface contamination beneath the school. Of these, none were detected in the vicinity of the northwestern portion of the school at concentrations high enough to include them in the risk assessment and only ethylbenzene was detected at a concentration within the school building at a concentration that included it as a contaminant of potential concern. The results of the human health risk assessment show that there are no unacceptable risks to either pupils or teachers from indoor air. The USEPA performed additional air sampling and conducted an independent risk assessment which also showed no unacceptable levels of risk."

Expected Progress Towards Meeting RAOs

- The RAOs: "Restore the aquifer to drinking water standards within a reasonable time frame" and "Monitor potential future migration of groundwater contamination" is met through annual groundwater monitoring as discussed in Section 7.4.2 above. Monitoring results are reported in Annual Reports that are reviewed by EPA and DEP.
- The RAO: "Eliminate risk from potential consumption of groundwater" is met though implementation of LUCs in the form of a groundwater use restriction documented in the 2007 Quitclaim Deed for Parcel A.15. The specific language includes: "The Grantee, its successors and assigns, shall not access or use ground water underlying the Property for any purpose without the prior written approval of the Grantor, the EPA, and the DEP."
- The RAO: "Reduce or eliminate the direct contact threat of contaminated soils" is met through completion of the 1997-1998 soil removal and LUCs in the form of soil excavation restrictions documented in the 2007 Quitclaim Deed for Parcel A.15. The specific language includes a

requirement for: "…implementation of soil management and health and safety plans prepared by a Licensed Site Professional and Certified Industrial Hygienist, or other qualified professionals, prior to initiating excavations. The Grantee, its successors and assigns, shall not excavate soil from areas of the Property identified as the Soil Management Area for any purpose without the prior written approval of the Grantor, the EPA, and the DEP."

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No other information has come to light that would call into question the protectiveness of the remedy as noted. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

7.6 Issues/Recommendations

None.

7.6.1 Other Findings

None.

7.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU07 - Former Elementary School AOC 69W	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at AOC 69W is protective of human health and the environment. The pre-ROD removal actions have eliminated underground storage tanks and the majority of contaminated soils that would otherwise be a continuing source of downgradient groundwater contamination. Exposure pathways that could result in unacceptable risks are being controlled. The RAOs are achieved through LUCs and groundwater monitoring. The LUCs prevent potential human exposure to site soil and ground water contaminants left in place. The LUCs are enforced and no exposures are currently occurring or imminent. Groundwater monitoring confirms that off-site migration of contaminated groundwater above cleanup levels is not occurring. The FYR site inspection and interviews, and annual LUC inspections and interviews, confirmed that site use remains consistent with the risk scenarios identified in the ROD (i.e., maintenance worker and elementary school children).		

7.8 Next Review

The next five-year review for AOC 69W is required five years from the completion of this review (September 2025).

7.9 References

References are included in **Appendix A**.

8 FORMER MOORE ARMY AIRFIELD – OPERABLE UNIT (OU) 8 / AOC 50 PCE SPILL STATUTORY FIVE-YEAR REVIEW

8.1 Introduction

This is the fourth five-year review for AOC 50. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

8.1.1 Site Background

The AOC 50 site is located on the northeastern boundary of the former Moore Army Airfield (MAAF), within the former North Post portion of Fort Devens, Ayer, Massachusetts (**Figure J-1, Appendix J**). All but approximately 14 acres of the former MAAF (approximately 246 acres total) were transferred to MassDevelopment for reuse in 1997. Currently, the airfield is closed to aircraft traffic and is used by the Massachusetts State Police for training purposes and vehicle storage. The former MAAF is zoned for Special Use II and Innovation and Technology Business by MassDevelopment. Under the Devens Reuse Plan dated 14 November 1994, Special Use II and Innovation and Technology Business includes a broad range of industrial, light industrial, office, and research and development use. MassDevelopment is considering repairs and upgrades for the Massachusetts State Police's use of the airfield, but the plans are still under development. The Devens Army Installation retained approximately nine acres of the former airfield for vehicle storage and maintenance and approximately four acres in and around the AOC 50 Source Area for remediation activities.

The primary area of groundwater contamination at AOC 50 is referred to as the Southwest Plume, which extends from the Source Area approximately 3,000 feet downgradient towards the Nashua River. Sources of groundwater contamination at AOC 50 include two World War II fueling systems, a drywell formerly connected to the parachute shakeout tower, and the tetrachloroethene (PCE) Former Drum Storage Area (FDSA); these sources are collectively referred to as the AOC 50 Source Area. The AOC 50 Source Area comprises less than two acres and surrounds Building 3803 (the former parachute shop), Building 3840 (the former parachute shakeout tower), Building 3824 (a gazebo), and Building 3801 (the former 10th Special Forces airplane parachute simulation building). Although these sources have been removed or taken out of commission, groundwater underlying AOC 50 contains elevated concentrations of volatile organic compounds (VOCs), most notably PCE. The AOC 50 site layout with existing monitoring wells is depicted in **Figures J-1** and **J-2** (**Appendix J**).

A site chronology and additional background information is included in **Appendix J**.

8.2 Response Action Summary

8.2.1 Basis for Taking Action

The baseline human health risk assessment revealed that workers and residents potentially exposed to COCs in groundwater via potable water ingestion and vapor inhalation may present unacceptable human health risks (i.e., cancer risks greater than 10^{-4} and non-cancer hazard indices greater than 1) (HLA, 2000). In addition, the screening-level ecological risk assessment indicated significant but low ecological risks (hazard quotients for benthic organisms greater than 1 indicating low potential risk). Therefore, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in the ROD (2004), may present an imminent and substantial endangerment to public health, welfare, or the environment. Groundwater is the focus of remedial actions at AOC 50, as it was concluded that soil at AOC

50 does not pose an unacceptable risk (HLA, 2000).Exposure to contaminated groundwater would only occur if the land use changes or if groundwater associated with the AOC is used in the future. Based on the results of the human health risk assessment (HHRA), the following future site and groundwater uses are associated with health risks that exceed USEPA target cancer-risk ranges and non-cancer thresholds:

- Potable use of the groundwater associated with the Source Area and the Southwest Plume by a full-time commercial/industrial worker.
- Use of the groundwater associated with the Source Area in an "open" industrial process (e.g., washing and spraying) by a full-time commercial/industrial worker.
- Unrestricted potable use of the groundwater associated with the Source Area, and North and Southwest Plumes (e.g., consumption by residents).
- Construction and occupation of residential dwellings over the Source Area (vapor intrusion).

Based on the results of the screening-level ecological risk assessment (ERA), the following potential risks are associated with groundwater discharging to the Nashua River:

- Low risk predicted for benthic organisms under current conditions.
- Low to moderate risk predicted for benthic organisms under future conditions.

Risks for pelagic organisms were determined to be negligible under all scenarios.

The *Final Record of Decision, AOC 50* (ARCADIS, 2004) identified the following contaminants of concern in groundwater; tetrachloroethylene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride (VC), 1,2-dichloropropane, methylene chloride, 1,2-dichloroethane, benzene, arsenic, lead, nitrate, and manganese.

8.2.2 Response Actions

There were three main areas of contamination identified for AOC 50; the Source Area, the Southwest Plume, and the North Plume. The qualitative Remedial Action Objectives (RAOs), per the ROD, are presented below:

- Minimize, stabilize or eliminate further migration of the groundwater contaminant plume within AOC 50 (containment); and
- Reduce the concentration of chemicals of concern (COCs) in groundwater to the chemical-specific interim cleanup levels, within a reasonable timeframe (aquifer restoration).

The selected remedial technologies for AOC 50, per the 2004 AOC 50 ROD, included Soil Vapor Extraction (SVE), Enhanced Reductive Dechlorination (ERD), in-well stripping (IWS)/aerobic bioremediation, long term monitoring (LTM), and Institutional Controls (IC). In addition, geochemical additives and In Situ Chemical Oxidation (ISCO) were included as contingencies to address inorganics and VOCs, respectively. This remedy is a comprehensive approach that addresses all current and potential risks caused by groundwater contamination and mitigates residual soil contamination in the Source Area.

The components of remedy selected for AOC 50 were chosen to reduce potential human health and ecological risks associated with contaminated groundwater under current and anticipated future land use scenarios. The remedial system for AOC 50 is also protective to the environment, attains ARAR and offers long-term and short-term effectiveness.

Key components of the remedial systems for AOC 50 consisted of the following:

- SVE in the Source Area;
- ERD throughout the site;
- IWS along the downgradient portion of the Southwest Plume;
- Contingency for chemical oxidation in the North Plume;
- Contingency for evaluation and manipulation of aquifer chemistry for re-precipitation of solubilized inorganics associated with the ERD process;
- Long Term Monitoring (LTM);
- Institutional Controls (IC); and
- Five-year site reviews.

Table 8-1 AOC 50 ROD-specified Groundwater Contaminants of Concern and Cleanup Levels

Contaminants of Concern	Cleanup Level (µg/L)	Selection Basis
Arsenic	10	MCL
Benzene	5	MCL
1,2-Dichloroethane	5	MCL
1,2-Dichloroethene	7	MCL
Cis-1,2-Dichloroethane	70	MCL
1,2-Dichloropropane	5	MCL
Iron	3,129	Risk-Based
Lead	15	NIPDWR
Manganese	1,460	Risk-Based
Methylene Chloride	5	MCL
Nitrate	10,000	MCL
PCE	5	MCL
TCE	5	MCL
Vinyl chloride	2	MCL

Some of the contaminants were designated COCs because they were present at concentrations above the applicable U.S. Environmental Protection Agency (USEPA) maximum contaminant level (MCL) or state groundwater quality standard (i.e., cis-1,2-DCE, iron, methylene chloride, and 1,2-DCP). Benzene was designated as a COC due to past releases. Cis-1,2-DCE and nitrate were identified as COCs due to their contribution to risk. Lead was identified as a COC due to its potential to pose ecological risks. Arsenic was designated as a COC because it may be solubilized (mobilized) by the selected remediation technology, even though it was not predicted to pose significant risks under baseline conditions.

8.2.3 Status of Implementation

The following documents the timeline of the remedy at AOC 50:

- Remedy implementation was initiated in May 2004 for SVE, IWS, and ERD systems in accordance with the Remedial Design (ARCADIS, 2004) and the Final Remedial Action Work Plan (ARCADIS, 2005).
- SVE operations in Area 1 began in September 2004 and ended in November 2005 with subsequent decommissioning of the system.
- IWS operations continued until system shutdown in March 2013 with the infrastructure left fully intact onsite.
- ERD injections, using wells were performed monthly at the start of the program (2004) but the frequency has decreased to annually with evolution of the program and injections are currently conducted annually but the plan for injections are reviewed each year. Since 2015, ERD injections used a combination of existing wells and DPT.
- The substrate that is injected has also changed over the years of the program. Initially molasses was injected from 2004 to 2008, then Anaerobic BioChem® (ABC®) from 2008 to 2015, then Anaerobic BioChem® + Oleic Acid (ABC® Ole') and Anaerobic BioChem® + Oleic Acid + Zero Valent Iron (ABC® Ole'+) from 2008 to 2019. The injected substrate was originally injected into designated wells and the program has changed and currently consists of injecting into wells as well as directly into the aquifer via direct push technology.
- Operation and maintenance and evaluation of the operating remedial systems continued throughout their operation and are discussed in annual OM&M reports.
- LTM activities have changed over the years and are performed in accordance with the most recent plan (KGS, 2017). LTM activities and results are discussed in annual reports.
- LUCs developed for the portion of the AOC 50 property leased to MassDevelopment and are documented in the 1996 Lease in Furtherance of Conveyance (LIFOC), along with other leased parcels.
- LUCs were included as deed restrictions in the portions of AOC 50 property that were transferred to MassDevelopment.
- LUCs were developed in an agreement between the Army and the Merrimack Warehouse Nominee Trust (July 2006).
- LUCs were developed in a Memorandum of Agreement between the Army and USFWS.
- LUCs developed for the Army retained property are detailed in the and the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (Appendix G of the 2015 LTMMP) (Sovereign/HGL, 2015). Any proposed actions that affect this property must consider the following ROD requirements:
    - Provide continued access to treatment transects and monitoring wells and access to install additional injection or monitoring wells, if necessary.
    - Coordinate construction plans with the BCT to facilitate ongoing remediation and future access to plume areas
    - No groundwater extraction or injection for any purpose
    - Coordinate construction plans for modifications to storm water systems with the BCT including

engineered storm water management plans and hydrologic/ mounding studies. (Continue use of existing storm water system to direct storm water away from the plume)

- The Army prepared and submitted a LUC implementation and monitoring plan as part of the site LTMP. Institutional control inspections are conducted annually per the land use control implementation and monitoring section of the 2015 LTMMP (Sovereign/HGL, 2015). The results of the inspections are reported in the AOC 50 annual report.
- On behalf of the Army, IC reinforcement letters are sent out annually to the property owners impacted by the LUCs at AOC 50 to reinforce the restrictions for the affected areas.
- Annual interviews and inspections of the site are made following issuance of the letter to confirm continued compliance with IC objectives. The interviews and inspection are documented in the AOC 50 annual report. The annual LUC compliance monitoring includes:
  - Review of documentation and records;
  - Physical on-site inspections; and
  - Interviews with knowledgeable personnel.
- Five-year reviews were completed in 2005, 2010, and 2015.

8.2.4 Institutional Controls Summary Table

The 2004 ROD required implementation of ICs to protect potential human receptors from risks resulting from exposure to contaminated groundwater and to vapors.

Table 8-2 AOC 50 – Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	North Plume	• Protect potential residential receptors from ingesting contaminated groundwater. • Restricting groundwater pumping to avoid drawing the contaminated groundwater from the Source Area. • Limiting construction over the contaminated groundwater that would interfere with the operation of the remedy. • Providing access to the site for monitoring /remediation.	LUC agreement between the Army and the Merrimack Warehouse Nominee Trust (July 2006). Existing property zoning and permits.

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	Source Area	• Protect potential residential and commercial/industrial receptors from ingesting contaminated groundwater. • Protect commercial/industrial workers from inhaling vapors released from groundwater used as "open" process water. • Prevent potential construction/occupation of residential dwellings, elementary and secondary schools, and child care facilities and inhalation of vapors released from contaminated groundwater to indoor air. • Restricting groundwater pumping and storm-water recharge to avoid drawing the contaminated groundwater from the Source Area. • Limiting construction in specified areas over the contaminated groundwater that would interfere with the operation of the remedy • Provide access to the site for monitoring /remediation.	Lease in Furtherance of Conveyance of Real Property and Facilities on Fort Devens, Massachusetts, Military Reservation, May 1996

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	Southwest Plume	• Protect potential residential and commercial/industrial receptors from ingesting contaminated groundwater. • Restricting groundwater pumping and storm-water recharge to avoid drawing the contaminated groundwater away from the limits of the plume. • Limiting construction in specified areas over the contaminated groundwater that would interfere with the operation of the remedy • Provide access to the site for monitoring /remediation.	Quitclaim deed between the Army and MassDevelopment. Memorandum of Agreement between the Army and the USFWS. Real Property Master Plan Long Range Component for Devens Reserve Forces Training Area Addendum – September 2007

8.2.5 Systems Operations / Operation & Maintenance

Operations & Maintenance has been performed 2015-2019 in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (KGS, 2017), which specifies the AOC 50 O&M activities. Details regarding ongoing O&M activities conducted 2015 to 2019 are presented in the 2015, 2016, 2017, 2018 and 2019 annual AOC 50 reports.

In 2017, an assessment of the IWS system was performed. The assessment was limited due to the lack of functionality. Visual inspection of system components revealed corrosion of pumps and blowers. In order for the IWS system to be returned to full functionality, it is likely the central processing unit along with various pumps, blowers, and other system components will need to be replaced. At the BCT meeting on January 18, 2018, the Army and EPA agreed that the system could be repaired in the future if it was found to be needed again. As of this FYR report, the IWS system remains off and no repairs have been made.

On July 5 and 6, 2017, locks were added to unsecured wells and monitoring well plugs were added where necessary based on the spring inspection results. At the same time, flush mount monitoring well pads were replaced at G6M-92-03X and G6M-13-03X. On September 26 and 27, 2017, accumulated sediment was removed from the bottom of MicroWells® XSA-12-95X, -96X, -97X, -98X, and monitoring well G6M02-07X. The sediment was removed from the wells using an inertial pump.

In 2019, locks and missing bolts were replaced as needed and the well pads and roadboxes for wells IW-27, IW-35, and G6M-02-13X were repaired (KGS, 2020).

8.3 Progress Since the Last Review

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 8-3 Protectiveness Determinations Statement from the 2015 FYR and FYR Addendum

OU/AOC	Protectiveness Determination	Protectiveness Statement
8/AOC 50	Protective (as stated in the 2015 FYR)	*The remedy at AOC 50 is protective of human health and environment. Exposure pathways that could result in unacceptable risks are being controlled. The remedial actions at AOC 50 are expected to allow unrestricted use and unlimited exposure following achievement of groundwater remediation goals.*

There were no issues and recommendations in the last (2015) FYR.

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in Appendix L of the Final 2015 Five Year Review (KGS, 2015).

8.4 Five-Year Review Process

8.4.1 Community Notifications, Involvement & Site Interviews

Details regarding community notification and involvement activities for the 2020 FYR are discussed in the Executive Summary, "Community Notification, Involvement and Site Interviews." In addition to the general comments discussed therein, the following are comments specific to ongoing remedial activities at AOC 50.

A representative of the US Fish and Wildlife Service (USFS), Eastern MA National Wildlife Reserve Complex, stated that they was informed of the site activities and progress and that USFWS was aware of land use controls and had no plans to drill wells on the property. A member of the general public and resident of Devens indicated that they were very concerned about the PFAS at Moore Airfield leaking into the Nashua River and off-site. They indicated it was important to not let this contaminant pollute the down-river water and effect the wildlife of the river. A representative of MassDevelopment indicated that new contract negotiations for state police training are underway.

8.4.2 Data Review

Groundwater quality and chemistry data from 2015 to 2019 were used to evaluate performance and effectiveness of the AOC 50 remedy (i.e., ERD injections). The LTM and performance monitoring data for AOC 50 are provided in annual monitoring reports. Historical data through 2019 are summarized in the tables in **Appendix J**. Graphical analyses of selected wells are also presented in **Appendix J**.

The primary objective of the ERD system is to stimulate and support the complete reduction of PCE within the source area and the downgradient plume. The following discussion presents current trends as related to the enhanced dechlorination activity occurring at each area.

Based on the data collected to date, the current ERD injection process appears to have been successful in treating the majority of the more permeable portions of the AOC 50 plume, especially at shallower depths in the source area. There is a general reduction of VOC in the source area and downgradient plume with no stalling of daughter products, indicating complete dehalogenation is occurring.

Data trends are used to evaluate the overall success of the ERD system at AOC50. These trends indicate the extent of enhanced contaminant degradation and included the following observations:

- Degradation of PCE is evident throughout the ERD injection areas. In most cases, the degradation of PCE is followed by an increase in degradation byproducts including TCE, cis-1,2-DCE, and VC.
- Residual pockets of VOCs in groundwater are found along the western edge of Areas 4 and 5. The western edges of these transects have had a less developed reducing environment and subsequently show a slower dechlorination of the primary PCE contaminant. The latest data confirm that targeted application of ERD substrate within these transects is effective at stimulating reductive dechlorination at the western edge of the former PCE plume; however, it was determined that the ERD injection network needed to be expanded further to the west to provide a greater distribution of ERD substrate to more comprehensively address the VOCs in this portion of the plume.

A more detailed discussion of each area is below. Supporting data (plan-view and cross-section figures, tables, and trend graphs) are provided in **Appendix J**.

Area 1

No VOCs were documented above laboratory detection limits in groundwater from the North Plume Area monitoring wells (G6M-96-22A and G6M-96-22B) since the October 2009 sampling event (**Table J-1, Appendix J**). These results confirm that VOCs were not migrating into this area from the AOC 50 source area as of the last sampling date of November 2016.

Concentrations of PCE have declined in Area 1 and the extent of PCE has decreased (**Figures J-6 through J-9**). PCE is only detected above the CL in two wells (5.3 µg/L at G6M-07-02X and 11.0 µg/L at G6M-04-10A) in Fall 2019 (**Figure J-9**). **Figure J-15** presents the PCE decline for select monitoring wells in Area 1, specifically G6M-04-09X, G6M-02-08X, G6M-03-01X, G6M-07-02X, and G6M-13-05X.

Area 2

PCE concentrations in Area 2, both upgradient and immediately downgradient of the injection wells remained below the CL since 2014, with the exception of G6M-04-03X. At G6M-04-03X the VOC concentrations decreased from 2015 to 2018 to below detection levels but have increased in 2019 (**Tables J-1, J-3, J-5, J-9** in **Appendix J**). **Figure J-16** presents the PCE decline for select monitoring wells in Area 2, specifically G6M-04-01X and G6M-04-03X.

Cross gradient of the Area 2 injection wells, PCE was detected at G6M-07-01X (35 J µg/L, spring 2019: **Table J-8**).

Area 3

The extent of PCE concentrations above the CL has not changed significantly since 2014 but the PCE concentrations continue to decline in Area 3 since 2014. PCE concentrations remain non-detect in monitoring wells downgradient of the injection wells. PCE is only detected above the CL in one well in Fall 2019 (5.4

µg/L at G6M-04-02X) (**Figure J-9**). This concentration represents a significant reduction compared to fall 2018 (200 µg/L) and is a result of the 2019 ERD injections. **Figure J-17** presents the PCE decline for monitoring wells G6M-04-04X, G6M-03-07X, and G6M-04-02X.

Areas 4 and 5

Overall, PCE concentrations in Areas 4 and 5 continue to decline. Downgradient of most of the Area 4 and Area 5 injection wells, PCE concentrations are non-detect or below the 5 µg/L CLs.

West of the Areas 4 and 5 injection wells, the plume extent has not changed significantly from 2014, but PCE concentrations have decreased and PCE concentrations continue to persist at low levels. Trend graphs for Areas 4 and 5 are presented on **Figure J-18**. The maximum PCE concentration in the plume is 36 µg/L (G6M-04-07X). Vertical profiling for VOCs was conducted at two locations west of the plume in 2018 (G6M-18-01 and -02) and monitoring wells were installed at these locations. The results confirm the western extent of the plume in this area (**Tables J-6** and **J-7, Appendix J**).

The maximum PCE concentration in this portion of the plume from 2014 to 2019 was at G6M-97-05B (240 µg/L April 2018). ERD injections were conducted to target the PCE contamination in this area of the aquifer in 2017, 2018 and 2019. Monitoring results from this area of the plume indicate geochemical conditions are becoming more suitable for sustaining reductive dichlorination (elevated methane and TOC). Also, VOC concentrations (historically low concentration of PCE, coupled with a decrease in TCE, along with an increase in cis-1,2-DCE) suggest that reductive dechlorinate is actively occurring in this area of the plume.

There are some fluctuations in PCE concentrations along the downgradient portions of the plume as it approaches the Nashua River, specifically at wells G6M-04-07X, XSA-12-97X, and XSA-12-98X. However, these concentrations are consistent with concentration fluctuation observed in historical results for each well. Concentrations of PCE continue to be non-detect at G6M 02-06X and below the CL at G6M-04-14X (since 2009) located on the west side of the Nashua River.

Metals

Metals solubilization, especially arsenic and manganese associated with the ERD process, is evident within the in-situ reactive zones (IRZ) across AOC 50. The resulting extent of metals desorption is directly correlated with the geochemically reducing conditions within the IRZ for each injection area. This relationship is observed throughout the AOC 50 treatment area and was an anticipated byproduct of the selected remedy.

The dissolved metals concentrations will likely continue to fluctuate within an IRZ and are not anticipated to significantly diminish until the IRZ reverts to an oxidizing state. As the aquifer returns to oxic conditions after remediation is complete (i.e., has a positive ORP), the geochemical conditions will promote the oxidation and precipitation of the dissolved metals.

Dissolved arsenic concentrations for the 2019 sampling events are presented on **Figure J-19**. Areas with dissolved arsenic concentrations above the CL of 10 ug/L are primarily in areas where ERD injections have occurred and downgradient of ERD injection areas, specifically in Areas 1, 2, 3, and in the eastern portion of Areas 4 and 5.

The dissolved arsenic levels remained elevated from 2015 through 2019 with little fluctuation at most of the locations. During the 2019 monitoring events, the maximum concentration of dissolved arsenic detected was 550 µg/L at G6M-04-06X (Area 5) in October 2019.

In wells where conditions are primarily oxidizing and/or locations that are outside the influence of injection events, the fall 2019 dissolved arsenic concentrations are generally non-detect or below the CL of 10 µg/L (**Figure J-19, Appendix J**). These areas include Area 3: G6M-04-04X, and Area 5: G6M-18-01, G6M-18-02, G6M-04-07X, XSA-12-95X, XSA-12-96X, XSA-12-97X, XSA-12-98X, G6M-02-06X, and G6M-02-07X. Across the Nashua River, arsenic was detected below the CL of 10 µg/L at G6M-04-14X.

As injections are ceased in areas where plume CVOC concentrations have decreased below CLs or in areas that have not been influenced by ERD injections (e.g., the western portions of Areas 4 and 5 and adjacent to the Nashua River), dissolved arsenic concentrations are expected to decrease as these areas begin to return to aerobic conditions.

The annual reports for 2015 – 2019 indicate that groundwater flow at AOC 50 is consistently towards the southwest. There have been no changes in direction or use of groundwater or identification of a new groundwater divide during this FYR period.

8.4.3 Site Inspection

The FYR site inspection of AOC 50 was conducted on February 12, 2020. In attendance was Melissa Miller of KGS. Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. For AOC 50, these include ensuring that exposure to, and extraction of, groundwater from the site for industrial and/or potable water supply is not permitted. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). As part of the site inspection the inspector verified appropriate O&M documents and records were available. The inspector verified institutional controls are in place through annual assessment of land use controls reported in annual land use control checklists and associated annual interviews. Features that were inspected included the fencing, asphalt areas, access road, monitoring wells, signs of vandalism, land use changes, and the treatment system. The overall condition of the site was satisfactory. The site inspection confirmed that the IWS is still in place but not functioning. The site inspection verified no change of use, there was no evidence of damage to the site, there were no groundwater extraction wells present, that the site was accessible, and there were no signs of increased exposure potential. The inspection checklist is included in **Appendix J** along with supporting photographs.

As part of the Five-Year Review process, the existing land-use was evaluated to ensure that the control requirements identified for the site is being met. For AOC 50 the ICs are detailed in the Real Property Master Plan (RPMP) Long Range Component for Devens Reserve Forces Training Area, Addendum (2007) (included in Appendix E of the 2019 Annual Report) and compliance with the institutional controls is verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The results of the annual monitoring are presented in the AOC 50 annual reports.

8.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" and EPA Region I's FY2020 Supplemental Technical Assessment Template, the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives

used at the time of the remedy still valid?

- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes. Monitoring data confirm the destruction of site COCs is ongoing, plume size and concentration have decreased since 2004, and that the remedy remains protective of human health and the environment.

Remedial Action Performance

As presented in the latest 2019 O&M and Monitoring Report (KGS, 2020), the current ERD injection treatment system appears to have been successful in treating the majority of the more permeable portions of the AOC 50 plume, especially at shallower depths in the source area. The most recent injections occurred in July/August 2019. As a result of the latest injections, the maximum PCE concentration in groundwater within the Source Area was reduced from 71 µg/L to 11 µg/L; within Area 3 from 160 µg/L to 5.4 µg/L; within Area 4 from 22 µg/L to 16 µg/L; and within Area 5 from 180 µg/L to 36 µg/L. The generation of daughter products along with ethene/ethane provide evidence that late-stage reductive dechlorination, thus a reduction in PCE mass, is occurring at AOC 50. In addition, with the exception of Area 4 (G6M-13-02X), geochemical conditions in these areas (i.e., methane [>500 µg/L], TOC [>20 mg/L], pH, and low concentration of terminal electron acceptors) remain suitable to support the transformation of chlorinated ethenes into harmless by-products. Despite not having TOC >20 mg/L at G6M-13-02X, concentrations of PCE continue to decrease. The ERD injection system is evaluated annually, and modifications are made to enhance the effectiveness of the ERD remedy. The IWS system was shut down in March 2013.

Overall, as a result of performing ERD at this site, since 2004, the PCE plume has decreased in size (15.5 acres in 2004 to 7.74 acres in 2019), and concentration (maximum concentration 14,000 µg/L to 36 µg/L. Modifications in injection strategy remain effective at remediating the VOCs that remain and meeting the AOC 50 remedial objectives.

Monitoring data, therefore, confirm that destruction of site COCs is ongoing and that the remedy remains protective of human health and the environment. Dechlorination rates are consistent with those predicted in the ROD; therefore, the remedy in place should achieve cleanup objectives within the proposed timeframe.

The Army has been proactive in optimizing the ERD remedy by continuing to evaluate and modify the injection locations and/or the injection substrate concentrations.

Activities proposed in support of an optimized exit strategy include:

- Evaluation of spring 2020 data and any rebound effects;
- Reduction in the frequency and locations of enhanced reductive dechlorination (ERD) injection event(s);
- Evaluation of a transition to monitored natural attenuation (MNA) using Interstate Technology Regulatory Council decision flowchart (ITRC, 2007); and
- Reduction in LTM well sampling (analysis and frequency).
- Natural Attenuation Software (NAS) to evaluate the time and distance to stabilization; and/or

- *Practical Method to Evaluate Ground Water Contaminant Plume Stability*[2]. This approach uses grid files from Surfer software to calculate plume area, average concentration, contaminant mass, and center of mass and then statistical trend analyses are performed on the calculated values; and/or
- *Monitoring and Remediation Optimization System (MAROS).* This tool provides (1) optimization routines, to help determine the appropriate number of sample locations, sampling frequency, and laboratory analytes for site monitoring objectives, and (2) statistical analysis tools to evaluate the plume stability condition and remedy performance.

System Operations/O&M

There are no current active treatment systems at AOC 50. Maintenance of monitoring wells was performed in 2017 and 2019. An assessment of the IWS system was performed in 2017. At the BCT meeting on January 18, 2018, the Army and EPA agreed that the system could be repaired in the future if it was found to be needed again. As of this FYR report, the IWS system remains off and no repairs have been made.

Implementation of Institutional Controls and Other Measures

IC objectives in the North Plume, Source Area, and Southwest Plume are being met. In accordance with the ROD, ICs that prohibit the use of groundwater as a potable source, restrict groundwater pumping and stormwater recharge, limit construction in specific areas, provide access to treatment systems and the monitoring network, protect workers from inhaling vapors from process water and restriction of residential/educational uses in the source area, are currently in effect at AOC 50. Legal agreements between the Army, MassDevelopment, and USFWS are in place to restrict activities that would interfere with the operation of the remedy, including:

- The construction of structures;
- Groundwater withdrawal for any purpose;
- Stormwater discharge/recharge; and
- Provide for Army access to the properties during the operation of the remedy to install and maintain monitoring wells and treatment systems.

On behalf of the Army, IC reinforcement letters are sent out annually to the property owners impacted by the LUCs at AOC 50 to reinforce the restrictions for the affected areas. Annual interviews and inspections of the site are made following issuance of the letter to confirm continued compliance with IC objectives. The annual LUC compliance monitoring included:

- Review of documentation and records;
- Physical on-site inspections; and
- Interviews with knowledgeable personnel.

The last annual IC inspection, held in 2019, is summarized in the 2019 Annual O&M and Monitoring Report (KGS, 2020). A separate site inspection for the FYR was held on February 12, 2020.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

[1] Ricker, J. A. (2008). A practical method to evaluate ground water contaminant plume stability. *Groundwater Monitoring & Remediation*, *28*(4), 85-94.

No. There have been changes in toxicity values, risk assessment methods, and exposure parameters since the 2004 ROD was issued as discussed below. The changes as described below are not expected to alter the protectiveness of the remedy because of various reasons discussed below.

Question B Summary

There are no changes in cleanup goals. The PFAS drinking water regulations do not affect protectiveness of the remedy because LUCs prevent use of groundwater.

The aerial difference between the 500-year flood elevation is not significantly different from the 100-year elevation at AOC 50 and changes to Federal floodplain regulations at 40 CFR Part 6 do not affect the protectiveness of the remedy.

Changes in toxicity do not affect protectiveness of the remedy. Lead was not identified in soil at concentrations greater than the new screening level. The other changes do not affect the current protectiveness of the remedy because LUCs are in place to restrict potential future residential development and use of the groundwater.

Changes in risk assessment methods do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 2004 ROD. There have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

The VISL calculator has not been run for this site, but a potential risk from vapor intrusion was previously identified for the site.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 2004 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location-and action-specific ARARs listed in 2004 ROD have been met since the remedial construction work (SVE and IWS components of the remedy) has been completed. For the groundwater, the chemical-specific ARARs identified in the ROD consist of the National Primary Drinking Water Standards and the Massachusetts Drinking Water Standards are considered relevant and appropriate. The Massachusetts Groundwater Quality Standards (314 CMR 6.00) was considered appropriate but 314 CMR 6.00 was rescinded in March 2009.

Table 8-5. Evaluation of Chemical of Concern Groundwater Cleanup Levels, AOC 50

Chemical of Concern[1]	ROD Cleanup Goal (CG) (µg/L)	Basis	Current EPA MCL (µg/L)	Current MA MCL (µg/L)	Change to CG Needed?

Arsenic	10	MCL	10	10	No
Benzene	5	MCL	5	5	No
1,2-Dichloroethane	5	MCL	5	5	No
Lead	15	NIPDWR[1]	15[2]	15[2]	No
Methylene Chloride	5	MCL	5	5	No
Tetrachloroethylene	5	MCL	5	5	No
Trichloroethene	5	MCL	5	5	No
Vinyl Chloride	2	MCL	2	2	No
1,1-Dichloroethylene	7	MCL	7	7	No
1,2-Dichloropropane	5	MCL	5	5	No
Cis-1,2-Dichloroethylene	70	MCL	70	70	No
Iron	3,129	Risk-Based Concentration[3]	300[4]	300[4]	No. ROD cleanup goal is risk-based.
Manganese	1,460	Risk-Based Concentration[4]	50[4]	50[4]	No. ROD cleanup goal is risk-based.
Nitrate	10,000	MCL	10,000	10,000	No

[1] National Interim Primary Drinking Water Regulation (NIPDWR), and it is based on treatment technology.

[2] Action level.

[3] Risk-based concentration based on child residents (ARCADIS, 2004).

[4] Secondary MCL or MMCL.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS*:* In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS.

The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the PFAS compounds included in EPA's LHA (i.e. PFOA and PFOS) to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of the five PFAS compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

The presence of PFAS in groundwater, soil, and surface water and sediment at AOC 50 is being investigated to address PFAS at former Fort Devens. The on-going base wide PFAS remedial investigation is discussed in Section 12 of this FYR. Land use controls are in place to prevent exposure to groundwater and residential development of the site.

Federal Floodplain Management: Federal regulations at 40 CFR Part 6, Appendix A identified in the ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. The Army has assessed potential floodplain impacts from a 500-year flood event at AOC 50 based on the information provided in OLIVER, the Massachusetts GIS system. The extent of the 500-year floodplain at AOC 50 is not significantly different from the 100-year floodplain, based on this review the Army has not identified any protectiveness issues at this time.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. Lead was not identified in soil at concentrations greater than the new screening level. The other changes do not affect the current protectiveness of the remedy because LUCs are in place to restrict the use of the groundwater.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*
  In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2014 PFBS*** *non-cancer toxicity value*
  Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks

from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***Lead in Soil Cleanups***

Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

The ROD did not identify an action or cleanup level for lead in soil. As part of this FYR, results from soil samples from soil borings, and post-excavation confirmation samples were reviewed. Lead was not detected above 200 ppm in any soil sample collected at AOC 50.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs) cancer and non-cancer toxicity values***

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

Environmental media at AOC 50 was not analyzed for the presence of PAHs (HLA, 2000).

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 2004 ROD. These changes do not affect the current protectiveness of the remedy because the new methods could result in slightly lower

risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 2004 ROD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014).

- ***2018 EPA VISL Calculator***

  In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator.

  https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator**.**

The VISL calculator has not been run for this site. Unacceptable risk from vapor intrusion was identified for residential use in the Source Area as part of the human health risk assessment. To eliminate this exposure pathway, an IC was put in place to restrict new building construction and residential/educational uses.

Expected Progress Towards Meeting RAOs

The first RAO has been met through implementation of the SVE and IWS systems and continued ERD injections along with natural attenuation; the migration of the groundwater contaminant plume has been

minimized. The second RAO will be met through continued operation and optimization of the remedial program.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

8.6 Issues/Recommendations

None.

8.6.1 Other Findings

The Army has been proactive in optimizing the ERD remedy by continuing to evaluate and modify the injection locations and/or the injection substrate concentrations. Activities proposed in support of an optimized exit strategy include:

- Evaluation of spring 2020 data and any rebound effects;
- Reduction in the frequency and locations of enhanced reductive dechlorination (ERD) injection event(s);
- Evaluation of a transition to monitored natural attenuation (MNA) using Interstate Technology Regulatory Council decision flowchart (ITRC, 2007); and
- Reduction in LTM well sampling (analysis and frequency).
- Natural Attenuation Software (NAS) to evaluate the time and distance to stabilization; and/or
- *Practical Method to Evaluate Ground Water Contaminant Plume Stability*[3]. This approach uses grid files from Surfer software to calculate plume area, average concentration, contaminant mass, and center of mass and then statistical trend analyses are performed on the calculated values; and/or
- *Monitoring and Remediation Optimization System (MAROS).* This tool provides (1) optimization routines, to help determine the appropriate number of sample locations, sampling frequency, and laboratory analytes for site monitoring objectives, and (2) statistical analysis tools to evaluate the plume stability condition and remedy performance.

[1] Ricker, J. A. (2008). A practical method to evaluate ground water contaminant plume stability. *Groundwater Monitoring & Remediation*, *28*(4), 85-94.

8.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU08 - Former Moore Army Airfield AOC 50	*Protectiveness Determination*: Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at AOC 50 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater or vapor that could pose an unacceptable human health risk, the LUCs are enforced, and no exposure are currently occurring or imminent. The first RAO has been achieved through implementation of the remedy, specifically through 1) SVE, 2) IWS, 3) ERD, and 4) natural attenuation. Groundwater monitoring at AOC 50 has confirmed the first RAO has been achieved. Groundwater monitoring will confirm when the second RAO will be met via enhanced reduction dechlorination and natural attenuation, which continues to reduce the solvent plume concentrations. The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that there is no new development and there is no use of groundwater.		

8.8 Next Review

The next FYR for AOC 50 will be conducted five years form the completion of this review (September 2025).

8.9 References

References are included in **Appendix A.**

9 BUILDING 3713 FUEL OIL SPILL SITE AREA OF CONTAMINATION 57

9.1 Introduction

This is the fourth five-year review for AOC 57, the last being completed in 2015. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

9.1.1 Site Background

AOC 57 consists of three sub-areas; Area 1, Area 2, and Area 3, located south and southeast of former building 3713 and former buildings 3756, 3757, and 3758. (**Figures K-1 through K-3, Appendix K**). These sub-areas received stormwater runoff and wastes from vehicle maintenance activities conducted at the storage yards related to Building 3713 and former Buildings 3757 and 3758. These yards were eventually abandoned in 1998, the pavement and fencing were improved, and eventually redeveloped. Areas 1, 2, and 3 include upland areas that slope downward to a delineated wetland, which is part of the wetland system and feeder stream known as Lower Cold Spring Brook.

Area 1 consists of a former stormwater outfall and drainage area for runoff from paved areas proximal to former Building 3713 (**Figure K-1**). An estimated 50- to 100-gallon spill of No. 4 fuel oil was discharged through the Area 1 outfall in 1977. Approximately 3,000 gallons of mixed oil and water were recovered through the use of contaminant dikes and absorbent booms in 1977, and approximately 25 cy of petroleum contaminated soil were removed in 1997.

Area 2 is located approximately 700 feet north of Area 1 and adjacent to a former vehicle storage yard associated with the motor repair shops located in former Buildings 3757 and 3758 (**Figure K-2**). Area 2 grades down towards the wetlands associated with Cold Spring Brook and formerly consisted of an eroded drainage ditch created by rainfall runoff from vehicle storage yards.

Area 3 is located approximately 600 feet to the northeast of Area 2, south of former vehicle maintenance motor pools (**Figure K-3**). Area 3 was identified through historical photograph analysis indicated an area of soil staining.

A site chronology and additional background information is included in **Appendix K**.

9.2 Response Action Summary

9.2.1 Basis for Taking Action

Per the ROD, the risk assessments were conducted to evaluate effects associated with exposure to contaminated media remaining at AOC 57 following soil removal actions. At Area 1, review of the data indicated that contamination associated with the fuel oil spill has been removed, and a risk assessment indicated that there were no unacceptable risks from unrestricted use

Per the ROD, the estimated excess cancer risks at Area 2 associated with current land use conditions at both upland and flood-plain areas are within the USEPA acceptable carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$. Noncancer risks associated with current land use are below the noncarcinogenic target HI of 1. Estimated cancer risks associated with possible future land use at the Area 2 upland and flood-plain areas of the site are also within USEPA's acceptable risk range. However, noncancer risks to a possible future construction worker associated with excavation of Area 2 flood plain subsurface soil exceeded an HI of 1. These noncancer risks were primarily attributable to PCBs.

Per the ROD, for unrestricted exposure to upland and flood-plain soil at Area 2, cancer risks do not exceed the USEPA cancer risk range; however, noncancer risks associated with unrestricted exposure to both upland and flood-plain soil exceed an HI of 1. These noncancer risks were primarily attributable to PCBs, chromium, petroleum hydrocarbons, and arsenic. In the upland Area 2 unrestricted child resident exposure scenario, the target-organ specific HIs are less than or equal to the USEPA target threshold value of 1 for noncancer risk. Therefore, noncancer risks from unrestricted child resident exposure to surface soil at Area 2 upland areas are considered unlikely. Unrestricted (residential) exposure to Area 2 flood plain groundwater poses risks that exceed the USEPA acceptable cancer risk range and target HI of 1, due primarily to arsenic.

At Area 3 estimated excess cancer risks associated with current land use conditions at both upland and flood-plain areas are within the USEPA acceptable carcinogenic risk range. Noncancer risks associated with current land use are below the noncarcinogenic target HI of 1. Potential risks associated with possible future construction and commercial/industrial worker exposure to surface and subsurface soil are within the USEPA target cancer risk range and below an HI of 1. However, estimated cancer risks associated with possible future commercial/industrial worker ingestion of Area 3 upland groundwater exceed USEPA's acceptable risk range, and noncancer risks associated with possible future commercial/industrial worker ingestion of groundwater exceed an HI of 1. Because, however, the target-organ specific HIs are less than or equal to the USEPA target threshold value of 1, noncancer risks from commercial/industrial worker ingestion of Area 2 upland groundwater are considered unlikely. Cancer risks associated with unrestricted exposures to upland and flood-plain soil at Area 3 do not exceed the USEPA acceptable cancer risk range; however, noncancer risks associated with unrestricted exposure to flood plain soil exceed an HI of 1. Unrestricted exposure to both upland and flood-plain groundwater at Area 3 poses risks that exceed the USEPA acceptable cancer risk range and target HI of 1. These cancer risks result primarily from arsenic, while the noncancer risks result primarily from hydrocarbons.

Per the ROD, because groundwater at AOC 57 is not currently used for potable water and the area bordering Barnum Road is serviced by a public water supply, future potable use exposure to AOC 57 groundwater is unlikely to occur. A more realistic potential use of AOC 57 groundwater is for industrial non-potable process water. However, it is unlikely that non-potable industrial uses of groundwater would result in an exposure scenario which would result in levels of risk that exceed the USEPA risk range or target level.

Per the ROD, those areas and media that present cancer risk greater than $1x10^{-4}$ and noncancer risk with HI greater than 1 are listed below.

Area 2 – Upland Area

None

Area 2 Flood Plain Area

- Possible future construction worker exposure to subsurface soil (noncarcinogenic risk).
- Unrestricted use child residential exposure to flood plain surface soil (noncarcinogenic risk).
- Unrestricted use child residential exposure to flood plain subsurface soil (noncarcinogenic risk).
- Unrestricted use adult residential exposure to flood plain groundwater (carcinogenic and noncarcinogenic risks).

Area 3 Upland Area

- Possible future commercial/industrial worker exposure to upland groundwater (carcinogenic and

noncarcinogenic risks).

- Unrestricted use adult residential exposure to flood plain groundwater (carcinogenic and noncarcinogenic risks).

Area 3 Flood Plain Area

- • Unrestricted use child residential exposure to flood plain surface soil (noncarcinogenic risk).
- • Unrestricted use adult residential exposure to flood plain groundwater (carcinogenic and noncarcinogenic risks).

9.2.2 Response Actions

There were three soil removal actions completed at AOC 57 before the ROD was written.

At AOC 57 Area 1, approximately 3,000 gallons of mixed oil and water were recovered through the use of contaminant dikes and absorbent booms in 1977, and approximately 25 cy of petroleum contaminated soil were removed in 1997. Area 1 was recommended for No Further Action (NFA) following the removal of this contaminated soil. The approved 2001 AOC 57 ROD indicated that Area 1 was closed with NFA.

At AOC 57 Area 2, following a soil removal action in 1994, Area 2 was re-graded and a permanent drainage swale was installed. Subsequent activities included subsurface investigations with soil sampling and monitoring well installation, removal of contaminated soil, construction of an interceptor trench, and operation of a petroleum product recovery system.

At AOC 57 Area 3, the Army conducted a soil removal action in 1999 that targeted soils with TPH and PCB concentrations exceeding soil standards published under the MCP. A total of 1,860 cy of materials was removed for off-site disposal.

The following RAOs were presented in the 2001 ROD at address the remaining contamination.

Area 2 Flood Plain

- Protect possible future construction workers that might work within Area 2 flood plain (recreational) areas from ingesting soils containing Aroclor-1260 and lead at concentrations in excess of PRGs considered protective of human health.
- Prevent unrestricted use residential receptors from coming in dermal contact with and ingesting Area 2 flood plain soils containing Aroclor-1260, arsenic, chromium, lead, and the EPH C11-C22 aromatic carbon range at concentrations in excess of PRGs considered protective of human health.
- Prevent unrestricted potable use of Area 2 flood plain groundwater containing arsenic and PCE at concentrations that exceed MCLs and Massachusetts Maximum Contaminant Levels (MMCLs) for drinking water.

Area 3 Upland

- Protect possible future commercial/industrial workers from ingesting Area 3 upland groundwater that contains arsenic, cadmium, and 1,4-DCB at concentrations that exceed MCLs and MMCLs for drinking water.
- Prevent unrestricted residential potable use of Area 3 upland groundwater containing arsenic, cadmium, and 1,4-DCB at concentrations that exceed MCLs and MMCLs for drinking water.

Area 3 Flood Plain

- Prevent unrestricted use residential receptors from coming in dermal contact with and ingesting surface soils containing the EPH C11-C22 aromatic carbon range at concentrations in excess of PRGs considered protective of human health.
- Prevent unrestricted residential potable use of Area 3 flood plain groundwater containing arsenic and PCE at concentrations that exceed MCLs and MMCLs drinking water.

The cleanup levels for soil presented in the ROD are below.

Table 9-1 Contaminants of Concern Cleanup Levels in Soil AOC 57 from the ROD

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis
Aroclor-1260	3.5	Risk based
Lead	600	MCP Method 1 S-2/GW-1

Soil cleanup levels and soil PRGs were not developed for Area 3 in the ROD because the remedy relies on LUCs to achieve protection of human health under anticipated future land use scenarios. The Area 3 soil cleanup objective was to remove organic material impacted stormwater runoff and wastes from vehicle maintenance at storage yards. The soil cleanup levels for Area 3 were developed during the design phase of the remedy.

Table 9-2 AOC 57 Area 3 Contaminants of Concern Cleanup Levels in Soil from the Design Phase

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis
C_{11}-C_{22} Aromatic Hydrocarbons	930	MassDEP method

The cleanup levels for groundwater presented in the ROD are below.

Table 9-3 Contaminants of Concern Cleanup Levels in Groundwater AOC 57 from the ROD

Contaminant of Concern	Cleanup Levels	Basis
Arsenic	50 µg/L	MCL
Cadmium	5 µg/L	MCL
1,4-DCB	5 µg/L	MMCL
Tetrachloroethylene	5 µg/L	MCL

The selected remedies for the three AOC 57 areas were presented in the 2001 ROD. No further action was required for AOC 57 Area 1. The selected remedy for Area 2 is "Alternative II-3, Excavation (For Possible Future Use), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls." Alternative II-3 contains components to reduce potential human-health risks associated with contaminated soil and groundwater at the Area 2 flood plain. Key components of Alternative II-3 consisted of the following:

- Soil Excavation and treatment/disposal at an off-site treatment, storage, or disposal facility
- Wetlands Protection
- Institutional Controls
- Existing zoning that prohibits residential use of Area 2 property and proposed deed restrictions that prohibit potable use of Area 2 groundwater and residential use of flood plain property
- Environmental Monitoring
- Long-term groundwater monitoring
- Long-term surface water monitoring
- Institutional Control Inspections
- Five-year Site Reviews

The selected remedy for Area 3 is "Alternative III-2a, Excavation (To Accelerate Groundwater Cleanup), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls." Alternative III-2a: contains all the elements of Alternative III-2, plus soil removal to accelerate groundwater cleanup. Key components of Alternative III-2a consist of following:

- Soil Excavation and treatment/disposal at an off-site treatment, storage, or disposal facility
- Wetlands Protection
- Institutional Controls
- Existing zoning that prohibits residential use of Area 3 property and proposed deed restrictions that prohibit potable use of Area 3 groundwater and residential use of flood plain property
- Environmental Monitoring
- Long-term groundwater monitoring
- Long-term surface water monitoring
- Institutional Control Inspections
- Five-year Site Reviews

In March 2004, an ESD was prepared for AOC 57. The ESD resulted from data collected during soil excavation activities at Area 2. There was no text in the ESD specifying changes to the RAOs. The changes to the selected remedy for Area 2 were:

- Increased volume and cost of contaminated soil requiring removal to attain cleanup levels at Area 2;
- Inclusion of EPH as a COC for soils at Area 2, in the September 2001 AO 57 ROD, to monitor the presence of petroleum waste encountered during contaminated soil removal; and
- Inclusion of EPH and PCBs COCs for Area 2 groundwater in the September 2001 AOC 57 ROD.

The original ROD established risk-based cleanup levels for Area 2 at AOC 57 for the PCBs (Aroclor-1260), and lead. Concerns about the persistent separate phase petroleum waste observed during removal and investigation work in 2002-2003 resulted in the addition of C_{11}-C_{22} aromatic hydrocarbons quantified by MADEP EPH Method as a soil and groundwater COC for Area 2. As a result of the addition of C_{11}-C_{22} aromatic hydrocarbons as a COC, the ROD adopted the more stringent S3/GW-1 cleanup level of 200 mg/kg EPH C_{11}-C_{22} aromatic fraction for Area 2 soils. PCBs were also added as a groundwater COC for Area 2.

Table 9-4 AOC 57 Area 2 Contaminants of Concern Cleanup Levels in Soil from the ESD

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis
Aroclor-1260	3.5	Risk based
Lead	600	MCP Method 1 S-2/GW-1
EPH C11-C22 Aromatics	200	MADEP method S-1/GW-1

Table 9-5 Area 2 Contaminants of Concern Cleanup Levels in Groundwater from the ESD

Contaminant of Concern	Cleanup Levels (µg/L)	Basis
Arsenic	50	MCL
Cadmium	5	MCL
1,4-DCB	5	MMCL
Tetrachloroethylene	5	MCL
EPH C_{11}-C_{22} Aromatics	200	MCP Method 1 risk assessment standards for GW-1
PCB (total of all Aroclors)	0.5	MCL

9.2.3 Status of Implementation

Soil Excavation and Treatment/Disposal at an Off-site Facility

The Army performed soil removal in January-February 2003 at AOC 57 Areas 2 and 3 under a Remedial Action Work Plan (RAWP) prepared to address the final ROD remedy for contaminated soils.

Area 3 was excavated to the target limits, and the planned volume of soil was removed within these limits to depths ranging from 2 to 4-feet. All confirmatory samples met the ROD cleanup criterion for EPH. Area 3 was backfilled and the extent of removal was documented.

At Area 2, the ROD-based soil excavation was performed between January 2002 and February 2003. However, contamination appeared to extend beyond the assumed limits of contamination. In addition, petroleum waste persistently seeped into the excavation. The excavation was left partially open to observe and remove the oil sheen and globules using absorbent pads and a belt-skimmer product recovery system.

During 2003, the Army continued operation of the petroleum product recovery system at Area 2 following a winter shutdown. The Army conducted additional soil sampling to delineate the extent of contaminated soils, and to identify the source of the petroleum waste. Based on the additional soil data, a Work Plan Amendment was developed to complete remediation of the remaining contaminated soils. The Army executed the Work Plan Amendment, which included contaminated soil removal and removal of excavation water to allow access to contaminated soils beneath the groundwater table. The Army installed

and operated a petroleum product recovery system in the open excavation and installed four collection sumps at Area 2 within a groundwater interception trench installed between the soil excavation area and the wetlands. Site restoration activities at AOC 57 Areas 2 and 3 were performed in October 2003. Transportation and disposal of remaining stockpiled contaminated soils were completed by the end of December 2003.

A final Interim Remedial Action Completion Report was prepared in September 2004. The report summarizes the work performed to complete remediation of contaminated soils at AOC 57 during 2002 and 2003. The following is a summary of the materials removed during the remedial activities:

1. 4,361 tons of contaminated material was excavated from Area 2 and 197 tons were removed from Area 3. All contaminated soils were transported offsite for treatment/recycling in a thermal desorption process at Environmental Soils Management, Inc., in Loudon, NH;
2. Twenty-four 55-gallon drums containing absorbent materials and PPE were transported to Onyx facility, Texax, for thermal destruction;
3. Two 55-gallon drums (an estimated 80-gallons) containing petroleum-contaminated liquids from skimming operations;
4. One 20 cy container of plastic liner co-mingled with contaminated soils;
5. Two 30 cy trash containers of construction wastes and decontaminated liner/cover materials; and
6. 94,000 gallons of contaminated water from the excavations were discharged to the Devens sewer system under a temporary discharge permit.

Wetland Protection

The removal contractor, Conti Environmental, Inc. (Conti), restored delineated wetlands that were damaged during the excavation activities in Areas 2 and 3. The remediation and restoration were completed in October 2003. Final restoration activities were performed in October 2003 following completion of the soil remedial actions.

A wetland monitoring plan was outlined in the LTMP prepared by USACE in March of 2004. The objectives of the wetland restoration and monitoring plan were to evaluate the restoration measures implemented during the first two growing seasons to ensure success and to identify and take corrective actions, if any, based on the periodic monitoring. The key components of the Wetlands Monitoring Plan included: monitoring during construction, LTM, and compliance with performance standards presented in the LTMP. Wetlands within AOC 57 are part of the Lower Cold Spring Brook drainage and must be considered with any plans to restore Lower Cold Spring, Bowers and Nonacoicus Brooks.

Three years of wetlands monitoring, and maintenance was performed by USACE from 2004 through 2006. By the end of 2006, the wetland areas of AOC 57 were found to meet performance standards and the Habitat LTMP Program was terminated. A two-year operation and maintenance phase was implemented by USACE from 2007 through 2008. The 2008 Final Annual Report, O&M Phase, Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Program, DCL) Areas of Contamination 9, 11, 40, 41 & Study Areas 12 and 13, and Area of Contamination 57 Areas 2 and 3 (USACE, 2009) summarized the findings of the 2008 O&M activities, and concluded the wetlands monitoring, maintenance and reporting activities for AOC 57.

Land Use Controls and Institutional Control Inspections

Per the ROD, the LUC would consist of deed covenants the Army would include if the property were transferred to prohibit the use of groundwater as a potable source and residential use of flood plain property are currently in effect at AOC 57. The Army has leased AOC 57 to MassDevelopment along with other Devens parcels as documented in the 1996 Lease in Furtherance of Conveyance (LIFOC). Land use controls are included in the LIFOC currently in affect for all leased parcels including AOC 57. The Army is currently is in the process of preparing a Finding of Suitability Transfer (FOST) to transfer the parcel to MassDevelopment for development as Rail Industrial land Trade-Related and Open Space property. The draft FOST details the administrative LUCs that will be included with the Deed prior to transfer of the parcel.

The Army prepared and submitted a LUC implementation and monitoring plan as part of the site LTMP. Institutional control inspections are conducted annually per the land use control implementation and monitoring section of the 2015 LTMMP (Sovereign/HGL, 2015). The results of the inspections are reported in the Main Post Annual Reports.

Environmental Monitoring

The first long-term surface water and groundwater sampling round at AOC 57 was performed in December 2003. The monitoring program has been revised numerous times since it was initiated. The current program (Sovereign/HGL, 2015) consists of annual sampling of two monitoring wells (analyzed for total arsenic, iron, and manganese analyses) at Area 3, gauging of Area 2 and Area 3 wells, and surface water sampling at one location in Area 3 (analyzed for dissolved arsenic, iron, and manganese analyses). Additional supplemental samples for dissolved arsenic, iron, and manganese analyses were collected from an expanded number of wells and piezometers in the winter of 2019 to support this FYR. The supplemental sampling was conducted in accordance with the workplan titled: Amended Supplemental Sampling to Support the 2020 Five-Year Review, Areas of Contamination 43G and 57 (KGS, 2020c). Analytical results are provided in **Appendix K**.

9.2.4 IC Summary Table

Table 9-6 AOC 57 - Summary of Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	AOC 57	Prohibit the potable use of groundwater and residential use of floodplain property	Lease in Furtherance of Conveyance of Real Property and Facilities on Fort Devens, Massachusetts, Military Reservation, May 1996

9.2.5 Systems Operations/Operation & Maintenance

There are no active systems to operate and maintain at AOC 57.

9.3 Progress Since Last Review

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 9-7 Protectiveness Determinations Statement from the 2015 FYR

OU#9	Protectiveness Determination	Protectiveness Statement
Site wide	Protective	"The remedy at AOC 57 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled".

There were no issues and recommendations in the last (2015) FYR.

Status of 2015 Five-Year Review

The Draft 2015 Five-Year Review was submitted to USEPA and Massachusetts Department of Environmental Protection (MassDEP) in July 2015. MassDEP comments were received on July 20, 2015 and USEPA comments were received on September 9, 2015. The U.S. Army (Army) responded to USEPA and MassDEP comments and, in order to meet the statutory deadline for submittal of the final document, issued the Final 2015 Five-Year Review on September 26, 2015. USEPA did not agree with all of the responses to comments, in particular, the site-specific protectiveness statements. The Army has reviewed the USEPA and MassDEP comments during preparation of this 2020 Five-Year Review and has incorporated responses, as applicable, into this document. The responses to USEPA and MassDEP comments on the 2015 Five-Year Review are provided in Appendix L of the Final 2015 Five Year Review (KGS, 2015).

9.4 Five-Year Review Process

This section summarizes the FYR process for AOC 57 and the actions taken to complete the review.

9.4.1 Community Notifications, Involvement & Site Interviews

As discussed in the Executive Summary, The USACE announced the commencement of this FYR at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in the Executive Summary regarding the overall cleanup of Devens. There were no AOC-specific comments.

9.4.2 Data Review

Annual Reports present groundwater sampling data for Areas 2 and 3 at AOC 57. The 2015 through 2019 LTM data and the supplemental sampling results for AOC 57 were reviewed for this FYR Report and are discussed below. Analytical results are provided in the tables in **Appendix K**.

The current monitoring program (Sovereign/HGL, 2015) consists of annual sampling of two monitoring wells (analyzed for total arsenic, iron, and manganese analyses) at Area 3, gauging of Area 2 and Area 3 wells, and surface water sampling at one location in Area 3 (analyzed for dissolved arsenic, iron, and manganese analyses). Although iron and manganese are not listed in the AOC 57 ROD, USEPA Region I requested that these metals be included in the sampling events as a measure of the potential for natural attenuation. AOC 57 does not have a site-specific cleanup goal for manganese and iron, as they were not groundwater COCs in the 2001 ROD. AOC 57 manganese and iron concentrations in groundwater are compared to their background levels of 291 and 9,100 µg/L, respectively. Summary tables of the most recent monitoring data from 2015 through 2019 and supplemental sampling results from 2020 are presented in **Appendix K**. Graphical and statistical analyses of selected wells are also presented in **Appendix K**. Statistical analyses were compared to a 95% confidence level.

2019 total arsenic concentrations in Area 3 groundwater remained above the MCL (10 µg/L) at wells 57M-96-11X (100 µg/L) and 57M-95-03X (15 µg/L). Graphical and statistical analysis of the data trends over the period of record, 2003 to 2019 (**Appendix K**), indicate that the total arsenic concentrations at source area well 57M-95-03X have been relatively stable, at or below 60 µg/L since 2005 (average of 32 µg/L since 2005). Arsenic concentrations at 57M-96-11X have varied more broadly over time from higher concentrations between 240 and 290 µg/L during 2003/2004 and 2015/2016 to lower concentrations in other years ranging from 148 µg/L to 192 µg/L, with 100 µg/L recorded most recently in 2019. Over the period of record analyzed, no statistically significant trends were identified at wells 57M-96-11X ($p = 0.404$) or 57M-95-03X ($p = 0.428$) at the selected 95% confidence level.

The presence of arsenic above the clean-up goal appear to be related to low (below 50 millivolt) ORP readings, and low (below 1 mg/L) DO levels, which are associated with reducing conditions. Overall, Area 3 well 57M-96-11X consistently portrays an elevated arsenic concentration ranging from 12 to 27 times the MCL, whereas arsenic in well 57M-95-03X has ranged from three to four times the MCL to slightly above it. Furthermore, according to the June 2019 ORP readings and DO levels, the Area 3 groundwater continues to support a reductive environment, which would promote the mobilization of metals from native, arsenic-bearing soils.

Groundwater sampling results indicate that arsenic concentrations are generally steady, with some fluctuations over time.

In the surface water, arsenic was not detected at surface water sampling location 57-AREA3-SW1 for the spring 2019 sampling event. The dissolved iron concentration in surface water sample 57M-AREA3-SW-1 (760 µg/L) was less than the monitoring benchmark of 1,000 µg/L. Manganese was detected in the surface water sample; however, no benchmark has been established for manganese in surface water.

Winter 2020 Supplemental Sampling

Additional supplemental groundwater sampling occurred in January and February 2020 at AOC 57. The supplemental sampling was initiated by requests from EPA for the Army to obtain additional groundwater data regarding the extent of COCs in groundwater to support the ongoing 2020 FYR for Fort Devens. EPA had indicated that the additional data were needed to facilitate the FYR's protectiveness evaluations of the remedial actions implemented at AOC 57 in accordance with the ROD.

Since completion of the source area removal, the Army has been conducting a long-term groundwater monitoring program for approximately the past 20 years. Contaminant of concern concentrations in groundwater have attenuated since the source area removal; however, some metals concentrations still remain above cleanup goals in a limited number of wells at the site. These dissolved metals concentrations in groundwater are believed to be elevated due to the mobilization of naturally occurring metals in the site soils to groundwater, resulting from the reducing conditions (low DO, low ORP) that occurs with the degradation of a carbon source such as the original hydrocarbon release at the site. It is expected that dissolved metals concentrations will decrease downgradient of the fuel release where more oxidizing conditions are present, which causes dissolved metals to precipitate out of solution. EPA has also indicated that further data are needed to support the conceptual site model (CSM) which indicates that the extent of the dissolved phase contamination is limited in extent and is controlled (bounded) by the discharge of shallow site groundwater into Cold Spring Brook. Therefore, the supplemental sampling event was performed (1) to verify that arsenic, iron, manganese concentrations are decreasing or stable and/or are attenuating over time per the CSM, (2) to further delineate the extent of elevated arsenic, iron, manganese concentrations in shallow and deep groundwater, (3) to confirm that shallow groundwater discharges to Cold Spring Brook, and (4) to

describe the flow pattern of deep groundwater toward Cold Spring Brook. The Army conducted the supplemental sampling event in January and February 2020 at AOC 57. In addition, as part of the ongoing Remedial Investigation (RI) of per- and polyfluoroalkyl substances (PFAS) at Fort Devens, vertical profile transects were installed in areas downgradient of AOC 57 and into the wetlands bordering Cold Spring Brook. Groundwater samples from these transects were also analyzed for dissolved arsenic, iron, and manganese to support the supplemental sampling effort. The purpose of including the metals data from the Cold Spring Brook vertical profile sampling program was to further evaluate the vertical and horizontal extent of metals in groundwater and to evaluate whether redox zone boundaries could be established.

The supplemental groundwater samples were collected from 15 monitoring wells and one well point at Area 2, and eight monitoring wells and three piezometers at Area 3. Samples collected during the supplemental sampling event were analyzed for the select dissolved metals, arsenic, iron, and manganese. Sampling activities and results are detailed in the *Draft Supplemental Sampling Report to Support the 2020 Five Year review, Areas of Contamination 43G and 57, Former Fort Devens Army Installation, Devens, MA* (KGS, 2020).

The sampling results were consistent with the CSM for the site. Conclusions of the Supplemental Sampling Report are summarized below by area. Figures and data tables are provided in **Appendix K**.

Area 2

Dissolved arsenic was detected at one shallow monitoring well (57M-03-05X) at a concentration (13 µg/L) only marginally greater than the cleanup goal (**Table K-11**). Arsenic levels were either non-detect or were below the cleanup goal at the other monitoring points within Area 2 with one exception. At deep monitoring well 5702MW-20-01B (collocated with 57M-03-05X), dissolved arsenic was detected at a concentration (17 µg/L) greater than the cleanup goal (**Table K-12**). However, the ORP and DO levels at this well were in the reducing range, and a upward vertical gradient in this well indicate that the detected arsenic level is representative of naturally-occurring arsenic levels in the deeper groundwater and the upward vertical gradient indicates that the detected arsenic level is not the result of the downward transport of elevated arsenic associated with the shallow source area. In addition, the concentration of arsenic at mid-depth well 5702MW-20-01A (2.2 µg/L) further supports that downward migration of elevated arsenic levels is not occurring at this location. Upward vertical gradients identified at additional well sites at the western and southern margins, topographically upslope from the Cold Spring Brook wetlands, indicate that the deeper groundwater moves upward toward Cold Spring Brook, consistent with the current CSM for AOC 57. Groundwater data generated by the sampling of four vertical profile sites (34 total samples) located downgradient of Area 2 and extending into the wetlands associated with Cold Spring Brook, indicate that arsenic concentrations, with one exception, were non-detect or less than the cleanup goal. These data further indicate that arsenic at levels greater than the cleanup goal has not been transported into or beyond Cold Spring Brook and the arsenic present at concentrations greater than the cleanup goal has a very limited extent.

Dissolved manganese was also detected at 57M-03-05X at a concentration (590 µg/L) greater than the monitoring criterion of 291 µg/L (**Table K-11**). Shallow groundwater with levels of dissolved manganese greater than the monitoring criterion was identified at a number of additional monitoring wells, situated in western margins of Area 2 in locations cross-gradient to the original source area. These manganese data indicate that the detected concentrations are representative of a wider range of background values than that defined by the 291 µg/L value developed in 2000 (HLA, 2000).

The dataset developed by the winter 2020 supplemental sampling event confirms the conclusion in 2015 that arsenic concentrations are very limited in extent and are not likely to pose a risk of offsite migration.

Area 3

The winter 2020 data for source area well 57M-95-03X identified dissolved arsenic at a concentration (30 µg/L) greater than the cleanup goal, consistent with previous LTM sampling results (**Table K-13**). The winter 2020 concentration was greater than that identified in the previous spring 2019 LTM sampling event but was consistent with the longer-term average value (32 µg/L since 2005). ORP and DO values at 57M-95-03X over the past several years have fluctuated from values representing a reducing environment in the groundwater to values representing a weakly oxidizing environment. Variation in arsenic levels have generally followed the variations in the oxidation-reduction state of the groundwater. Dissolved arsenic was also detected at a level greater than the cleanup goal at shallow downgradient well 57M-96-11X, consistent with results from previous LTM sampling. The detected value of dissolved arsenic in winter 2020 (67 µg/L) represents another incremental reduction in arsenic concentration at this well, starting with 290 µg/L (total arsenic) in spring 2016, 180 µg/L (total arsenic) in spring 2017 and 2018, and 100 µg/L (total arsenic) in spring 2019. Fluctuating ORP and DO values at 57M-96-11X (**Table K-13**) are an indication of the groundwater transitioning from a reducing state to a weakly oxidizing state, and this is reflected in the incremental reduction is arsenic levels over the past four years.

Arsenic was detected at one additional monitoring point, deep monitoring well 5703MW-20-01B, at a concentration (11 µg/L) only marginally greater than the cleanup goal (**Table K-13**). This well is situated to the east of the former source area in a cross-gradient location. The ORP and DO data at this well were in the reducing range and a positive upward gradient at this well indicate that the detected concentration is representative of a naturally occurring dissolved arsenic in this deep zone and is not a result of the downward transport of impacted groundwater from the former source area. The remaining monitoring well samples had arsenic concentrations that were either nondetect or below the groundwater cleanup value.

Groundwater data generated by the sampling of four vertical profile sites (22 total samples) located downgradient of Area 3 and extending into the wetlands associated with Cold Spring Brook, indicate that arsenic concentrations in groundwater beneath the wetland were non-detect or less than the cleanup goal. These data further indicate that arsenic at levels greater than the cleanup goal has not been transported into or beyond Cold Spring Brook and the extent of arsenic present at concentrations greater than the cleanup goal is limited.

Dissolved manganese was detected at a number of monitoring points within Area 3 at levels greater than the background value developed in 2000 (HLA, 2000). However, the distribution of elevated manganese with respect to the former source area and the relationship with associated ORP and DO data do not present a definable pattern. Elevated manganese levels were identified in groundwater in both reducing and oxidizing states, as well as low levels of manganese also in groundwater in both reducing and oxidizing states. The data may indicate that the range of background levels of manganese in the groundwater is wider than the data used to generate the 2000 background level (HLA, 2000).

The winter 2020 groundwater sampling results at 57M-96-11X (**Table K-15**) indicate that arsenic concentrations are decreasing incrementally as the groundwater transitions to a more oxidizing state. The data for source area well 57M-96-03X indicate that arsenic concentrations are relatively stable, associated with fluctuating ORP and DO levels indicative of variation between weakly reducing and weakly oxidizing states in the groundwater. As indicated by the current literature, metals can be expected to come out of solution (precipitate) when the aquifer reverts to more permanent oxidizing state within the impacted area, or when the impacted groundwater reaches and expands into an oxidizing environment. The shallow groundwater at AOC 57 flows toward Cold Spring Brook; the identification of an upward vertical gradient at

57M-96-11X indicates that deeper groundwater also flows toward Cold Spring Brook. The chemical status of the groundwater and the presence of the upward vertical gradient at the wetlands margin are consistent with the current CSM for AOC 57. The CSM also acknowledges that naturally occurring subsurface zones can occur and that the concentrations of metals in those zones that are greater than site cleanup levels or monitoring criteria can be naturally occurring. The dataset developed by the winter 2020 supplemental sampling event confirms the conclusion in 2015 that arsenic concentrations are very limited in extent and are not likely to pose a risk of offsite migration.

Vertical Gradients

Interpretive shallow and deep groundwater elevations for AOC 57 Area 2 are presented on **Figure K-4 and Figure K-5**, respectively. Interpretive shallow and deep groundwater elevations for AOC 57 Area 3 are presented on **Figure K-6 and Figure K-7**, respectively. Data from the winter 2020 event at AOC 57 indicate that the shallow and deep groundwater flow in a south/southeast direction, toward Cold Spring Brook, which is consistent with historical observations of groundwater flow patterns in this area.

Horizontal groundwater gradients for the shallow and deep groundwater in Area 2, using the flow lines shown in **Figure K-4 and Figure K-5**, were calculated to be 0.0109 feet per foot (ft/ft) (Gradient Line A-A', **Figure K-4**) and 0.0053 ft/ft (Gradient Line A-A', **Figure K-5**), respectively.

Horizontal groundwater gradients for the shallow and deep groundwater in Area 3, using the flow lines shown in **Figure K-6 and Figure K-7**, were calculated to be 0.0195 ft/ft (Gradient Line A-A', **Figure K-6**) and 0.0127 ft/ft (Gradient Line A-A', **Figure K-7**), respectively.

The supplemental sampling event at AOC 57 generated a number of well pairs and well triplets at which vertical groundwater gradients have been calculated (**Tables K-16 and K-17**). For Area 2, three well pairs and two well triplets were created. For Area 3, two well pairs and one well triplet were created.

For Area 2, downward vertical gradients in the groundwater were identified at Well Pairs 1 and 2 located at the northern margin of the site (**Table K-16**). Upward vertical gradients in the groundwater at Well Triplets 1 and 2 (**Table K-17**) and Well Pair 3 located at the southern margin of the site, adjacent to the Cold Spring Brook wetlands. For the well triplets, upward vertical gradients were identified between the deep and shallow wells, between the deep and mid-depth wells, and between the mid-depth and shallow wells. These upward gradients suggest that deep groundwater at Area 2 moves upward toward Cold Spring Brook, consistent with the current CSM.

For Area 3, downward vertical gradients were identified in the groundwater at Well Pairs 1 and 2 (**Table K-17**) located on the western and eastern margins of the area of the original hydrocarbon release. Upward vertical gradients were identified at Well Triplet 1 located at the southern margin of the site, adjacent to the Cold Spring Brook wetlands. Upward vertical gradients were identified between the deep and shallow wells, between the deep and mid-depth wells, and between the mid-depth and shallow wells at this well triplet. These upward gradients suggest that deep groundwater at Area 3 moves upward toward Cold Spring Brook, consistent with the current CSM.

9.4.3 Site Inspection

The FYR site inspection was conducted on February 5, 2020. In attendance was Melissa Miller of KGS. Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (EPA, 2001). The inspector verified there were no

changes in land use at the site and that no vandalism was evident. The inspector also verified that monitoring data is routinely submitted on time, that contaminant concentrations are declining, and that monitoring wells are properly secured, functioning, and in good condition. The inspection checklist is included in **Appendix K** along with supporting photographs.

As part of the FYR process, the existing land-use was evaluated to ensure that the control requirements identified for the site are being met. Land use controls are included in the Lease in Furtherance of Conveyance (LIFOC) currently in affect for all leased parcels including AOC 57. Compliance with the LUCs was verified through annual monitoring of the controls, which was conducted in accordance with the Land Use Control Implementation & Monitoring Plan portion of the LTMMP (Sovereign/HGL, 2015). The results of the annual monitoring are presented in the Main Post annual reports.

9.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" and EPA Region I's FY2020 Supplemental Technical Assessment Template, the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes. In accordance with the ROD and ESD contaminated soil was excavated, confirmatory sampling was performed prior to backfilling, soils were transported off-site for disposal, the excavated area was backfilled with clean material and the area was restored. Also, in accordance with the ROD a groundwater and surface water monitoring program was established, and monitoring has been conducted annually and the site has been reviewed every five years. Land use controls were established and LUCs inspections are conducted annually.

Remedial Action Performance

The Draft Final Operating Properly and Successfully Demonstration for Area of Contamination 57 (USACE, 2010) concluded that the remedial actions selected for AOC 57 were operating properly and successfully, consistent with the provisions of CERCLA, Section 120(h)(3). This conclusion was based on the following lines of evidence:

- The remedy for AOC 57 has been implemented as designed;
- The remedy will achieve the RAOs delineated in the ROD;
- The remedy is functioning in such a manner that it is expected to adequately protect human health and the environment when completed; and

- Land use controls have been enacted to provide further protection to human health.

Groundwater and surface water at AOC 57 are sampled annually in accordance with the 2015 LTMMP (Sovereign/HGL, 2015). Additional sampling occurred in winter 2020 to support the FYR. Arsenic concentrations are generally decreasing or steady with some fluctuations over time. Arsenic results in Area 2 have decreased significantly over time but remain slightly above the cleanup goal in wells 57M-03-05X and 5702MW-20-01B. The shallow groundwater at AOC 57 flows toward Cold Spring Brook. The upward gradients in Area 2 suggest that deep groundwater at Area 2 moves upward toward Cold Spring Brook, consistent with the current CSM. The dataset developed by the winter 2020 supplemental sampling event confirms the conclusion in 2015 that arsenic concentrations are very limited in extent and are not likely to pose a risk of offsite migration.

Arsenic results in Area 3 well 57M-95-03X have decreased significantly over time to concentrations that are slightly above the cleanup goal, although results in well 57M-96-11X remain at concentrations that are above the cleanup goal. Groundwater sampling results indicate that arsenic concentrations are generally steady, with some fluctuations over time. The upward gradients in Area 3 suggest that deep groundwater at Area 3 moves upward toward Cold Spring Brook, consistent with the current CSM. The arsenic concentrations above the MCL in groundwater are persisting longer than estimated in the ROD (8 years after excavation). The time to reach the arsenic groundwater cleanup levels are partly due to the lowering of the MCL from 50 µg/L to 10 µg/L and partly due to the longer time for aquifer conditions to return to background conditions than estimated. The dataset developed by the winter 2020 supplemental sampling event confirms the conclusion in 2015 that arsenic concentrations are limited in extent and are not likely to pose a risk of offsite migration.

Arsenic concentrations are diminished, the remaining concentrations are steady, and there is limited potential for off-site migration of arsenic via the groundwater to surface water discharge pathway. Based on the previous remedial activities performed at AOC 57 and evaluation of the available monitoring data through 2020, it is recommended that the groundwater and surface water sampling at Area 3 be reduced to once every five years to coincide with the FYR cycle. It is also recommended that arsenic, iron, and manganese in groundwater be analyzed as dissolved (filtered) concentrations as these are more representative of actual groundwater concentrations. The Army recommends eliminating the gauging of Area 2 wells. The groundwater flow patterns at Area 2 have been confirmed through numerous rounds of gauging. The site currently does not pose an exposure risk and is not expected to pose a risk in the future.

System Operations/O&M

There are no active treatment systems or applicable operations and operations and maintenance for AOC 57.

Implementation of Institutional Controls and other measures

The Army retains ownership of the property. The current lease terms between Army and MassDevelopment prohibit MassDevelopment from occupying or using the AOC 57 area without the written consent of the Army. The Army is currently is in the process of preparing a Finding of Suitability Transfer (FOST) to transfer the parcel to MassDevelopment for development as Rail Industrial land Trade-Related and Open Space property. The draft FOST details the administrative LUCs that will be included with the Deed prior to transfer of the parcel.

Monitoring of land-use control implementation is conducted in accordance with the Long-Term Monitoring and Maintenance Plan (LTMMP) (Sovereign/HGL, 2015). The monitoring is conducted on an annual basis via interviews with site representative and on-site visits. The annual monitoring is

documented in the Main Post Annual Report.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

No. There have been changes in cleanup levels, toxicity values, risk assessment methods, and exposure parameters since the 2001 ROD was issued as discussed below. The changes as described below are not expected to alter the protectiveness of the remedy because of various reasons discussed below.

Question B Summary

The reduction in the MCL for arsenic is a change to a cleanup goal. As discussed below, this change is not expected to alter the protectiveness of the remedy. The PFAS drinking water regulations do not affect protectiveness of the remedy because LUCs prevent use of groundwater.

The change in 40 CFR Part 6 to expand from 100-year flood elevation to the 500-year flood elevation does not affect the protectiveness of the remedy because, per the ROD, because contaminated soil remains in the flood plain with no plan for removal.

Changes in toxicity do not affect protectiveness of the remedy. Post excavation confirmatory soil samples for Area 1 and Area 2 excavations indicated that the average lead concentration was below 200 ppm. Review of the lead concentrations in soil samples from Area 3 in the RI (HLA, 2000) indicated that the average lead concentration was below 200 ppm. Changes in toxicity of PAHs is less stringent then when the risk assessment was conducted, therefore the risk associated with PAHs, at the time of the risk assessment, is potentially overestimated. Changes in toxicity of PFAS do not affect protectiveness of the remedy because LUCs are in place to restrict the use of the groundwater.

Changes in risk assessment methods do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the ROD. There have been changes to exposure parameters, but these do not affect the protectiveness of the remedy because in general would result in a slight decrease of the risk estimates for most chemicals.

Vapor intrusion (VI) was not recognized as an exposure pathway at AOC 57 in the ROD or the ESD. The VISL calculator has not been run for this site.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the 2001 ROD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

Location-and action-specific ARARs listed in 2001 ROD have been met since the remedial construction work has been completed. There were no additional ARARs identified in the ESD. There were no chemical specific ARARs identified related to the soil cleanup levels. The soil cleanup levels are no longer applicable because the remedial construction work has been completed and the clean-up levels have been attained.

The cleanup levels for soil presented in the ROD are below.

Table 9-8 Evaluation of Contaminants of Concern Cleanup Levels in Soil AOC 57 from the ROD

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis	Change to Cleanup Level Needed?
Aroclor-1260	3.5	Risk based	No
Lead	600	MCP Method 1 S-2/GW-1	No

Soil cleanup levels and soil PRGs were not developed for Area 3 in the ROD because the remedy relies on LUCs to achieve protection of human health under anticipated future land use scenarios. The Area 3 soil cleanup objective was to remove organic material impacted stormwater runoff and wastes from vehicle maintenance at storage yards. The soil cleanup levels for Area 3 were developed during the design phase of the remedy.

Table 9-9 Evaluation of Area 3 Contaminants of Concern Cleanup Levels in Soil from the Design Phase

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis	Change to Cleanup Level Needed?
C_{11}-C_{22} Aromatic Hydrocarbons	930	MassDEP method	No

The cleanup levels for soil presented in the ESD are below.

Table 9-10 Evaluation of Area 2 Contaminants of Concern Cleanup Levels in Soil from the ESD

Contaminant of Concern	Cleanup Levels (mg/kg)	Basis	Change to Cleanup Level Needed?
Aroclor-1260	3.5	Risk based	No
Lead	600	MCP Method 1 S-2/GW-1	No
EPH C11-C22 Aromatics	200	MADEP method S-1/GW-1	No

For the groundwater, the chemical specific ARARs identified in the ROD consist of the National Primary Drinking Water Standards and the Massachusetts Drinking Water Standards are considered relevant and appropriate. The Massachusetts Groundwater Quality Standards (314 CMR 6.00) were also considered relevant and appropriate but 314 CMR 6.00 was rescinded in March 2009. The ESD did not contain additional ARARs.

Table 9-11 Evaluation of Chemical of Concern Groundwater Cleanup Levels, AOC 57

Contaminant of Concern	ROD Cleanup Goals (µg/L)	Basis	Current MCL (µg/L)	Current Mass Criteria (µg/L)	Change to CG needed?
Arsenic	50 µg/L	MCL	10	10[1]	Yes
Cadmium	5 µg/L	MCL	5	5[1]	No
1,4-DCB	5 µg/L	MMCL	75	5[1]	No
Tetrachloroethylene	5 µg/L	MCL	5	5[1]	No
EPH C_{11}-C_{22} Aromatics[3]	200 µg/L	MA GW-1	none	200[2]	No
PCB[3]	0.5 µg/L	MCL	0.5	0.5[1]	No

[1] Massachusetts MCL.

[2] Massachusetts Office of Research and Standard Guideline for drinking water and Massachusetts GW-1 Standard.

[3] Area 2 groundwater COC identified in the ESD.

The MCLs are health-based standards established by the USEPA. The MCL for arsenic in effect at the time of the ROD (50 µg/L) was selected as a groundwater cleanup goal. The MCL for arsenic has been revised to 10 µg/L in 2002. There have been no other changes to the COC MCLs or MMCLs since the previous five-year review. The change in the arsenic MCL will result in extending the time to reach groundwater cleanup levels but the change does not expected to alter the protectiveness of the remedy due to implementation of LUCs. No other changes to ARARs or TBCs were identified that could affect protectiveness of the remedy.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

"Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

PFAS*:* In May 2016, EPA issued final lifetime drinking water health advisories (HA) for PFOA and PFOS. The EPA HA for PFOA and PFOS is 70 ng/L (ppt) individually or combined. See also EPA's *Interim Recommendations to Address Groundwater Contaminated with Perfluorooctanoic Acid and Perfluorooctanesulfonate* [OSWER DIRECTIVE 9283.1-47, Dec. 19, 2019].

In June 2019, MassDEP established an Office of Research and Standards Guideline (ORSG) level for drinking water that expanded the PFAS compounds included in EPA's LHA (i.e. PFOA and PFOS)to include perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluoroheptanoic acid (PFHpA). The ORSG level is 70 ng/L (ppt) and applies to the total summed level of the five PFAS compounds. An MCL of 20 ng/L (ppt) has been proposed for these five compounds plus PFDA; public comment closed in February 2020.

The presence of PFAS in groundwater, soil, and surface water and sediment at AOC 57 is being investigated to address PFAS at former Fort Devens. The on-going base-wide PFAS remedial investigation is discussed in Section 12 of this FYR. Land use controls are in place to prevent exposure to groundwater.

Federal Floodplain Management: Federal regulations at 40 CFR Part 6, Appendix A identified in the ROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. Based on the information provided in OLIVER, the Massachusetts GIS system, AOC 57 is within the area indicated on the FEMA National Flood Hazard Layer as having a 0.2 percent annual chance of flooding (i.e., the 500-year floodplain). A portion of AOC 57 is also within the 500-year flood elevation. The soil removal planned in the ROD is complete. Per the ROD, because contaminated soil remains in the flood plain with no plan for removal the change in 40 CFR Part 6 to expand from 100-year flood elevation to the 500-year flood elevation does not affect the protectiveness of the remedy.

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PFOA, PFOS, and PFBS in groundwater, PAHs, and lead in soil cleanups as described below. Lead was not identified in soil at concentrations greater than the new screening level. As the toxicity used for benzo(a)pyrene was greater at the time the risk assessment was conducted, the risk related to PAHs, at the time of the risk assessment, was likely overestimated. PAHs were not identified as COCs and cleanup levels were not determined for PAHs. The other changes do not affect the current protectiveness of the remedy because LUCs are in place to restrict use of the groundwater.

- ***2016 PFOA/PFOS*** *non-cancer toxicity values*

In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on-site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFOA and PFOS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***2014 PFBS*** *non-cancer toxicity value*

Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on-site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- ***Lead in Soil Cleanups***

Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the

analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

Review of the excavation confirmation soil samples from the Area 1 Excavation (Weston, 1998) indicated that the average lead concentration was below 200 ppm.

Review of the excavation confirmation soil samples from the Area 2 excavations (Conti Environmental & Infrastructure, Inc., 2004) indicated that all of the lead in the excavation confirmation soil samples was below 200 ppm.

Review of the lead concentrations in soil samples from Area 3 in the RI (HLA, 2000) indicated that the average lead concentration was below 200 ppm.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors for different age groups. The cancer potency of other carcinogenic cPAHs is adjusted by the use of relative potency factors, which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

The risk assessment included an evaluation of PAHs. As the toxicity used for benzo(a)pyrene was greater at the time the risk assessment was conducted, the risk related to PAHs, at the time of the risk assessment, was likely overestimated. PAHs were not identified as COCs and cleanup levels were not determined for PAHs.

Changes in Risk Assessment Methods

There have been changes to EPA's risk assessment methodologies since the 2001 ROD. These changes do not affect the current protectiveness of the remedy because the new methods could result in slightly lower risk or higher screening levels and LUCs are in place to restrict potential future residential development and groundwater use, thus preventing future exposure to site contaminants.

- ***2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance***

In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 2001 ROD. As further discussed below, there have been changes to exposure parameters, but these do not affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator.

https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator**.**

Vapor intrusion (VI) was not recognized as an exposure pathway at AOC 57 in the ROD or the ESD. The VISL calculator has not been run for this site.

Expected Progress Towards Meeting RAOs

The RAOs at AOC 57 have been met through soil excavation and disposal and through implementation of LUCs.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that would call into question the protectiveness of the remedy. No weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

protectiveness of the remedy during this review period.

9.6 Issues/Recommendations

None.

9.6.1 Other Findings

Based on the data reviewed during this FYR, the Army recommends reducing groundwater and surface water sampling in Area 3 to once every five years to coincide with the FYR cycle. The Army further recommends that arsenic, iron, and manganese in groundwater be analyzed as dissolved (filtered) concentrations as these are more representative of actual groundwater concentrations. The Army recommends eliminating the

gauging of Area 2 wells. The groundwater flow patterns at Area 2 have been confirmed through numerous rounds of gauging.

9.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU09 - Former Building 3713 Fuel Spill AOC 57	*Protectiveness Determination*: Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at AOC 57 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Land use controls are in place that prevent exposure to groundwater that could pose an unacceptable human health risk, the LUCs are enforced, and no exposures are currently occurring or imminent. The RAOs have been achieved through 1) excavation and disposal of contaminated soil, 2) reduction of groundwater contamination through natural attenuation, and 3) implementations of LUCs. Groundwater monitoring at AOC 57 has confirmed many of the contaminants of concern concentrations have decreased below cleanup levels. The FYR site inspection and interviews, and annual land use control inspections and interviews, confirmed that site use remains Rail Industrial Land Trade-Related and Open Space property.		

9.8 Next Review

The next FYR for AOC 57 is required five years from the completion of this review (September 2025).

9.9 References

References are included in **Appendix A**.

10 FORMER RAILROAD ROUND HOUSE (OU 11 / SA 71)

10.1 Introduction

This section presents the findings of the FYR for the remedy implemented at the former Railroad Round House Study Area 71 (SA 71). This is the first five-year review for SA 71. The triggering action for this statutory review is the signature date of September 30, 2015 for the ROD for AOC 72 Plow Shop Pond and SA 71 Former Railroad Roundhouse [(Sovereign, 2015); AOC 72 is not subject to CERCLA five-year reviews because the selected remedy was no further action)]. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

10.1.1 Site Background

SA 71 is a historically contaminated location within the former Fort Devens property located on the southern shore of Plow Shop Pond (**Figure L-1**). SA 71 is undeveloped and currently zoned as Open Space/Recreational per the Devens Reuse Plan. Response Actions have been conducted to remove railroad maintenance by-product material containing heavy metals that was discharged along the pond shoreline and to remove impacts to upland soil at the former Railroad Roundhouse site (SA 71) from railroad maintenance byproduct deposition.

The Army conducted site investigations at SA 71 from 1993 to 1994. Data gathered during the investigations indicated the widespread presence of coal ash and maintenance byproduct materials in surface and deeper soil across much of the site. A Time Critical Removal Action (TCRA) consisting of the excavation and disposal of metals-contaminated soil was completed in 2000. A subsequent risk evaluation (summarized in the ROD) demonstrated acceptable risk for the assumed future use as open space/recreation. The Army issued a ROD in 2015 (Sovereign, 2015) that documents implementation of land use controls as the final remedy for SA 71.

A site chronology and additional site background information are included in **Appendix L**.

10.2 Response Action Summary

10.2.1 Basis for Taking Action

As documented in the ROD, a CERCLA action was required at SA 71 because the cumulative Excess Lifetime Cancer Risk (ELCR) for human receptors was above acceptable risk criteria for unrestricted residential use of SA71. However, the human health risk evaluation demonstrated acceptable risk for the assumed future use (open space/recreation) of the site. The potential risk to human health is driven by residual railroad maintenance byproduct material in upland soils of the former Railroad Roundhouse as a result of activities in the former area. The ecological risk assessment indicated that ecological receptors are unlikely to be at risk from contaminants of concern in surface soil.

The human health risk assessment indicated that potential exposures to contaminants (principally arsenic) in surface water and sediment in Plow Shop Pond, including Red Cove and in the area of the former Railroad Roundhouse, by recreational receptors, are within the USEPA's acceptable cancer risk range and do not exceed a Hazard Index limit of 1. The installation of a low- permeability groundwater barrier wall between the landfill and Red Cove and sediment removal actions within the Red Cove area and former Railroad Roundhouse area of AOC72 have mitigated the potential risk associated with Plow Shop Pond sediments. In addition, all visual evidence of the maintenance byproduct was removed. With the removal of impacted sediment from both Red Cove and in the area of the former Railroad Roundhouse, exposure point concentrations have been reduced, and the benthic community is expected to improve (Sovereign, 2015).

Table 10-1 SA 71 ROD-Specified Contaminants of Concern in Soil[1]

Contaminant of Concern[2]	Cleanup Level
Naphthalene	Not Specified
Chrysene	Not Specified
Antimony	Not Specified
Cadmium	Not Specified
Zinc	Not Specified

[1] Soil was the only media with COCs identified in the ROD.

[2] Excerpted from Table 1 in 1995 ROD that summarized COCs included in the risk assessment

Human health and ecological risk evaluations were summarized in the ROD. The ROD states that the removal of 2,400 cubic yards of soil in 1999 resulted in a reduction of risk to human health and welfare or the environment at SA 71, and the residual conditions in the upland area of SA 71 are consistent with industrial fill containing coal ash. Following the removal action, a human health and ecological risk evaluation was conducted in 200 to evaluate the risk associated with post-remedial conditions at SA 71. A revised human health and welfare risk evaluation was then conducted in 2014 at the request of the USEPA and MassDEP to update all risk assessment assumptions and address additional state and federal regulatory agency comments. The current and future land use of SA 71 remains open space/recreational; however, to be conservative, the quantitative human health risk assessment evaluated unrestricted residential use, using several algorithms and exposure variables, such as chemical-specific toxicity and derivation of exposure factors. As stated in the ROD, based on 2014 updated human health risk evaluation for SA 71, the cumulative Excess Lifetime Cancer Risk (ELCR) for human receptors is above acceptable risk criteria for unrestricted residential use of SA 71. Specifically, the ELCR for residential human receptors is greater than one chance in 1,000,000 (10^{-6}). However, the updated human health risk evaluation demonstrates acceptable risk for the assumed future use (open space/recreation) of the site.

Per the 2015 ROD, ecological receptors at SA 71 include terrestrial wildlife, plants, and invertebrates that may occur in or utilize the area. Potential contaminant exposure routes for these receptors include incidental soil ingestion and terrestrial food web exposure. Risk to terrestrial wildlife, plants, and invertebrates was evaluated through comparison of contaminant concentrations in surface soil to Protective Contaminant Levels, phytotoxicity benchmark values, and invertebrate toxicity benchmark values, respectively. The 2001 ecological risk assessment indicated that ecological receptors are unlikely to be at risk from contaminants of concern remaining in surface soil. Although concentrations at some locations still exceed some of the ecological screening values, most concentrations are consistent with background levels, and the overall magnitude of exceedance is small. As stated in the ROD, the lower concentrations, combined with the general observation of a healthy ecological community indicated that ecological receptors are unlikely to be at risk from analytes remaining in the surface soil at SA 71.

10.2.2 Response Actions

As discussed in the ROD, soil removal actions were conducted at SA 71 from November 1999 to May 2000 to remove approximately 2,400 cubic yards of impacted soil. Final sidewall confirmatory samples from the excavation identified concentrations of contaminants above the remediation goals. However, further excavation was not warranted based on the current and future use of SA 71 (open space/recreation), the depth of the impacted soil, and the low risk associated with the remaining soil. Consequently, the development of

additional remedial alternatives for SA 71 focused on limiting the exposure to site soils in excess of human health risk-based thresholds as identified in the site updated risk assessment. The remedy selected in the ROD is "Limited Action: Implementation of Land Use Controls".

The 2015 ROD identified the following RAO:

- Prevent ingestion/direct contact with residually impacted soil that could pose unacceptable human health risk at SA 71.

As stated in the ROD, the major component of the selected remedy for the former Railroad Roundhouse SA71 is implementation of land use controls. Land use controls are addressed through institutional controls, access restrictions, affirmative measures, and prohibitive directives (*Sovereign, 2015*). No cleanup levels were identified in the ROD.

10.2.3 Status of Implementation

The pre-ROD soil removal actions were conducted at SA 71 from November 1999 to May 2000 to remove approximately 2,400 cubic yards of impacted soil.

The Army has leased SA 71 to MassDevelopment along with other Devens parcels as documented in the 1996 Lease in Furtherance of Conveyance (LIFOC). The LIFOC is included as Exhibit E in the Draft Final LUCIP. The lease terms include the stipulation that "The Lessee shall not occupy or use parcels A.l and A.20 of the Leased Premises as described in Exhibit A without the written consent of the Army." Lease Parcel A.1 (also referred to in the LUCIP as Parcel A.1SHL), includes SA 71. Lease Parcel A.1SHL will be transferred by deed to MassDevelopment when the SA-71 remedy and the adjacent Shepley's Hill Landfill remedy are determined to be Operating Properly and Successfully. Implementation of land use controls will be assessed through annual land use control inspections after the current draft final LUCIP is finalized.

10.2.4 IC Summary Table

Table 10-2 SA 71 - Summary of Planned and/or Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
Soil	Yes	Yes	SA 71	Limit potential exposure to any residual soil contamination associated with the former Railroad Round House activities by (1) ensuring that any future soil disturbance activities, such as excavation are performed in accordance with site specific Soil Management Plan (SMP) and Health and Safety Plan (HASP) and (2) prohibiting residential reuse through the use of a property deed restriction.	Devens Study Area 71 (Former Railroad Roundhouse); Draft Final Land Use Control Implementation Plan (LUCIP) (February 2017)

Upon finalizing the LUCIP, LUCs will be implemented through institutional controls, affirmative measures and prohibitive directives with the objective of limiting potential exposure to any residual soil contamination associated with the former RRRH activities. The specific elements of the LUCs include the following:

a. Institutional Controls

1) Deed Restriction: At the time of Lease Parcel A.1SHL (inclusive of SA-71) property transfer to MassDevelopment, the Army will implement a deed restriction prohibiting future residential land use for Lease Parcel A.1SHL inclusive of SA-71.

2) Notice of Activity & Use Limitation (NAUL): Prior to Lease Parcel A.1SHL (inclusive of SA-71) property transfer to MassDevelopment, the Army will cause an NAUL to be prepared, executed and implemented pursuant to requirements set forth in 310 CMR 40.1074 pursuant to the LUCIP Implementation Schedule in Exhibit D.

b. Affirmative Measures

1) Public Education and Outreach: The Army (or its designee) will distribute the LUCIP to all area stakeholders (MassDevelopment, Devens Enterprise Commission and the Town of Ayer) and request the plan be posted on their public websites.

c. Prohibitive Directives

1) Future Soil Disturbance and Excavation: The Army (or its designee) will distribute to all construction and/or utility personnel a current copy of the Devens Soils Management Policy containing the protocols and procedures to follow for the management of potentially contaminated soil and/or the discovery of potential/suspected UXO. The Army will also prepare an Amendment to the Devens Soils Management Policy that will specifically address how this policy will comply with the requirements of CERCLA, the Devens Federal Facilities Agreement (FFA) and the SA-71 LUCs.

10.2.5 Systems Operations/Operations & Maintenance

The remedy for SA 71 does not include any system operations or O&M requirements.

10.3 Progress Since the Last Review

The ROD for SA 71 was signed in 2015. Because this is the first FYR for SA 71, there are no protectiveness statements or issues/recommendations from a previous FYR to discuss in this section.

10.4 Five-Year Review Process

This section summarizes the FYR process for SA 71 and the actions taken to complete the review.

10.4.1 Community Notifications, Involvement & Site Interviews

As discussed in the Executive Summary, The USACE announced the commencement of this Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in the Executive Summary regarding the overall cleanup of Devens. There were no specific comments related to SA-71.

10.4.2 Data Review

Groundwater monitoring is not required as part of the SA 71 remedy; however, several monitoring wells within the footprint of SA 71 are sampled on an annual basis as part of the Shepley Hill Landfill

groundwater LTM program. The results are reported in the annual Operations, Maintenance, and Monitoring reports for Shepley's Hill Landfill and are assessed as part of the Shepley's Hill Landfill OU FYR.

10.4.3 Site Inspection

The FYR site inspection was conducted on February 10, 2020. The purpose of the inspection was to assess the protectiveness of the remedy.

The inspection was documented using a site inspection form in accordance with the USEPA Five Year Review Guidance (USEPA, 2001). The entire area of SA 71 was walked and photo documented. The overall condition of the site was satisfactory. The site inspection confirmed that there is no evidence of recent excavation (e.g., activity since the completion of the 2013 excavation work) and that no residential development has occurred. The inspection checklist is included in **Appendix L** along with supporting photographs.

10.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Responses are provided as follows:

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes, the remedy is functioning as intended by the 2015 ROD as summarized below. There are no known exposures to site contaminants above cleanup levels. The Army has leased SA 71 to MassDevelopment; however, the lease terms prohibit MassDevelopment from occupying or using the SA 71 area without the written consent of the Army. The FYR site inspection confirmed that the property is maintained as open space. The SA 71 LUCIP is in the process of being finalized and will include a requirement to implement a deed restriction prohibiting future residential land use when the Army transfers the parcel to MassDevelopment.

Remedial Action Performance

The pre-ROD removal of 2,400 cubic yards of soil in 1999 has resulted in a reduction of risk to human health and welfare and the environment at SA 71, and the residual conditions in the upland area of SA 71 are consistent with industrial fill containing coal ash (Sovereign, 2015). The selected remedy did not include groundwater monitoring, therefore, there are no opportunities for optimization of a monitoring program.

SA 71 land use is designated as open space/recreational and there are no current or future plans for a change of land use. The FYR site inspection confirmed that the property is maintained as open space.

System Operations/O&M

Not applicable. The remedy does not include a treatment system or any O&M requirements.

Implementation of Institutional Controls and Other Measures

The Army retains ownership of the property. The current lease terms between Army and MassDevelopment prohibit MassDevelopment from occupying or using the SA 71 area without the written consent of the Army. As stated in the ROD, the specific elements of the LUCs will include (1) prohibiting residential reuse through the use of a property deed restriction and the implementation of an environmental use covenant consistent with a Notice of Activity Use Limitation (NAUL) at the time of property transfer by the Army to MassDevelopment; (2) affirmative measures to include public education and outreach; and (3) prohibitive directives to ensure that any future soil disturbance activities are avoided by the public and that any excavation by construction/utility contractors is performed in accordance with a site specific Soil Management Plan (SMP).

The Army is in the process of finalizing the LUCIP for SA 71. The current draft final version of the LUCIP states that upon concurrence of the LUCIP by EPA and MassDEP, the Army will undertake the following implementation actions in compliance with LUC objectives:

- Distribution of the LUCIP to EPA, MassDEP, MassDevelopment, DEC, and the Town of Ayer.
- Implement deed restrictions, NAUL, and affirmative measures/prohibitive directives to prevent future residential land use (these will occur at the time of property transfer from Army to MassDevelopment).
- Conduct annual LUC inspections.
- Prepare annual LUC compliance reports.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

Question B Summary:

The exposure assumptions and RAO established in the 2015 ROD are still valid; however, EPA has developed updated screening levels for lead in soil. As discussed below, the 1999 post-excavation confirmation soil samples collected from the floor of the excavation exceed the new screening level of 200 ppm.

Changes in Standards and TBCs

The draft ROD identified location-specific and action-specific ARARs; however, these were removed from the final 2015 ROD. The final ROD states: "The prior response action at SA 71 met the ARARs identified in the Action Memorandum (SWETS, 1999). No other ARARs are applicable to the selected remedy". The ROD notes that Table 4 (the ARAR table) was removed from the document since the ARARs were not applicable to the final remedy. Because the cleanup goals for soil at SA 71 were based on HHRA levels determined specifically for the site and the contaminated soils were removed, changes to soil TBCs do not affect the protectiveness of the implemented remedy.

New standards should be considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

Changes in Toxicity and Other Contaminant Characteristics

EPA recently published updated policy addressing lead in soil cleanups as described below.

- ***Lead in Soil Cleanups***

  Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

  EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

  EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

  Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

As part of this FYR, the confirmatory sidewall and excavation floor samples from the 1999 soil excavation (Weston, 2001) were reviewed to determine if average lead concentrations exceeded the updated screening

level of 200 ppm for residential exposure. The average lead concentration in the sidewall confirmation samples was 80 ppm. The average lead concentration in the floor confirmatory samples was 403 ppm. This finding does not affect protectiveness of the remedy because (1) the ROD identified that lead exceeded remedial goals in some of the confirmation samples collected at the time of remedial action. As stated in the ROD: " Final sidewall confirmatory samples from the excavation identified concentrations of contaminants above the remediation goals. However, further excavation was not warranted based on the current and future use of SA 71 (open space/recreation), the depth of the impacted soil, and the low risk associated with the remaining soil", and (2) the risk assessment ruled out lead as a COC based on an exposure point concentration below background (as calculated using ProUCL).

Changes in Risk Assessment Methods

Because the exposure pathways and receptors have not changed since the remedy was selected, changes in risk assessment methods would not affect the protectiveness of the remedy.

Changes in Exposure Pathways

There have been no changes in current or expected land use or exposure pathways identified in the 2015 ROD that could affect the protectiveness of the remedy.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***
  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)
- ***2018 EPA VISL Calculator***
  In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Vapor intrusion (VI) was not recognized as an exposure pathway of concern in the ROD for the SA 71. Therefore, the VISL calculator has not been run for this OU.

Expected Progress Towards Meeting RAOs

The RAO for SA 71 is to prevent ingestion/direct contact with residually impacted soil that could pose unacceptable human health risk at SA 71. The RAO has been achieved via the LIFOC that prevents MassDevelopment from occupying or using the property without written permission of the Army. Additional ICs will be implemented after finalizing the LUCIP.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

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

weather-related events or natural disaster impacts have affected the protectiveness of the remedy during this review period.

10.6 Issues/Recommendations

None.

10.6.1 Other Findings

The following are recommendations that were identified during the FYR, but do not affect current and/or future protectiveness:

- Finalize the LUCIP and implement the LUC compliance actions describe therein.

10.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU11 - Former Railroad Roundhouse SA 71	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedy at SA 71 is protective of human health and the environment. The pre-ROD removal action resulted in the reduction of risk to human health in upland soils and the elimination of the ecological risk in pond sediments along the shoreline of SA 71. LUCs are in place that prevent ingestion/direct contact with residually impacted soil that could pose unacceptable human health risk, the LUCs are enforced, and no exposures are currently occurring or imminent. The FYR site inspection and interviews confirmed that site use remains open space. The RAO has been achieved because (1) Army retains ownership of the property; (2) the lease terms between Army and MassDevelopment (as detailed in the LIFOC) prevent MassDevelopment from occupying or using the property without written permission of the Army, and (3) a deed restriction prohibiting residential reuse and an environmental use covenant consistent with a NAUL will be implemented at the time of property transfer by the Army to MassDevelopment.		

10.8 Next Review

The next five-year review for SA 71 is required five years from the completion of this review (September 2025).

10.9 References

References are included in **Appendix A**.

11 FORMER GRANT, OAK AND MAPLE HOUSING AREAS AND 37-MM IMPACT AREA (OU1 & OU13)

11.1 Introduction

This section presents the findings of the 2020 FYR for the remedy implemented at the former Grant, Oak and Maple Housing Areas (HAs) and 37-Millimeter (mm) Impact Area (IA). This is the second FYR for these sites. A FYR is required because hazardous substances, pollutants or contaminants, including UXO and MEC, remain above levels that allow for unlimited use and unrestricted exposure (UU/UE). The 2015 Five-Year Review is documented in the *Final 2015 Five Year Review Addendum, Grant, Oak and Maple Housing Areas and 37mm Impact Area* dated May 2020 (KGS, 2020).

11.1.1 Site Background

The former HAs and IA comprise approximately 167 acres located within the Main Post area of the former military base, between Hospital Road, El Carney Street, and the Nashua River. (**Figures M-1 and M-2, Appendix M**). Between World War (WW) I and WW II, the 130-acre "Grant Road Parcel" was a 37-mm artillery firing range with targets on the northern slope of Oak Hill (i.e., IA). Although artillery firing originated along the northern edge of the former Grant HA, the range firing fan extended south across the former Grant HA, across the former Oak HA hillside (i.e., IA) and partially into portions of the anti-tank range to the south, which later became the Oak and Maple HAs. Upon discontinuation of training activities in the 1950s, a multi-family military housing development were constructed in the areas comprising the former Grant, Oak and Maple HAs. The Oak Hillside target area (i.e., IA) was left undeveloped due to unresolved UXO-related issues and concerns.

In 1996, Army transferred ownership of a portions of former HA property to Massachusetts Development Finance Agency (**Appendix M.5-1**). In 2003, a deed was signed and recorded for "Parcel A.21" inclusive of the former Oak HA, the remaining portion of the former Grant HA, and the IA (**Appendix M.5-2**). The 1996 and 2003 deeds are collectively referred to as the "Army Deeds." Section XVII of the 1996 Deed and Section XI of the 2003 Deed include a standard UXO notice indicating that, as a result of historic use of the property for military training activities, there exists a possibility that UXO may exist, but that based on available information and existing data, Army does not believe that UXO is present.

With continued, effective implementation, monitoring and enforcement of LUCs required per the 2009 ROD, 2011 LUCIP, 2011 IA GERE, 2014 ESD, and LUCIP Addendum (in process), the uses listed below are permissible for the former HAs and IA:

- Grant HA – residential use
- Oak and Maple HAs – commercial use (innovation and technical business)
- Impact Area – restricted use.

A site chronology is provided in **Appendix M**.

11.2 Response Action Summary

11.2.1 Basis for Taking Action

Based on results of the investigations and removal actions discussed below, the Army prepared a Focused Feasibility Study (FFS) in April 2008 comparing remedial alternatives to address potential residual UXO/MEC (Weston, 2008a). A summary of the FFS and Army's preferred response action were presented

in a Proposed Plan released for public review and comment in September 2008 (Weston, 2008b). The MMRP RI conducted at the former Oak and Maple HAs in 2011/2012 recommended that response alternatives be developed for these areas. Because the remedial alternatives considered for the nearby former Grant HA and IA in the 2008 FFS were similar to those being considered for the former Oak and Maple HAs, an Addendum to the former Grant HA and IA FFS was prepared for the former Oak and Maple HAs in 2013. The FFS Addendum recommended LUCs as the appropriate remedy and indicated that the RAO for the former Oak and Maple HAs was the same as that indicated for the former Grant HA and IA (i.e. prevent direct contact with UXO/MEC, which may remain in soils).

11.2.2 Response Actions

Numerous investigations have been conducted in the former HAs and IA to assess potential impacts associated with historic military training activities that occurred in these areas of the former Fort Devens. Several instrument-assisted, geophysical surveys were performed to identify and remove UXO and MEC that may have remained after conclusion of training activities, and soil and groundwater samples were collected for munitions constituents (MC) or other chemicals of concern (COC) analysis, to evaluate potential hazards/risks to human health and the environment.

In 1994/1995, the USACE conducted a study to document the locations of all known training areas and ranges at Devens (USACE, 1995). Results of the study and follow-up recommendations were used to guide future investigations and subsequent response actions.

In 1995 and 1996, a munitions response investigation and removal action were performed, respectively. Significant amounts of UXO and UXO scrap were discovered in the IA, in the southwest corner of the former Grant HA. In excess of 50 unexploded 37-mm projectiles and a large number of 37-mm fragments were located and disposed. Most of the ordnance located was in two dense clusters indicating former target locations. (Human Factors Applications, Inc., 1996).

In addition to UXO/MEC-related investigations and response actions, removal actions have been conducted to address pesticide- and PCB- contaminated soils (and associated human health and ecological risks) discovered in the former Grant HA. Specifically, Army excavated and disposed of pesticide-contaminated soils as part of a MCP-lead response action in 2002. The removal action resulted in the excavation and disposal of more than 150,000 tons of contaminated soils and concrete from pesticides applied around homes in the 1950s and 1960s. No UXO/MEC was discovered in the excavation areas. (Weston, 2009a).

From 2002 through 2005, a Time Critical Removal Action was conducted in the southeast portion of the former Grant HA to remove PCB-contaminated soils from an unknown source (i.e., undocumented historical release). A total of 12,000 tons of soils were excavated and disposed as part of the removal action. No UXO/MEC was discovered in the excavation areas. (Weston, 2006).

From 2004 and 2005, Army conducted a Preliminary Assessment (PA)/Site Inspection (SI)/Supplemental Site Inspection (SSI) within the former HAs and IA to assess the potential presence of munitions constituents (MC) or other chemicals of concern (COC) in soil and groundwater from historic training activities (Weston, 2008). While no UXO-related chemicals (i.e., MC) or other COCs were detected in the former HAs, potential UXO was discovered in the IA. While the item was determined to be scrap from an exploded munition, concerns remained that additional UXO may exist.

In 2006, to address concerns regarding potential remnant UXO within the former Grant HA and IA and to prepare the site for future residential use, MassDevelopment performed and issued results of a digital and analog (“mag, flag and dig”) geophysical survey and removal action conducted throughout the entire former

Grant HA and northern portions of the former Oak and Maple HAs. In total, an additional 31 UXO items (20 37-mm projectiles, 4 mines, 1 rifle grenade, and 6 stokes mortars) and 17 other ordnance items (one 37-mm armor piercing round, 8 empty rifle grenades, 3 training hand grenades, 2 empty mine flare bodies, 1 empty anti-tank mine, and 1 French VB2 trainer (rifle grenade)) were identified and removed (OER, 2008).

As recommended in the PA/SI/SSI, a MMRP RI was conducted at former Oak and Maple HAs in 2010/2011 (HGL, 2012). The investigation and associated clearance activities were focused in areas identified as having the greatest likelihood of MEC discovery. Based on the number of anomalies investigated (3,647) versus the number of MEC found (one) and the fact that previous investigations overlapped portions of the former Oak and Maple HAs, the investigation concluded that the probability of encountering additional UXO/MEC was low. The one discovered MEC item (a 37-mm black powder practice projectile) was found halfway across Oak Hill about 10–20 feet downslope of the Oak housing lot. The location of the discovered MEC projectile corresponds to an area where MEC was discovered during previous investigations. At the former Maple HA, 37-mm MD was scattered across the northern edge, with one 37-mm fragment found in the center of the HA.

In September 2009, a ROD was released for the former Grant HA and IA that identified LUCs as the selected remedy to attain the specified RAO (i.e., to prevent direct contact with UXO that may remain in soil). While details regarding the implementation of the LUCs were developed in conjunction with the 2011 LUCIP, the ROD specified that LUCs would be addressed through the following affirmative measures, institutional controls, and prohibitive directives:

Former Grant Housing Area

- Public education via ongoing distribution of educational materials, development of web-based visual and audio media, live information sessions and signage.
- Deed notice.
- Annual LUC reviews/site inspections.
- Comprehensive Five-Year Reviews.

Former Impact Area

- Public education via ongoing distribution of educational materials, development of a web-based visual and audio media, live information sessions and signage (same as former Grant HA).
- Institutional controls to be implemented through a GERE.
- Access Controls to include the signage, fencing and vegetative barriers to limit public access.
- Prohibitive directives to include restrictions for all ground intrusive activities (i.e., activities involving the disturbance and/or excavation of soils) except when performed in conjunction with specific activities/work (see Section 4.2).
- Annual MEC/UXO inspections (separate from and in addition to the annual inspections required for all LUC remedy sites).
- Annual LUC reviews/site inspections.
- Comprehensive Five-Year Reviews.

Since the same RAO and similar alternatives were included in the 2008 FS and 2013 FFS Addendum, an ESD to the 2009 ROD was issued in 2014 that added LUCs specific to the former Oak and Maple HAs to address differences in levels of UXO/MEC clearance performed and the proposed future use of each area. Specific details regarding the implementation of the LUCs for the former Oak and Maple HAs are provided in the LUCIP Addendum (in process of finalization).

Former Oak and Maple HAs

- Public Education through the distribution of educational materials, live information sessions, web-based visual and audio media, and signage at site (same as former Grant HA and IA).
- Pre-construction MEC clearance of selected grids.
- MEC physical preview of any proposed construction footprint.
- MEC construction support for all intrusive activities where construction support has not previously been conducted.
- Inclusion of prohibition of residential reuse.
- Annual LUC Reviews/Site Inspections.
- Comprehensive Five-Year Reviews.

11.2.3 Status of Implementation

As discussed above, the 2009 ROD and 2014 ESD identified LUCs as the selected remedy to attain the specified RAO (i.e., to prevent direct contact with UXO that may remain in soil) for the former HAs and IA. These are detailed in the 2011 LUCIP for former Grant HA and the IA, and in the 2020 LUCIP Addendum (in process of finalization) for the former Oak and Maple HAs.

The ICs for the site are summarized in the table below A detailed description of the affirmative measures, institutional controls, and prohibitive directives necessary to ensure effective implementation of the ROD/ESD-specified LUCs are outlined below the table.

11.2.4 IC Summary Table

Table 11-1 Housing Area and 37-mm Impact Area - Summary of Planned and/or Implemented ICs

Media, Engineered Controls, and Areas that do not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcels	IC Objective	Title of IC Instrument Implemented and Date
UXO	Yes	Yes	Grant Housing Area and 37-mm Impact Area	Prevent direct contact with UXO	Final Land Use Control Implementation Plan, Grant Housing Area and 37-mm Impact Area, May 2011

UXO	Yes	Yes	Oak and Maple Housing Areas	Prevent direct contact with UXO	Final Land Use Control Implementation Plan Addendum, Former Oak and Maple Housing Areas, Former Fort Devens Army Installation, Devens, Massachusetts (in process of finalization)

Former Grant Housing Area

- *Public education via ongoing periodic distribution of educational materials, development of web-based visual and audio media, live information sessions, and signage* - Education and outreach materials shall be developed and distributed to property owners, residents, including tenants and potential residents, the public, and construction and/or utility contractors conducting ground intrusive activities to educate them about historical military use of Devens, the potential presence of UXO, locations where UXO are more likely to be encountered, how to identify UXO, how to minimize the potential of encountering UXO, what actions to take if suspect UXO is encountered, and to provide an avenue for potential future property owners to have knowledge of property conditions prior to their purchase.
    - The Army shall cause the operator of the electric utilities at Devens to include, at least annually, an educational insert in electric utility bill mailings to property owners, residents, tenants and other occupants of former Grant HA property (and in first bills to any new customer) that includes, at a minimum, the information specified above;
    - The Army shall cause, within thirty (30) days of issuance of the first building permit for a residential dwelling within former Grant HA property, the educational insert to be posted in an 11" x 17" permanent laminated format on a kiosk or a community bulletin board located in a central public space on former Grant HA property (or, if a central public space does not yet exist, the kiosk or bulletin board shall be located in the area where construction activity is occurring, provided that the Army relocate such kiosk or bulletin board once a central public space has been created);
    - The Army shall cause educational materials that contain, at a minimum, the information specified above, to be displayed on a community website;
    - Information included in the educational insert and/or displayed on the community website may be updated from time to time to reflect new developments, changes in site conditions and results of annual LUC reviews/site inspections providing that substantive changes have been approved by EPA, MassDEP, MassDevelopment, DEC and Army (if developed by an another, Army-designated party);
    - The Army (or its designee) shall provide notice of required UXO awareness training to all construction and/or utility personnel at the time of application for a building permit; and,
    - The Army shall cause all construction and/or utility workers and other personnel planning to conduct ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) to complete UXO awareness training and receive a copy of the Devens SMP prior to commencement of construction/utility-related work or ground intrusive activity.
- *Deed Notice* – A Supplemental Deed Notice shall be inserted into any deeds conveying all or part of the former Grant HA property; the Notice shall identify additional sources of UXO information,

describe UXO investigations and removal actions performed, and include the conclusion of the ROD that the property with LUCs in place is suitable for the proposed future use, and that there is no evidence of additional UXO present at the site, but that the possibility does remain that UXO could be discovered in the future;

- Annual LUC reviews/site inspections – Annual LUC reviews and site inspections shall be conducted to confirm the overall effectiveness of, and compliance with, ROD-specified LUCs, verify existing site conditions, inspect the area for potential UXO, and verify that any activity/work performed in the prior year was consistent with the permissible uses, restrictions, and controls set forth in the 2009 ROD and 2011 LUCIP. Army shall summarize the results in an Annual LUC Review/Site Inspection Report (for distribution to EPA, MassDEP, MassDevelopment, the DEC, the Towns of Ayer, Harvard and Shirley, Devens RAB members and the Base Realignment and Closure (BRAC) mailing/distribution list) and include, at a minimum, the following;

  (1) transcript of interviews conducted with MassDevelopment and DEC personnel (or successor municipal authority), current property owners, tenants, Devens Fire Department, Town officials and others, as identified, to assess/verify compliance with ROD-specified LUCs;

  (2) verification that the educational information on the community website is relevant and reflective of recent developments, changes in site conditions, and results of annual LUC reviews and site inspections;

  (3) verification that the educational insert was included in electric utility bill mailings to residents, tenants and other occupants, if any, of the former Grant HA property (and in first bills to any new utility customer) in the prior year (a copy of the educational insert, specifying the date of the utility bill mailing, shall be provided as an appendix);

  (4) verification of the posting of the educational insert, in an 11” X 17” permanent laminated, on a kiosk or a community bulletin board centrally located in the former Grant HA (photos confirming the content and location of the postings shall be provided as an appendix);

  (5) verification that the all deeds conveying an interest in all or part of the former Grant HA property in the prior year included the supplemental deed notice (a copy of any such deeds shall be provided as an appendix);

  (6) verification that all construction and/or utility workers and other personnel, at the time of application for a building permit, received notice of UXO awareness training requirement (a copy of MassDevelopment/DEC’s Building Permit Application shall be included as an appendix to confirm continued inclusion of the UXO training requirement in the DEC building permit application process);

  (7) verification that all property owners, residents, tenants, and all construction and/or utility personnel completed required UXO awareness training and received a copy of the Devens SMP prior to commencement of construction/utility work or ground intrusive activity (i.e. activity involving the disturbance and/or excavation of soils);

  (8) identification and detailed description of any/all UXO discovered during the prior year; information pertaining to the type of UXO (if known), the location of the discovery, the activitybeing conducted that led to the discovery, the name and affiliation of the individual reporting the discovery, and confirmation of compliance with safety procedures followed and

the ultimate disposition of any such discovered UXO;

(9) identification of any deviation(s) identified during the annual LUC review/site inspection and a description of the corrective measures that have or will be undertaken to resolve the deficiency(ies) and a schedule to correct the same; the correction and enforcement of such deficiency(ies) shall be consistent with the requirements set forth in Section 7.0 of the 2011 LUCIP;

(10) written description of proposed changes, if any, to the inspection and reporting frequency and justification for said change; and,

(11) a copy of the completed Annual LUC Review/Site Inspection checklist; and,

- *Five-Year Reviews* – Comprehensive assessments of remedy performance and protectiveness are required at CERCLA sites where hazardous substances, pollutants, and contaminants, including UXO and/or MEC, remain above levels that allow for unlimited use and unrestricted exposure (UU/UE) at least every five years (see Section 6.0).

Former Impact Area

- *Public education via ongoing periodic distribution of educational materials, development of web-based visual and audio media, live information sessions and signage* – (same as required for former Grant HA);
- *Institutional controls to be implemented through a GERE* - MassDevelopment, as the current owner of the former IA, agreed to grant to MassDEP a Grant of Environmental Restrictions and Easements (GERE) to identify the covenants, restrictions, prohibitive directives, easements and other rights and obligations for the former IA property. (The GERE was signed by both parties on October 20, 2011 and recorded with the Worcester District Registry of Deeds on December 19, 2011 (Book 48291, Page 138) (**Appendix M.5-3**));
- *Access controls* –The Army, in consultation with MassDevelopment (or successor owner of the Impact Area), shall (i) install and maintain a six (6) foot high, black-clad chain link fence without barb wire around the perimeter of the former IA to restrict public access, and (ii) install and maintain a vegetative barrier consisting of dense evergreen shrubs or similar plantings appropriate for location to screen the fence and which at maturity will provide an approximate ten (10) foot clear area in front of the fence.
- *Signage*- The Army, in consultation with MassDevelopment (or successor owner of the former IA) shall install and maintain signage on the required fencing that states "No Trespassing – Impact Area". The signage shall have dimensions of approximately 12 inches by 18 inches and be placed at eye level at 50-foot intervals on the exterior side of such fencing;
- *Annual MEC/UXO Monitoring* – A meandering path survey, utilizing typical instrument and field procedures of a "mag and flag" approach, shall be conducted annually to monitor for the presence of surficial and near surface MEC/UXO that may have come to the surface via frost heave action and/or erosion; in the event MEC/UXO is discovered, Army shall implement the response actions outlined in Sections 5.5 and 9.2 of the 2011 LUCIP;
- *Prohibitive directives* – All ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) are prohibited in the former IA except when performed in conjunction

with the following work:

- Annual MEC/UXO Monitoring/Annual LUC Review and Site Inspection;
- Installation and/or maintenance of fencing, vegetative barriers and signage; and/or,
- Emergency excavation - excavation required to respond to an emergency, including repairing and/or replacing existing utility lines; must be conducted in accordance with the pre-approved emergency excavation plan, available from the Devens Fire Department;

- *Annual LUC Review/Site Inspection* – Annual LUC reviews and site inspections shall be conducted to confirm the overall effectiveness of, and compliance with, ROD-specified LUCs, verify existing site conditions, and verify that any activity/work performed in the prior year was performed in conjunction with (1) an annual site inspection, (2) the installation and/or maintenance of fencing, vegetative barriers and/or signage, or (3) an emergency evacuation. Army shall summarize the results in an Annual LUC Review/Site Inspection Report (for distribution to EPA, MassDEP, MassDevelopment, the DEC, the Towns of Ayer, Harvard and Shirley, Devens RAB members and the Base Realignment and Closure (BRAC) mailing/distribution list) and include, at a minimum, the following:

  (1) transcript of interviews conducted with MassDevelopment and DEC personnel (or successor municipal authority), current property owners, tenants, Devens Fire Department, Town officials and others, as identified, to assess/verify compliance with ROD-specified LUCs;

  (2) verification that educational insert prepared for inclusion in electric utility bill mailings to residents, tenants and other occupants, if any, within the former Grant HA property, was posted. in an 11” X 17” permanent laminated format, on a kiosk or a community bulletin board centrally located in or near former IA property (maps and photos confirming the content and location of the postings shall be provided as an appendix);

  (3) verification that the educational information on the community website is relevant and reflective of recent developments, changes in site conditions, and results of annual LUC reviews and site inspections at the former IA;

  (4) verification of the existence and condition of fencing installed around the perimeter of the former IA to restrict public access that complies with the height, material specifications and other requirements set forth in the 2011 LUCIP; changes made to the fencing in the prior year, if any, shall be noted and described;

  (5) verification of the existence and condition of signage on the fencing that complies with the specifications and other requirements set forth in the 2011 LUCIP; changes made to the signage in the prior year, if any, shall be noted and described;

  (6) verification of the existence and condition of the vegetative barrier installed to screen the fence that complies with the specifications and requirements set forth in the 2011 LUCIP; changes made to the vegetative barrier in the prior year, if any, shall be noted and described;

  (7) verification that any changes made to the fence or vegetative barrier are (1) appropriate for a residential area; and (2) were conducted after consulting with MassDevelopment (or the successor owner of the IA);

(8) verification that no ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) were conducted in the prior year; if performed, a description of the specific activities performed and sufficient documentation to verify that the work was conducted in conjunction with one of the following activities: (a) an annual site inspection, (b) installation and/or maintenance of fencing, vegetative barriers and/or signage, or (c) emergency evacuation shall be included;

(9) verification that all construction and/or utility personnel permitted to conduct ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) in the prior year completed required UXO awareness training and received a copy of the Devens SMP prior to commencement of said activities;

(10) summary of annual MEC/UXO monitoring activities and results, including a description of any MEC/UXO discovered, identification of the specific type of MEC/UXO discovered (if known) and verification of compliance with the required UXO safety and disposal procedures specified in Sections 5.5 and 9.0 of the 2011 LUCIP, 2011 GERE, and Devens SMP;

(11) written description of any deviation(s) identified during the annual LUC review/site inspection and efforts or measures that have or will be undertaken to correct/resolve the deficiency(ies) and a schedule to correct the same; the correction and enforcement of such deficiency(ies) shall be consistent with the requirements set forth in Section 7.0 of the 2011 LUCIP;

(12) written description of proposed changes, if any, to the inspection and reporting frequency and justification for said change; and,

(13) copy of the completed Annual LUC Review/Site Inspection checklist.

- *Five-Year Reviews* – Comprehensive assessments of remedy performance and protectiveness shall be conducted at CERCLA sites where hazardous substances, pollutants, and contaminants, including UXO and/or MEC, remain above levels that allow for unlimited use and unrestricted exposure (UU/UE) at least every five years (see Section 6.0).

Former Oak and Maple HAs

The 2014 ESD included LUCs for the former Oak and Maple HAs, beyond those specified in the 2009 ROD for the former Grant HA and IA. While specific details regarding the implementation of LUCs for the former Oak and Maple HAs will be provided in the LUCIP Addendum, the following construction-related and intrusive activity requirements, institutional controls, prohibitive directives, and affirmative measures are required to address LUCs for the former Oak and Maple HAs:

- *Pre-Construction MEC Clearance of Selected Grids at the former Oak HA* - Prior to the commencement of any site redevelopment activities, the ten grids within Sub-Area 2 of the Oak HA not addressed in the 2010/2011 MEC RI (HGL,2012) shall be surveyed and cleared.

  In accordance with Sections 2.0 and 4.0 of the July 2016, *Final MEC Clearance and Construction Support Work Plan for the Former Oak and Maple HAs* ("MEC Construction Work Plan"), a low-probability MEC survey was completed in the ten (10) un-surveyed grids in the former Oak HA not addressed in the MEC RI. No material potentially presenting an explosive hazard (MPPEH) or MEC was encountered.

In addition to the investigation of ten (10) un-surveyed grids, the MEC Construction Work Plan stipulated that a concurrent low-probability MEC survey would be conducted beneath remnant concrete building slabs and asphalt roads within the former Oak HA to support future development and construction activities. Although the May 2017, *Final MEC Summary Completion Report for the Former Oak and Maple HAs* ("MEC Completion Report") confirmed performance of MEC construction support during removal of 13 concrete slab footprints in the former Oak HA (with no MPPEH or MEC encountered), the MEC Clearance Survey planned for beneath asphalt roads was not conducted. However, Section 2.0 of the MEC Completion Report stipulated that that a MEC clearance survey of the asphalt roads would occur if the roads are removed in the future. This requirement will be incorporated into the LUCIP Addendum for the former Oak and Maple HAs.

- *MEC Physical Preview of Any Proposed Construction Footprint* - Prior to commencement of any construction-related or ground intrusive activity (i.e. activities involving the disturbance and/or excavation of soils), an instrument-assisted, visual survey, using a meandering path approach, of the entire proposed construction area shall be performed. As required in the 2014 ESD and described in Sections 2.0 and 4.0 of the July 2016, MEC Construction Support Plan, all areas where intrusive activities will be conducted, including areas outside of building footprints (e.g., areas to be regraded, landscaped, or covered by pavement or grass) will be investigated; geophysical instrumentation must also be used during construction of future buildings to survey the footprint for any subsurface MEC.
- *Future MEC construction support for all intrusive activities where construction support has not previously been conducted* – As required in the 2014 ESD and described in Sections 2.0 and 4.0 of the July 2016, MEC Construction Support Plan, on-call MEC construction support will be provided for all intrusive activities (i.e., whenever an activity involves the disturbance and/or excavation of soils) in geographic areas where construction support has not previously been conducted;
- *Inclusion of prohibition of residential reuse* - A prohibition of residential reuse will be enforced through a deed notice that will restrict residential usage of the former Oak and Maple HAs; the prohibition on residential reuse is warranted based on potential human health risks and explosive safety hazards associated with UXO or MEC that may still be present in these areas. The restriction would be included in all subsequent transfers of the property from the current owner.
- *Public education via ongoing periodic distribution of educational materials, development of web-based visual and audio media and live information sessions* – (same as required for former Grant HA and IA);
- *Annual LUC Review/Site Inspection* – Similar to the LUC review and site inspection requirements described above for the former Grant HA and IA, Army (or its designee) is required to annually verify the overall effectiveness of, and compliance with, ROD/ESD-specified LUCs, verify existing site conditions, and verify that any activity/work performed in the prior year was consistent with the permissible uses, restrictions, and controls set forth in the ROD, ESD and the LUCIP Addendum. Army shall summarize the findings in an Annual LUC Review/Site Inspection Report (for distribution to EPA, MassDEP, MassDevelopment, the DEC, the Towns of Ayer, Harvard and Shirley, Devens RAB members and the Base Realignment and Closure (BRAC) mailing/distribution list) and include, at a minimum, the following;

    (1) transcript of interviews conducted with MassDevelopment and DEC personnel (or successor municipal authority), current property owners, tenants, Devens Fire Department, Town

officials and others, as identified, to assess/verify compliance with ROD/ESD-specified LUCs;

(2) verification that the former Oak and Maple HA properties have not been used for residential purposes in the prior year;

(3) verification that all deeds conveying an interest in all or part of the former Oak and Maple HA in the prior year included a prohibition on residential use (a copy of any deed recorded in the prior year shall be provided as an appendix);

(4) verification that the educational information on the community website for the former Oak and Maple HAs is relevant and reflective of recent developments, changes in site conditions, and results of annual LUC reviews and site inspections;

(5) verification that educational insert, in an 11" X 17" permanent laminated format, was posted on a kiosk or a community bulletin board centrally located in or near the former Oak and Maple HA properties (maps and photos confirming the content and location of the postings shall be provided as an appendix);

(6) verification that all construction and/or utility workers and other personnel, at the time of application for a building permit, received notice of UXO awareness training requirement (a copy of MassDevelopment/DEC's Building Permit Application shall be included as an appendix to confirm continued inclusion of the UXO training requirement in the DEC building permit application process);

(7) verification that prior to commencement of any construction-related or ground intrusive activity (i.e. activities involving the disturbance and/or excavation of soils) that property owners, tenants, and construction and/or utility personnel completed the required UXO awareness training and received a copy of the "Site-Specific Soil Management Plan for the former Oak and Maple Housing Areas" (SSSP);

(8) verification that all construction-related or ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) conducted in the prior year were performed in accordance with the July 2016, MEC Clearance and Construction Support Work Plan and SSSP;

(9) verification that prior to removal of existing asphalt roads or performance of ground intrusive activities (i.e. activities involving the disturbance and/or excavation of soils) beneath or near existing asphalt roads in the prior year, that a low probability MEC investigation was performed in accordance with Sections 2.0 and 4.0 of the July 2016, MEC Construction Work Plan;

(10) identification and detailed description of any/all UXO discovered during the prior year; information pertaining to the type of UXO (if known), the location of the discovery, the activitybeing conducted that led to the discovery, the name and affiliation of the individual reporting the discovery, and confirmation of compliance with safety procedures followed and the ultimate disposition of any such discovered UXO;

(11) identification of any deviation(s) identified during the annual LUC review/site inspection and a description of the corrective measures that have or will be undertaken to resolve the deficiency(ies) and a schedule to correct the same;

(12) a summary of any UXO discovered during the reporting period (including the location of discovered UXO, the type of UXO (if known) and information on the activity conducted that led to the find and the name and affiliation of the individual that reported the discovery), as well as safety procedures followed and the ultimate disposition of any such discovered UXO;

(13) written description of proposed changes, if any, to the inspection and reporting frequency and justification for said change; and,

(14) copy of the completed Annual LUC Review/Site Inspection checklist.

- *Five-Year Reviews* – Comprehensive assessments of remedy performance and protectiveness are required at CERCLA sites where hazardous substances, pollutants, and contaminants, including UXO and/or MEC, remain above levels that allow for unlimited use and unrestricted exposure (UU/UE) at least every five years.

11.2.5 System Operations/Operations & Maintenance

Although there are no LTM or O&M requirements in place for the former HAs and IA, ROD/ESD-required LUCs are being implemented, monitored and enforced. Physical, on-site inspections and interviews with knowledgeable personnel and affected communities, are required annually to evaluate/confirm overall effectiveness and compliance with the established LUCs.

11.3 Progress Since the Last Review

This section includes the protectiveness determination and statements from the last (2015) FYR.

Table 11-2 Protectiveness Determinations Statement from the 2015 FYR Addendum

AOC	Protectiveness Determination	Protectiveness Statement
Grant, Oak and Maple Housing Areas and 37-mm Impact Area	Short-Term Protective	*"The remedy(s) for the former HAs and IA is Short-Term Protective. The remedy(s) currently protect human health and the environment because LUCs are enforced and no exposures are currently occurring or imminent. However, for the remedy to be protective in the long-term, Army shall agree to perform annual site inspections at all of the former HAs and IA, finalize the LUCIP Addendum for the former Oak and Maple HAs, and complete the ARARs assessment for the former HAs and IA, prior to issuance of the next (2020) Devens five-year review, in accordance with CERCLA, the NCP and EPA's FYR guidance to ensure protectiveness."*

The following recommendations/follow up actions were presented in the 2015 Five-Year Review.

Table 11-3 Status of Recommendations from the 2015 FYR Addendum

OU/AOC	Recommendations/ Follow-up Actions	Party Responsible	Oversight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
Former Grant, Oak and Maple Housing Areas and 37-mm Impact Area	Finalize Former Oak and Maple HA LUCIP Addendum	Army	EPA/State	Prior to Issuance of 2020 FYR	In process of finalization	
	Analyze each of the standards and TBCs included in the 2009 ROD and 2014 ESD to determine if post-ROD/ESD changes to these standards and TBCs have affected the protectiveness of the remedy.	Army	EPA/State	Prior to Issuance of 2020 FYR	Completed as part of FYR process	09/26/2020
	Perform site inspections as part of the annual LUC reviews in accordance with the requirements of the LUCIP Addendum	Army	EPA/State	Prior to Issuance of 2020 FYR and annually thereafter	FYR Site Inspection completed as part of FYR process. 37-mm Impact Area inspections occur annually.	02/12/2020

11.4 Five-Year Review Process

This section summarizes the FYR process for the former housing areas and 37-mm impact area and the actions taken to complete the review.

11.4.1 Community Notifications, Involvement & Site Interviews

As discussed in the Executive Summary, The USACE announced the commencement of this Five-Year Review at the January 16, 2020 RAB meeting and in local newspapers. FYR interviews were conducted in February and March 2020 and are provided in **Appendix B**. General comments are provided in the Executive Summary regarding the overall cleanup of Devens. The only site-specific comments were from a representative of MassDevelopment who indicated that a housing development at Grant Road is ongoing (Phase II currently) and that they are in the planning stages for a development at 105 and 111 Hospital Road.

11.4.2 Data Review

No sampling was conducted at any of the former HAs or IA because long-term monitoring is not a component of the selected remedies required under the selected remedial action.

11.4.3 Site Inspection

The FYR site inspections were conducted on February 12, 2020. The inspections were documented using site inspection forms in accordance with the USEPA Five Year Review Guidance (EPA, 2001). Features that were inspected included the asphalt areas, access roads, UXO information signage, residential construction (exterior only), and fencing and gates. The overall condition of the sites was satisfactory; however, it was noted during the inspection of the Former Oak and Maple housing areas that UXO signage was damaged and needed replacement. The inspection checklists are included in **Appendix M** along with supporting photographs.

11.5 Technical Assessment

In accordance with EPA's 2001 "Comprehensive Five-Year Review Guidance" the technical assessment of a remedy should examine the following three questions which provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of the remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

QUESTION A: Is the remedy functioning as intended by the decision documents?

<u>Question A Summary</u>

Yes. As demonstrated below, the selected remedy (i.e., LUCs) for the former HAs and IA is functioning as intended by the 2009 ROD and 2014 ESD and attain the specified RAO (i.e., to prevent direct contact with UXO that may remain in soil). LUCs are in effect and the FYR site inspections and site interviews confirm that LUCs are enforced.

Remedial Action Performance:

Army has verified through interviews with MassDevelopment and annual LUC reviews that the affirmative measures, institutional controls, and prohibitive directives necessary to ensure protectiveness of the ROD/ESD-specified LUC s for the former HAs and IA are being implemented, monitored and enforced. Specifically, educational materials have been developed and are being distributed, web-based visual and audio media have been developed and are maintained; required UXO awareness training is being conducted and copies of the Devens Soil Management Policy are being distributed prior to commencement of intrusive ground activities; the supplemental deed notice has been included in deeds conveying interests in former Grant HA property; the GERE between MassDevelopment and MassDEP, with covenants, restrictions, prohibitive directives, easements and other obligations applicable to the IA, was finalized and recorded in 2014; annual MEC/UXO inspections to evaluate access controls and monitor for the presence of surficial and near surface UXO are being performed in the former IA, and the ten (10) un-surveyed grids not

addressed during the 2010/2011 MEC RI in the former Oak HA were surveyed and cleared in 2016 and MEC construction support was provided during the removal of concrete foundation slabs in the former Oak HA in 2016/2017 to support future development and construction activities

System Operations/O&M:

There are no LTM or O&M requirements in place for the former HAs and IA. However, annual LUC reviews are being conducted to evaluate/confirm overall effectiveness and compliance with the LUCs set forth in the ROD/ESD.

Implementation of Institutional Controls and Other Measures

LUCs are in effect and are enforced as demonstrated by the FYR site inspections and interviews. Physical inspections of the IA occur annually and the annual LUC checklists for all of the HAs are provided in the Main Post annual reports.

The LUCIP Addendum for the former Oak and Maple HAs needs to be finalized; this has been identified as a recommendation under Other Findings below. The LUCIP is administrative in nature and the absence of a final LUCIP does not affect the performance of a remedy (only the actions described within the LUCIP have potential to affect remedy performance).

Due to a misunderstanding of LUC-related requirements in the 2009 ROD, 2011 LUCIP and 2014 ESD, annual site inspections have not been conducted consistently for the former HAs. Army has agreed, beginning with the 2020 FYR and annually thereafter, to conduct the annual LUC reviews and site inspections for all of the former HAs and IA (beyond that required in the annual MEC/UXO inspection) to annually verify the overall effectiveness of, and compliance with, ROD/ESD-specified LUCs, verify existing site conditions, and verify that any activity/work performed in the prior year complied with the permissible uses, restrictions, and controls set forth in the ROD, ESD, LUCIP, MEC Construction Work Plan, Devens SMP, SSMP and LUCIP. In addition, Army will summarize the results of the annual LUC reviews/site inspections in an Annual LUC Review/Site Inspection Report for distribution to EPA, MassDEP, MassDevelopment, the Devens Enterprise Commission, the Towns of Ayer, Harvard and Shirley, Devens RAB members and the Base Realignment and Closure (BRAC) mailing/distribution list. The absence of annual site inspections at the HAs does not affect protectiveness of the remedy because LUCs are in effect and are enforced as demonstrated by the FYR site inspections and interviews.

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

No. Although exposure assumptions, and the RAO remain unchanged since the time of remedy selection, there have been changes in toxicity data associated with PAHs, RDX, and lead (as discussed below) since the ROD and ESD were signed. These changes are not expected to affect protectiveness of the remedy as none of these were identified as COCs at the time of remedy selection and the remedy addresses MEC, rather than chemical contamination.

Question B Summary

There were no changes to ARARs, toxicity, risk assessment methods, or exposure pathways that affect protectiveness of the remedy. Protectiveness is ensured through implementation and enforcement of LUCs.

Changes in Standards and TBCs

A review of Applicable or Relevant and Appropriate Requirements (ARARs) was performed to determine the impact on the remedy due to any changes in standards that were identified as ARARs in the OD and ESD, newly promulgated standards for chemicals of potential concern, and TBCs (to be considered) that may affect the protectiveness of the remedy.

There were no chemical cleanup values established for the HAs and IA. The only ARAR/TBC identified as changed is discussed below:

- USACE EP 75-1-2 (MEC Support During Construction Activities) was identified as a TBC. EP 75-1-2 was rescinded by the USACE's Safety-Explosives Safety and Health Requirements Manual (EM385-1-97, Change 1 dated 12 April 2013). Section III.B.01 of EM385-1-97 Change 1 requires the responsible authority (for example, installation or district commander or a designated representative) to determine whether construction support is required, and the level of such support, based on site-specific data prior to commencing construction operations or other activities. Because EM385-1-97, Change 1 incorporates the explosives safety aspects of EP 75-1-2, this change to the TBC has no effect on the protectiveness of the remedy.

New standards are considered during the five-year review process as part of the protectiveness determination. Under the NCP, if a new requirement is promulgated after the ROD is signed, and the requirement is determined to be an ARAR, the new requirement must be attained only if necessary, to ensure that the remedy is protective of human health and the environment.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new … [standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, p. 1-56.)

Changes in Toxicity and Other Contaminant Characteristics

EPA has published updated policy addressing PAHs, RDX, and lead as described below. These changes do not affect the current protectiveness of the remedy because the remedy does not address PAHs, RDX, or lead, but rather relies on land use controls to prevent potential human health risks and explosive safety hazards associated with UXO or MEC that may still be present in the HA areas and IA.

- ***2017 Polycyclic Aromatic Hydrocarbons (PAHs)*** *cancer and non-cancer toxicity values*
  On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values

prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

As part of this FYR, the benzo(a)pyrene results in soil samples collected during the PA/SI at the former Grant HA were reviewed to determine if concentrations exceed current RSLs. Although benzo(a)pyrene was not detected in a majority of the soil samples, the detection limits exceeded the current RSL of 0.11 mg/kg. PAHs were not selected as COCs and the change in toxicity value described above is less stringent than the previous values. Therefore, this change does not impact the protectiveness of the remedy. It is further noted that the 2009 ROD and 2015 ESD document that risks to human health are based on potential exposure to UXO/MEC, rather than chemical constituents. The human health risk screening documented in the 2008 PA/SI concluded that the "…screening calculations demonstrate that the relatively limited detections of hazardous substances, above their respective Project Action Levels that may be associated with the former military use of the SA, do not pose a significant risk".

- ***2018 Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*** *cancer and non-cancer toxicity values*
  In August 2018, EPA revised the non-cancer oral reference dose (RfD) and the cancer oral slope factor (CSF). These new values indicate that RDX is now less toxic from cancer and non-cancer health effects. These toxicity changes would result in decreased cancer risk and decreased non-cancer hazard from exposure to RDX. RDX was not detected in any of the PA/SA samples.

- ***Lead in Soil Cleanups***
  Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 µg/dL. Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL." Soil screening, action or cleanup level developed based on the previous target BLL of 10 µg/dL may not be protective.

  EPA's approach to evaluate potential lead risks is to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL blood lead level (BLL). This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. Additionally, this approach aligns with the Lead Technical Review Workgroup's current support for using a BLL of 5 µg/dL as the level of concern in the Integrated Exposure Uptake Biokinetic Model (IEUBK) and Adult Lead Methodology (ALM). A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

  EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology. These updates are based on the analysis of the NHANES 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default IEUBK and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

As part of this FYR, the lead results in soil samples collected during the PA/SI at the former Grant HA were reviewed to determine if average lead concentrations exceeded the updated screening level of 200 ppm for residential exposure. Lead exceeded 200 ppm in one sample from location IA5-002 (203 ppm); however, the average lead concentration at this location was well below 200 ppm. None of the other lead samples exceeded 200 ppm. Based on this review, no further remedial work is necessary to address remaining lead in soil.

Changes in Risk Assessment Methods

As discussed below, there have been changes to EPA's risk assessment methodologies since the 2009 ROD and 2014 ESD These changes do not affect the current protectiveness of the remedy because the remedy relies on land use controls to address potential human health risks and explosive safety hazards associated with UXO or MEC that may still be present in the HAs and IA.

In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.)

Changes in Exposure Pathways

Since the previous FYR, there have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy. There have been no changes to the exposure pathways evaluated in the 1995 ROD and 2006 ESD. There have been changes to exposure parameters as further discussed below; however, these do not affect the protectiveness of the remedy because the remedy addresses potential human health risks and explosive safety hazards associated with UXO or MEC that may still be present in these areas, rather than chemical hazards typically associated with CERCLA sites.

- ***2014 OSWER Directive on the Update of Standard Default Exposure Factors***

  In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf . Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD(s). These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- ***2018 EPA VISL Calculator***

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Vapor intrusion (VI) was not recognized as an exposure pathway of concern at the HAs and IA in either the ROD or ESD. Therefore, the VISL calculator has not been run for this site.

Expected Progress Towards Meeting RAOs

The RAO (prevent direct contact with UXO that may remain in soil at the sites) is achieved through on-going LUCs. The LUCIP Addendum needs to be finalized and annual site inspections conducted to ensure that the RAO continues to be achieved.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information come to light that could call into question the protectiveness of the remedy. No natural disaster impacts occurred at any of the former HAs and IA during the FYR review period.

11.6 Issues/Recommendations

None.

11.6.1 Other Findings

The following are recommendations that were identified during the FYR, but do not affect current and/or future protectiveness:

- The LUCIP Addendum for the Oak and Maple HAs should be finalized and annual site inspections conducted at all HAs.

11.7 Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: OU12 & OU13 - Former Grant, Oak, and Maple Housing Areas and 37-mm Impact Area	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date* N/A
Protectiveness Statement: The remedies at the former housing areas and 37-mm impact area are protective of human health and the environment The RAOs are achieved via LUCs that prevent direct contact with UXO. The LUCs are enforced (confirmed via annual 37-mm Impact Area inspections, annual site interviews, and the FYR site inspection and interview) and no exposures are currently occurring or imminent.		

11.8 Next Review

The next FYR for the HAs and IA is required five years from the completion of this review (September 2025).

11.9 References

References are included in **Appendix A.**

12 BASE-WIDE PFAS

12.1 Background Information

Per- and poly-fluoroalkyl substances (PFAS) are identified as an emerging contaminant by the EPA and Army and are 'pollutants or contaminants' as defined under CERCLA. Aqueous film-forming foam (AFFF) was used to extinguish fires and in firefighting training activities at former Fort Devens during its operation and likely contained formulations of PFAS. Although AFFF is considered the primary source of PFAS at the former Fort Devens, PFAS compounds are also used in fertilizers, herbicides, insecticides, cosmetics, greases, lubricants, and adhesives, and are now considered to be widespread in the environment. Additionally, landfills, wastewater treatment plants, and areas where vehicle maintenance or industrial operations have occurred, may be a source of PFAS at the former Fort Devens.

On March 18, 2016 EPA issued a letter requiring the Army to conduct additional work to determine whether a release of PFAS occurred at the former Fort Devens facility. This work was conducted based on past operations at former Fort Devens and in response to USEPA health advisories, updated in May 2016, for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which are two of the most prevalent PFAS typically detected in the environment. In 2014, EPA identified two PFOA and PFOS) as emerging contaminants. In 2016, EPA issued a Lifetime Health Advisory (LHA) for the sum of PFOS and PFOA at 70 parts per trillion (ppt) or nanograms per liter (ng/L) when applied to drinking water. Although PFAS is not currently a CERCLA-regulated contaminant, the Army Corps is following the CERCLA process for the investigation.

12.2 Response Action Summary

In September 2016, the Army completed a draft preliminary assessment evaluating the historical use of PFAS compounds at the former Fort Devens. It identified nine potential source areas for a site investigation. In June 2017, the Army began an expediated site inspection intended to determine the presence or absence of PFAS at the former Fort Devens. In response to regulatory review of the expedited site investigation, the Army began supplemental groundwater sampling to assess potential offsite migration of PFAS in groundwater.

General conclusions from the expedited SI report included:

- PFAS was detected in groundwater and soil at several sites, most notably in the Town of Ayer's public water supply wells and Devens' MacPherson Water Supply Well. PFAS resulted from potential historical releases along Barnum Road, Defense Reutilization and Marketing Office, Shepley Hill Landfill, and the former Moore Army Airfield.
- Other public water supply wells tested were at or below the EPA LHA.

An addendum to the expedited SI included sampling of the Devens fire station, and an additional nine locations, for soil and groundwater sampling. These results indicated that six of the sampling locations had PFOS and PFOA detected at or above the EPA LHA in groundwater.

Based on the results of the expedited SI, a remedial investigation (RI) was recommended. The RI is presently underway to determine the nature and extent of PFAS and assess potential risks from PFAS in environmental media (groundwater, soil, surface water, and sediment). The RI includes sampling of selected private residential and community wells in proximity to Devens and an evaluation of the source of PFAS in public water supply well systems and potential impacts to other water supplies. The following

AOCs are part of the PFAS RI. These are also depicted on **Figure 12-1**.

- AOC 5 - Shepley's Hill Landfill
- AOC 20 – Wastewater Treatment Plant Sand Filter Beds
- AOC 21 – Wastewater Treatment Plant Sludge Drying Beds
- AOC 30 – Former Moore Army Airfield Drum Storage Area
- AOC 31 – Former Moore Army Airfield Fire Training Area
- AOC 32 – Former Defense Resume and Marketing Office
- AOC 40 – Cold Spring Brook Landfill
- AOC 43A - Petroleum, Oil, and Lubricant (POL) Storage Area
- AOC 43G - Army Air Force Exchange Service (AAFES) Gas Station and Historical Gas Station G
- AOC 43J – Historic Gas Station J
- AOC 50 – Former Moore Army Airfield
- AOC 57 – Building 3717 Fuel Oil Spill Site
- AOC 74 – Barnum Road Firefighting Exercise Site
- AOC 75 – Former Building T-1445 Warehouse Fire
- AOC 76 – Devens Fire Station

In addition to the above AOCs, the following public water supply wells are included in the evaluation for PFAS:

- Grove Pond Water Supply Well Area (Town of Ayer water supply wells)
- MacPherson Water Supply Well Area
- Patton Water Supply Well Area
- Shabokin Water Supply Well Area

In 2018, MassDEP issued a public health guideline [Office of Research and Standards Guideline (ORSG)] for PFAS in drinking water. This guideline added three other PFAS compounds to the EPA LHA and included that the sum of the five compounds should not exceed 70 ppt in drinking water. In response to this guideline, one of the Grove Pond Wellfield wells was also taken out of service on February 26, 2018, and the MacPherson water supply well was taken out of service a day later for exceedances of the sum of the five PFAS compounds.

In 2019-2020, the Army Corps is implementing a time-critical removal action for the Ayer public wells to include:

- Temporary treatment of well 8 using granular activated carbon (online in June 2019)
- A permanent upgrade to the Grove Pond Water Treatment Plant, consisting of an ion exchange system, which will remove PFAS from extracted water more efficiently than activated carbon

In addition to these steps, MassDevelopment has implemented temporary treatment for its wells. Granular activated treatment began on the MacPherson well in August 2019 and on the Shabokin well in September 2019. MassDevelopment also installed temporary treatment for PFAS at the Patton well and brought the well back into service in March 2020. Permanent treatment is planned for the Shabokin and Patton wells.

The municipal water supplies at Devens are managed by MassDevelopment, which operates three water supply wells, MacPherson, Patton, and Shabokin. MassDevelopment first sampled the MacPherson well for

PFAS in July 2016. MassDevelopment has continued to sample the well on a quarterly basis until February 2018 when the well was taken out of service after MassDEP informed MassDevelopment that MassDEP planned to adopt an ORSG for drinking water addressing five PFAS chemicals (PFOS, PFOA, PFNA, PFHxS, and PFHpA) at a sum of 70 ng/L.

In April 2019, MassDEP proposed draft amendments to the MCP that included groundwater and soil cleanup standards for six PFAS. The proposed standard for groundwater that MassDEP indicated might be proposed as the standard for drinking water in 2020 is 20 ng/L for six PFAS; specifically PFOA, PFOS, PFHxS, PFHpA, PFNA, and perfluorodecanoic acid (PFDA). The proposed change was implemented on January 27, 2020, when MassDEP updated the ORSG for drinking water to add PFDA, for a total of six PFAS and lowered the guideline to 20 ng/L for the total sum of concentrations of the six PFAS.

MassDevelopment installed a granular activated carbon treatment system at the MacPherson well to remove PFAS from the water and the well was brought back into service in August 2019. The MacPherson well was turned off for the winter of 2019/2020. MassDevelopment is planning on installing a permanent PFAS removal system at the MacPherson well.

The Patton well was first sampled for PFAS in July 2016. MassDevelopment installed temporary treatment for PFAS at the Patton well and brought the well back into service in March 2020. MassDevelopment is planning a permanent treatment system of granular activated carbon followed by ion exchange that would treat water from Patton and Shabokin wells.

The Shabokin well was first sampled for PFAS in July 2016. MassDevelopment installed a GAC treatment system at the Shabokin well to remove PFAS in September 2019. As indicated above, MassDevelopment is planning for a permanent treatment system using granular activated carbon followed by ion exchange that would treat water from Patton and Shabokin wells. The permanent treatment plant for Patton and Shabokin water supply wells is planned to be online in early 2022.

Future FYRs will address PFAS if and when the site decision documents (e.g., ROD or ESD) identify PFAS as requiring remedial action and remedial action is implemented.

FIGURES

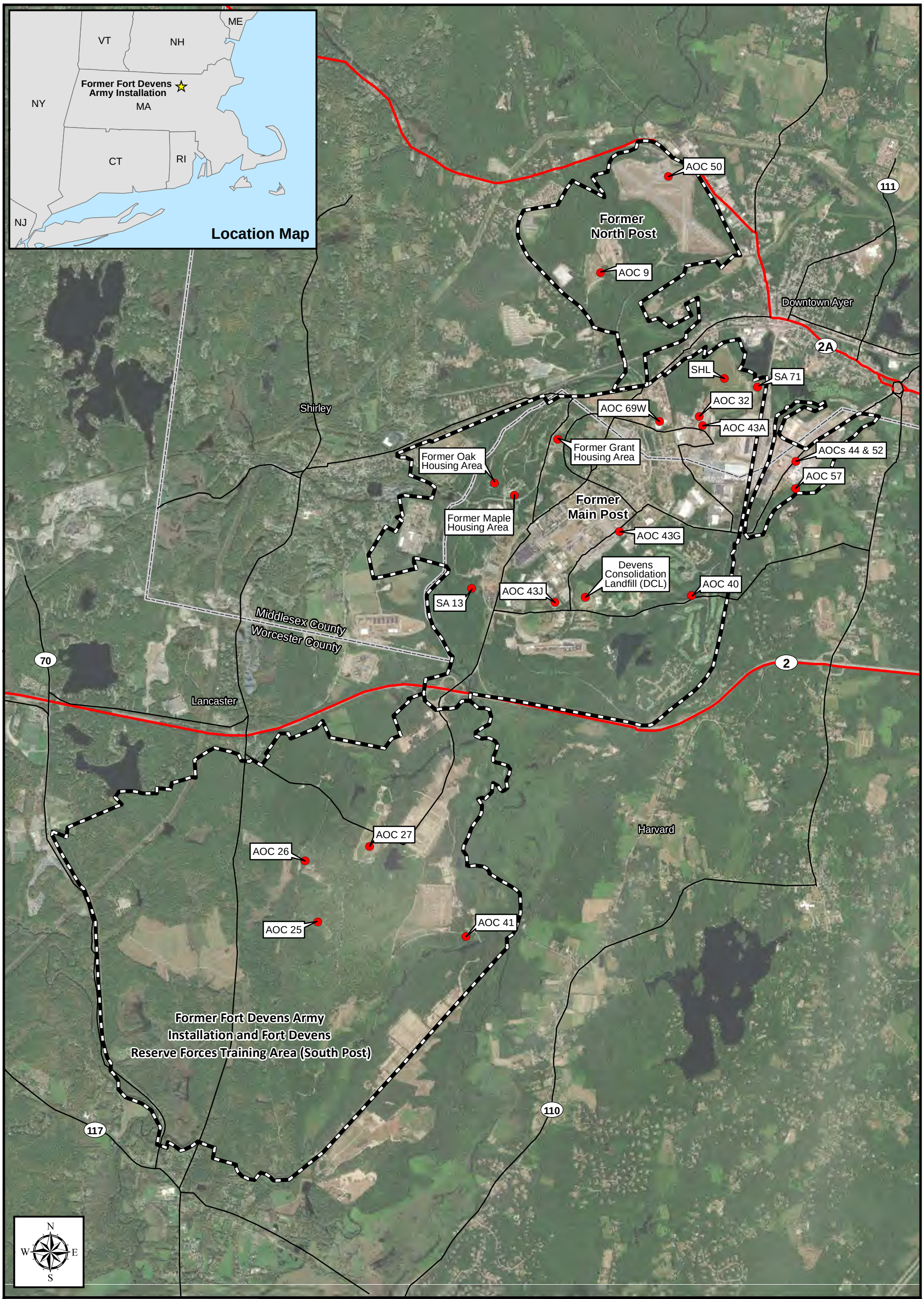


Figure 1-1
Five-Year Review Site Locations

References: HGL. LTMMP 2012.
Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Area of Contamination (AOC)
- Highway
- Major Road
- County Line
- Former Fort Devens Boundary

Five Year Review Report
Former Fort Devens Army Installation

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

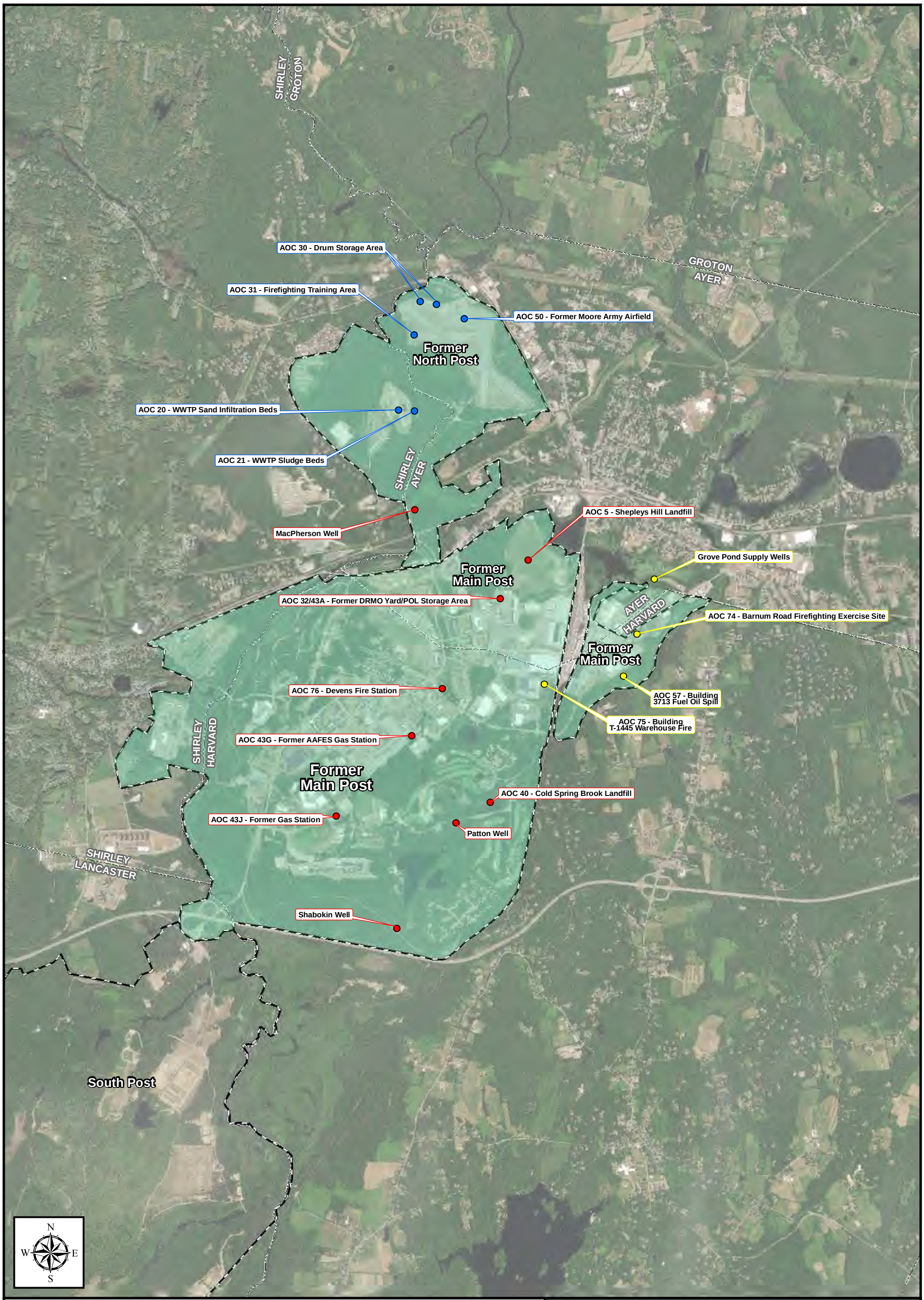
H & S Environmental , Inc.
160 East Main Street, Suite 2F, Westborough, MA 01581

0 1,750 3,500
Feet

Date: 01/15/2020

Figure 1-1

File: 2020_Figure10_1_SiteLoc_FiveYear.mxd



Legend

- Area 1 - Grove Pond Supply Wells, AOCs 57, 74, and 75
- Area 2 - MacPherson, Patton and Shabokin Water Supply Wells, SHL, AOCs 32/43A, 40, 43G, 43J and 76
- Area 3 - AOCs 20, 21, 30, 31, and 50
- Devens Regional Enterprise Zone
- City/Town Boundary
- Former Fort Devens Boundary

Devens PFAS Remedial Investigation Areas
Devens Five Year Review

Former Army Installation Devens
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 1,500 3,000
Feet

Date:
03/10/2020

Figure
12-1

File: PFAS2018_RI_WP_F1-2_Areas.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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APPENDIX B – Community Involvement

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Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Worcester Division
Docket No.W019P4094EA
INFORMAL PROBATE PUBLICATION NOTICE
Estate of: **Leon Wilson, Jr.**
Date of Death: July 11, 2019
To all persons interested in the above captioned estate, by Petition of Petitioner Joann Lockhart of Fitchburg, MA. Joann Lockhart of Fitchburg, MA has been informally appointed as the Personal Representative of the estate to serve without surety on the bond. The estate is being administered under informal procedure by the Personal Representative under the Massachusetts Uniform Probate Code without supervision by the Court. Inventory and accounts are not required to be filed with the Court, but interested parties are entitled to notice regarding the administration from the Personal Representative and can petition the Court in any matter relating to the estate, including distribution of assets and expenses of administration. Interested parties are entitled to petition the Court to institute formal proceedings and to obtain orders terminating or restricting the powers of Personal Representative appointed under informal procedure. A copy of the Petition and Will, if any, can be obtained from the Petitioner.

January 3, 2020

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Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No **W019P4187EA**
Worcester Probate and Family Court, 225 Main Street, Worcester, MA 01608; (508)831-2200
CITATION ON PETITION FOR FORMAL ADJUDICATION
Estate of Timothy P. Brothers, Date of Death 11/04/2019
To all interested persons: A Petition for Formal Probate of Will with Appointment of Personal Representative has been filed by Janet K Reese Brothers of Fitchburg, MA requesting that the Court enter a formal Decree and Order and for such other relief as requested in the Petition. The Petitioner requests that Janet K Reese Brothers of Fitchburg, MA be appointed as Personal Representatives of said estate to serve without surety on the bond in an unsupervised administration. Important Notice: You have the right to obtain a copy of the Petition from the Petitioner or at the Court. You have a right to object to this proceeding. To do so, you or your attorney must file a written appearance and objection at this Court before **10:00 a.m.** on the return day of 01/14/2020. This is NOT a hearing date, but a deadline by which you must file a written appearance and objection if you object to this proceeding. If you fail to file a timely written appearance and objection followed by an affidavit of objections within thirty (30) days of the return day, action may be taken without further notice to you. Unsupervised Administration under the Massachusetts Uniform Probate Code (MUPC): A Personal Representative appointed under the MUPC in an unsupervised administration is not required to file an inventory or annual accounts with the Court. Persons interested in the estate are entitled to notice regarding the administration directly from the Personal Representative and may petition the Court in any matter relating to the estate, including the distribution of assets and expenses of administration.
Witness, Hon. Leilah A. Keamy, First Justice of this Court. Date: December 17, 2019
STEPHANIE K. FATTMAN, Register of Probate

January 3, 2020

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Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No **W019P4186EA**
Worcester Probate and Family Court, 225 Main Street, Worcester, MA 01608; (508)831-2200
CITATION ON PETITION FOR FORMAL ADJUDICATION
Estate of: **Mary Jane Cuddahy**
Date of Death: **04/03/2016**
To all interested persons: A Petition for **Late and Limited Formal Testacy and/or Appointment** has been filed by Walter E. Cuddahy of Leominster, MA requesting that the Court enter a formal Decree and Order and for such other relief as requested in the Petition. The Petitioner requests that Walter E. Cuddahy of Leominster, MA be appointed as Personal Representatives of said estate to serve **Without Surety** on the bond in an unsupervised administration.
Important Notice: You have the right to obtain a copy of the Petition from the Petitioner or at the Court. You have a right to object to this proceeding. To do so, you or your attorney must file a written appearance and objection at this Court before **10:00 a.m.** on the return day of **01/21/2020.** This is NOT a hearing date, but a deadline by which you must file a written appearance and objection if you object to this proceeding. If you fail to file a timely written appearance and objection followed by an affidavit of objections within thirty (30) days of the return day, action may be taken without further notice to you. **Unsupervised Administration under the Massachusetts Uniform Probate Code (MUPC):** A Personal Representative appointed under the MUPC in an unsupervised administration is not required to file an inventory or annual accounts with the Court. Persons interested in the estate are entitled to notice regarding the administration directly from the Personal Representative and may petition the Court in any matter relating to the estate, including the distribution of assets and expenses of administration.
Witness, Hon. Leilah A. Keamy, First Justice of this Court. Date: December 23, 2019
STEPHANIE K. FATTMAN, Register of Probate

January 3, 2020

510 Help Wanted General

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Sentinel & Enterprise

Ph: ( )

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No **W019P4067EA**
Worcester Probate and Family Court, 225 Main Street, Worcester, MA 01608; (508)831-2200
CITATION ON PETITION FOR FORMAL ADJUDICATION
Estate of: **Patricia Griffin**
Date of Death: **07/29/2019**
To all interested persons: A Petition for **Formal Probate of Will** has been filed by Lauren E Kohl of Newtonville, MA requesting that the Court enter a formal Decree and Order and for such other relief as requested in the Petition. The Petitioner requests that Lauren E. Kohl of Newtonville, MA be appointed as Personal Representative of said estate to serve **Without Surety** on the bond in an unsupervised administration.
Important Notice: You have the right to obtain a copy of the Petition from the Petitioner or at the Court. You have a right to object to this proceeding. To do so, you or your attorney must file a written appearance and objection at this Court before **10:00 a.m.** on the return day of **01/14/2020.** This is NOT a hearing date, but a deadline by which you must file a written appearance and objection if you object to this proceeding. If you fail to file a timely written appearance and objection followed by an affidavit of objections within thirty (30) days of the return day, action may be taken without further notice to you. **Unsupervised Administration under the Massachusetts Uniform Probate Code (MUPC):** A Personal Representative appointed under the MUPC in an unsupervised administration is not required to file an inventory or annual acco unts with the Court. Persons interested in the estate are entitled to notice regarding the administration directly from the Personal Representative and may petition the Court in any matter relating to the estate, including the distribution of assets and expenses of administration.
Witness, Hon. Leilah A. Keamy, First Justice of this Court. Date:December 19, 2019
STEPHANIE K. FATTMAN, Register of Probate

January 3, 2020

PUBLIC NOTICE FOR FIVE-YEAR REVIEW
FORMER FORT DEVENS SUPERFUND SITE
DEVENS, MASSACHUSETTS
The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five-Year Review of remedial actions taken at the former Fort Devens Federal Superfund Site, Devens, MA. The purpose of the Five-Year Review is to evaluate whether the cleanup methods put in place at the site are working as designed and continue to remain protective of human health and the environment as required by the Superfund law. It is anticipated that this Five-Year Review will be completed in September 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The next RAB meeting will occur on January 16, 2020 (7PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://fldevens.org
BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Devens was placed on the National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination. Since its placement on the NPL, long term monitoring and remediation activities have taken place at the contaminated sites, which have proved to be successful. For more information on the upcoming Five-Year Review process please contact:
Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 3 & 5, 2020

Public Notice

CARE AND PROTECTION, TERMINATION OF PARENTAL RIGHTS, SUMMONS BY PUBLICATION, DOCKET NUMBER: 19CP0049LE, Trial Court of Massachusetts, Juvenile Court Department, COMMONWEALTH OF MASSACHUSETTS, Worcester County Juvenile Court, 25 School Street, Leominster, MA 01453
TO: Unknown/Unnamed father of **Jack Chase John Mitchell:**
A petition has been presented to this court by DCF (Leominster), seeking, as to the following child, **Jack C Mitchell,** that said child be found in need of care and protection and committed to the Department of Children and Families. The court may dispense the rights of the person(s) named herein to receive notice of or to consent to any legal proceeding affecting the adoption, custody, or guardianship or any other disposition of the child named herein, if it finds that the child is need of care and protection and that the best interests of the child would be served by said disposition. **You are hereby ORDERED to appear in this court, at the court address set forth above, on the following date and time: 01/30/2020 at 9:30 AM Pre Trial Conference (CR/CV)** You may bring an attorney with you. If you have a right to an attorney and if the court determines that you are indigent, the court will appoint an attorney to represent you. If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter.
For further information call the Office of the Clerk-Magistrate at 978-537-3722.
WITNESS: Hon. Carol A. Erskine, FIRST JUSTICE
Brendan J. Moran, Acting Clerk-Magistrate, DATE ISSUED: 12/17/2019

January 3, 6 & 13, 2020

CARE AND PROTECTION, TERMINATION OF PARENTAL RIGHTS, SUMMONS BY PUBLICATION, DOCKET NUMBER: 19CP0049LE, Trial Court of Massachusetts, Juvenile Court Department, COMMONWEALTH OF MASSACHUSETTS, Worcester County Juvenile Court, 25 School Street, Leominster, MA 01453
TO: Victor John and/or Unknown/Unnamed father of Joseph Mikey Tene: A petition has been presented to this court by DCF (Leominster), seeking, as to the following child, Joseph M Tene, that said child be found in need of care and protection and committed to the Department of Children and Families. The court may dispense the rights of the person(s) named herein to receive notice of or to consent to any legal proceeding affecting the adoption, custody, or guardianship or any other disposition of the child named herein, if it finds that the child is need of care and protection and that the best interests of the child would be served by said disposition. You are hereby ORDERED to appear in this court, at the court address set forth above, on the following date and time: 01/30/2020 at 9:30 AM Pre Trial Conference (CR/CV) You may bring an attorney with you. If you have a right to an attorney and if the court determines that you are indigent, the court will appoint an attorney to represent you. If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter. For further information call the Office of the Clerk-Magistrate at 978-537-3722.
WITNESS: Hon. Carol A. Erskine, FIRST JUSTICE
Brendan J. Moran, Acting Clerk-Magistrate, DATE ISSUED: 12/17/2019

December 27, 2019
January 3, 6, 2020

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No.W019D2324DR
Worcester Probate and Family Court
225 Main Street
Worcester, MA 01608
Divorce Summons By Publication and Mailing
Melvin Rodriguez Rivera vs. Ana D. Soto
To the Defendant: The Plaintiff has filed a Complaint for Divorce requesting that the court grant a divorce for Irretrievable Breakdown. The Complaint is on file at the Court. An Automatic Restraining Order has been entered in this matter preventing you from taking any action which would negatively impact the current financial status of either party. SEE Supplemental Probate Court Rule 411. You are hereby summoned and required to serve upon Melvin Rodriguez Rivera, PO Box 965, Nashua, NH 03061 your answer, if any, on or before 03/18/2020. If you fail to do so, the court will proceed to the hearing and adjudication of this action. You are also required to file a copy of your answer, if any, in the office of the Register of this Court. Witness, Leilah A Keamy, First Justice of this Court. Date: January 2, 2020. Stephanie K. Fattman, Register of Probate

January 3, 2020

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Worcester Division
Docket No.

INFORMAL PROBATE PUBLICATION NOTICE
Estate of
Nancy A Gauthier,
Date of Death
November 25 2019
To all persons interested in the above captioned estate, by Petition of Petitioner Denise R. Levesque of Leominster, MA a Will has been admitted to informal probate. The estate is being administered under informal procedure by the Personal Representatives under the Massachusetts Uniform Probate Code without supervision by the Court. Inventory and accounts are not required to be filed with the Court, but interested parties are entitled to notice regarding the administration from the Personal Representatives and can petition the Court in any matter relating to the estate, including distribution of assets and expenses of administration. Interested parties are entitled to petition the Court to institute forma l proceedings and to obtain orders terminating or restricting the powers of Personal Representatives appointed under informal probedure. A copy of the Petition and Will, if any, can be obtained from the Petitioners.

January 3, 2020

102 Autos for Sale

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Burlington, MA 01803
(877)889-4952
herbchambershondaofburlington.com

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'16 Honda CRV LX AWD auto,34k miles stk# HP6603...$18,998
'16 Honda Odyssey EX auto, 36K miles stk# H191006...$21,998
'14 Honda Accord EX auto,116k miles stk# H191740..$10,998
'16 Honda Odyssey EX auto,34k miles stk# HP6552..$20,998
'17 Honda Accord EX auto, 18k miles stk# HP6629..$19,498
'16 Honda Civic LX auto, 15k miles stk# H191980...$15,998
'16 Honda Civic LX auto, 15k miles stk# HP6634..$14,998
'17 Honda Civic LX auto, 18k miles stk# HP6549...$14,998
'17 Honda Pilot Touring auto, 30k miles stk# H200040..$34,998
'16 Hyundai Tucson SE AWD, auto, 36k miles stk# H191683I..$14,698
'15Kia Sorento LX AWD auto, 55k miles stk# H200028...$13,998
'18 Kia Sorento LX AWD auto,45k miles stk# H191977...$18,498
'18 Kia Optima SXL auto, 20k miles stk# HP6623XX..$22,998
'17 Chevy Silverado DBLCab auto, 12k miles stk# HP6579...$25,998
'18 Mazda CX9 Touring auto, 22k miles stk# H191979...$26,998
'13 Mercedes E350 LUX auto, 32k miles stk# H200064...$18,998
'17 Nissan Murano S AWD auto, 21k miles stk# H191823...$21,498
'17 Subaru Crosstrek Prem Wagon, auto, 41k miles stk# H192012...$17,998
'14 Subaru Forester Premi auto, 93k miles stk# H191403...$11,998
'17 BMW X3 X Drive auto, 33K miles HP6564...$24,998
'15 Volkswagen GTI Hatch auto, 58k miles H191807...$14,998

Public Notice

CARE AND PROTECTION, TERMINATION OF PARENTAL RIGHTS, SUMMONS BY PUBLICATION, DOCKET NUMBER: 18CP0500LE, Trial Court of Massachusetts, Juvenile Court Department, COMMONWEALTH OF MASSACHUSETTS, Worcester County Juvenile Court, 25 School Street, Leominster, MA 01453 **TO: Unknown/Unnamed father of Michael David Trudell III:** A petition has been presented to this court by DCF (Leominster), seeking, as to the following child, **Michael D Trudell III,** that said child be found in need of care and protection and committed to the Department of Children and Families. The court may dispense the rights of the person(s) named herein to receive notice of or to consent to any legal proceeding affecting the adoption, custody, or guardianship or any other disposition of the child named herein, if it finds that the child is need of care and protection and that the best interests of the child would be served by said disposition. You are hereby ORDERED to appear in this court, at the court address set forth above, on the following date and time: **02/06/2020 at 11:00 AM Report** You may bring an attorney with you. If you have a right to an attorney and if the court determines that you are indigent, the court will appoint an attorney to represent you. If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter.
For further information call the Office of the Clerk-Magistrate at 978-537-3722.
WITNESS: Hon. Carol A. Erskine, FIRST JUSTICE
Brendan J. Moran, Acting Clerk-Magistrate, DATE ISSUED: 12/17/2019

December 27 2019
January 3 & 6 2020

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Public Notice

LEGAL NOTICE MORTGAGEE'S SALE OF REAL ESTATE

By virtue of and in execution of the Power of Sale contained in a certain mortgage given by **Darrell B. Laws** to Mortgage Electronic Registration Systems, Inc., as mortgagee, acting solely as nominee for Nationstar Mortgage LLC, dba Greenlight Loans, dated September 10, 2015 and recorded in Middlesex County (Southern District) Registry of Deeds in Book 66084, Page 253 (the "Mortgage") of which mortgage U.S. Bank Trust National Association, as trustee of Lodge Series IV Trust is the present holder by Assignment from Mortgage Electronic Registration Systems, Inc., as mortgagee, as nominee for Nationstar Mortgage LLC, d/b/a Greenlight Loans, its successors and assigns to Nationstar Mortgage LLC d/b/a Mr. Cooper dated December 20, 2017 and recorded at said Registry of Deeds in Book 70528, Page 107, and Assignment from Nationstar Mortgage LLC d/b/a Mr. Cooper to New Penn Financial, LLC d/b/a Shellpoint Mortgage Servicing dated October 16, 2018 and recorded at said Registry of Deeds in Book 71754, Page 466, and Assignment from NewRez LLC f/k/a New Penn Financial, LLC d/b/a Shellpoint Mortgage Servicing to U.S. Bank Trust National Association as trustee of Lodge Series IV Trust dated August 26, 2019 and recorded at said Registry of Deeds in Book 73201, Page 143, for breach of conditions of said mortgage and for the purpose of foreclosing the same, the mortgaged premises located at 47 Shaker Road, Shirley, MA 01464 will be sold at a Public Auction at 11:00 AM on January 30, 2020, at the mortgaged premises, more particularly described below, all and singular the premises described in said mortgage, to wit: The tract or parcels of land situated on the northwesterly side of Shaker Road (a/k/a Phoenix Street) Shirley, Middlesex County, Massachusetts, being shown as Lot A-1, on a plan of land entitled "Plan of Land in Shirley, Mass, prepared for SPL Development Group, LLC, Scale 1"=40' dated May 2002," and recorded with the Middlesex South District Registry of Deeds as Plan No. 674 of 2002, and being bounded and described as follows. BEGINNING at a point which is the most southeasterly corner of the within described premises; THENCE N. 65 degrees 27' 42" W., for a distance of 210.84 feet, as bounded by land now or formerly of Carol A. Glover, as shown on said plan, to a point. THENCE N. 32 degrees 55' 24" E., for a distance of 189.19, as bounded by land now or formerly of Michelle Fitch, as shown on said plan, to a point; THENCE S. 57 degrees 05' 23" E., for a distance of 206.65 feet, as bounded by Lot A-2 as shown on said plan, to a point; THENCE S. 32 degrees, 13' 26" W., fora distance of 158.51 feet, as bounded by shaker Road to the point of beginning. Said Lot A-1 contains 36,108 square feet of land, according to said plan. Being that same property conveyed to Darrell B. Laws by Deed from D'Boss & Son Builders, Inc. dated August 20, 2004 and recorded August 23, 2004 in Book 43568 Page 352 in the Office of the Register of Deeds in and for Middlesex County, Massachusetts. For mortgagor's title see deed recorded with the Middlesex County (Southern District) Registry of Deeds in Book 43568, Page 352. The premises will be sold subject to any and all unpaid taxes and other municipal assessments and liens, and subject to prior liens or other enforceable encumbrances of record entitled to precedence over this mortgage, and subject to and with the benefit of all easements, restrictions, reservations and conditions of record and subject to all tenancies and/or rights of parties in possession. Terms of the Sale: Cash, cashier's or certified check in the sum of $5,000.00 as a deposit must be shown at the time and place of the sale in order to qualify as a bidder (the mortgage holder and its designee(s) are exempt from this requirement); high bidder to sign written Memorandum of Sale upon acceptance of bid; balance of purchase price payable in cash or by certified check in thirty (30) days from the date of the sale at the offices of mortgagee's attorney, Korde & Associates, P.C., 900 Chelmsford Street, Suite 3102, Lowell, MA 01851 or such other time as may be designated by mortgagee. The description for the premises contained in said mortgage shall control in the event of a typographical error in this publication. Other terms to be announced at the sale. U.S. Bank Trust National Association, as trustee of Lodge Series IV Trust Korde & Associates, P.C. 900 Chelmsford Street Suite 3102 Lowell, MA 01851 (978) 256-1500 Laws, Darrell B., 17-031056

January 3, 10, 17 2020

PUBLIC NOTICE FOR FIVE-YEAR REVIEW
FORMER FORT DEVENS SUPERFUND SITE
DEVENS, MASSACHUSETTS

The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five-Year Review of remedial actions taken at the former Fort Devens Federal Superfund Site, Devens, MA.

The purpose of the Five-Year Review is to evaluate whether the cleanup methods put in place at the site are working as designed and continue to remain protective of human health and the environment as required by the Superfund law. It is anticipated that this Five-Year Review will be completed in September 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The next RAB meeting will occur on January 16, 2020 (7PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://ftdevens.org

BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Devens was placed on the National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination. Since its placement on the NPL, long term monitoring and remediation activities have taken place at the contaminated sites, which have proved to be successful. For more information on the upcoming Five-Year Review process please contact:

Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 3 & 5, 2020

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Middlesex Probate and Family Court
208 Cambridge Street
Cambridge, MA 02141
(617)768-5800
Docket No. MI19P3596EA
CITATION ON PETITION FOR FORMAL ADJUDICATON
Estate of:
Anthony E. Tucker
Date of Death:
06/18/2014

To all interested persons:
A Petition for Late and Limited Formal Testacy and/or Appointment has been filed by Lisa A Roche of Leominster, MA requesting that the Court enter a formal Decree and Order and for such other relief as requested in the Petition. The Petitioner requests that Lisa A Roche of Leominster, MA be appointed as Personal Representative of said estate to serve Without Surety on the bond in an unsupervised administration.

IMPORTANT NOTICE:
You have the right to obtain a copy of the Petition from the Petitioner or at the Court. You have a right to object to this proceeding. To do so, you or your attorney must file a written appearance and objection at this Court before 10:00 a.m. on the return day of 01/15/2020. This is NOT a hearing date, but a deadline by which you must file a written appearance and objection if you object to this proceeding. If you fail to file a timely written appearance and objection followed by an affidavit of objections within thirty (30) days of the return day, action may be taken without further notice to you. Unsupervised Administration under the Massachusetts Uniform Probate Code (MUPC): A Personal Representative appointed under the MUPC in an unsupervised administration is not required to file an inventory or annual accounts with the Court. Persons interested in the estate are entitled to notice regarding the administration directly from the Personal Representative and may petition the Court in any matter relating to the estate, including the distribution of assets and expenses of administration. Witness, Hon. Maureen H Monks, First Justice of this Court; Date: December 18, 2019
Tara E DeCristofaro
Register of Probate

January 3, 2020

COMMONWEALTH OF MASSACHUSETTS
LAND COURT (SEAL)
DEPARTMENT OF THE TRIAL COURT
19 SM 005980
ORDER OF NOTICE
TO: **Arthur L. Buchanan and Norma D. Buchanan**
and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. c. 50 § 3901 et seq.: U.S. Bank National Association, not in its individual capacity but solely as trustee for the RMAC Trust, Series 2016-CTT claiming to have an interest in a Mortgage covering real property in **Pepperell**, numbered 3 Mason Street, given by Arthur L. Buchanan and Norma D. Buchanan to Bank of America, N.A., dated October 12, 2006, and recorded in Middlesex County (Southern District) Registry of Deeds in Book 48331, Page 557, and now held by Plaintiff by assignment, has/have filed with this court a complaint for determination of Defendant's/Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before January 27, 2020 or you may lose the opportunity to challenge the foreclosure on the ground of noncompliance with the Act. Witness, GORDON H. PIPER, Chief Justice of this Court on December 12, 2019
Attest: Deborah J. Patterson Recorder

January 3, 2020

Public Notice

Devens Enterprise Commission

The Devens Enterprise Commission will conduct a Public Hearing on Thursday, February 6, 2020 at 7:30 AM in the Vicksburg Conference Room at 33 Andrews Parkway, Devens, MA to consider a Level 2 Unified Permit application submitted by Bristol-Myers Squibb for an amendment to their existing site plan and Flammables and Combustibles License to accommodate the expansion of an existing emergency generator fuel storage area, including two (2) additional 15,000 gallon above-ground diesel storage tanks, an expanded spill containment area, and associated site improvements.

Property located at 38 Jackson Road (Parcel ID # 9-4-200), Devens, MA in the Innovation & Technology Business District. Plans and supporting information may be viewed at the Town Halls of Ayer, Harvard, Shirley and at the Devens Enterprise Commission office during normal business hours.

January 3, 10, 2020

(SEAL)
THE COMMONWEALTH OF MASSACHUSETTS
LAND COURT
DEPARTMENT OF THE TRIAL COURT
19 SM 006117
ORDER OF NOTICE
To: **Tara L. Hasbrouck**
and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. c. 50 §3901 (et seq): Direct Federal Credit Union claiming to have an interest in a Mortgage covering **real property in Pepperell, numbered 31 Shattuck Street**, given by Richard T. Hasbrouck and Tara L. Hasbrouck to Direct Federal Credit Union, dated April 24, **2003**, and registered at the Middlesex County (Southern District) Registry District of the Land Court as document number 1269168, and noted on certificate of title number 210924, as modified by a certain modification agreement dated October 22, 2004, and registered with the Middlesex County (Southern District) Registry District of the Land Court as Document No. 1353832 as noted on Certificate of Title No. 210924, has/have filed with this court a complaint for determination of Defendant's/Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before February 3, 2020 or you may lose the opportunity to challenge the foreclosure on the ground of noncompliance with the Act.

Witness,
Gordon H. Piper,
Chief Justice of this Court on December 17, 2019.
Attest:
Deborah J. Patterson
Recorder
16983

January 3, 2020

Public Notice

CITATION ON PETITION FOR FORMAL ADJUDICATION
Docket No. MI19P6042EA
Commonwealth of Massachusetts
The Trial Court Probate and Family Court
Middlesex Probate and Family Court
208 Cambridge Street Cambridge, MA 02141
(617)768-5800
Estate of: Gale Ruth Durno
Date of Death: 06/22/2019
To all interested persons

A Petition for S/A Probate of Will with Appointment of Personal Representative has been filed by **Seth E. Durno of Pepperell, MA** requesting that the Court enter a formal Decree and Order and for such other relief as requested in the Petition.

The Petitioner requests that:
Seth E. Durno of Pepperell, MA
be appointed as Personal Representative(s) of said estate to serve **Without Surety on the bond in an unsupervised administration.** IMPORTANT NOTICE You have the right to obtain a copy of the Petition from the Petitioner or at the Court. You have a right to object to this proceeding. To do so, you or your attorney must file a written appearance and objection at this Court before: 10:00 a.m. on the return day of 01/15/2020. This is NOT a hearing date, but a deadline by which you must file a written appearance and objection if you object to this proceeding. If you fail to file a timely written appearance and objection followed by an affidavit of objections within thirty (30) days of the return day, action may be taken without further notice to you.

UNSUPERVISED ADMINISTRATION UNDER THE MASSACHUSETTS UNIFORM PROBATE CODE (MUPC)
A Personal Representative appointed under the MUPC in an unsupervised administration is not required to file an inventory or annual accounts with the Court. Persons interested in the estate are entitled to notice regarding the administration directly from the Personal Representative and may petition the Court in any matter relating to the estate, including the distribution of assets and expenses of administration.

WITNESS, Hon. Maureen H Monks, First Justice of this Court. Date: December 18, 2019
Tara E. De Cristofaro, Register of Probate

January 3, 2020

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
Premises: 36 Cambridge Street, Ayer, Massachusetts

By virtue and in execution of the Power of Sale contained in a certain mortgage given by Philip A. Zimmerman to Bank of America, N.A. and now held by HSBC Bank USA, National Association, as Trustee for Structured Adjustable Rate Mortgage Loan Trust, Mortgage Pass-Through Certificates, Series 2005-18, said mortgage dated June 15, 2005, and recorded in the Middlesex County (Southern District) Registry of Deeds, in Book 45411 at Page 318, as affected by an Assignment of Mortgage dated September 30, 2013, and recorded with said Deeds in Book 62765 at Page 304 as affected by an Assignment of Mortgage dated June 27, 2017 and recorded with said Deeds in Book 69989 at Page 169, of which mortgage the undersigned is the present holder, for breach of the conditions in said mortgage and for the purpose of foreclosing the same will be sold at Public Auction on January 10, 2020, at 12:00 PM Local Time upon the premises, all and singular the premises described in said mortgage, to wit:

Being lot numbered twenty (20) and a portion of lot numbered nineteen (19) on a plan of lan entitled "Plan of Land in Ayer belonging to Mrs. S.J.S. Bennett, surveyed July 1886" Horace C. Hovey, Surveyor, bounded as follows: BEGINNING at the southeasterly corner of said lot No. 20 on the northerly side of contemplated extension of Cambridge Street, as shown on said plan; THENCE running northerly at a right angle with the northerly side of said extension one hundred fifteen (115) feet on lot No. 21 on said plan to a bound at the southwesterly corner of lot No. 30 on said plan-; THENCE westerly by an interior angle of ninety degree, ninety (90) feet on lan formerly of Sarah J.S. Bennett, being lot 29 on said plan, and land of Clara F. Hill, being lot 28 on said plan, to a stone bound in the center of the southerly boundary line of said lot 28; THENCE through the center of said lot 19, on a course parallel with the firs described course, one hundred fifteen (115) feet to said contemplate extension of Cambridge-Street; THENCE easterly on said contemplated extension ninety (90) feet to the point of beginning Said plan is filed in the Middlesex County (Southern District) Registry of Deeds in Plan Book 111, Plan 32. The description of the property contained in the mortgage shall control in the event of a typographical error in this publication. For Mortgagor' Title see deed dated June 10, 2005 and recorded with the Middlesex County (Southern District) Registry of Deeds in Book 45411 at Page 316, asaffected by deed dated November 23, 2005, andrecorded with said Deeds in Book 47952 at Page 120. TERMS OF SALE: Said premises will be sold and conveyed subject to all liens, encumbrances, unpaid taxes, tax titles, municipal liens and assessments, if any, which take precedence over the said mortgage above described. TEN THOUSAND ($10,000.00) Dollars of the purchase price must be paid in cash, certified check, bank treasurer's or cashier's check at the time and place of the sale by the purchaser. The balance of the purchase price shall be paid in cash, certified check, bank treasurer's or cashier's check within forty five (45) days after the date of sale. Other terms to be announced at the sale.

Marinosci Law Group, P.C.
275 West Natick Road, Suite 500
Warwick, RI 02886
Attorney for HSBC Bank USA, National Association, as Trustee for Structured Adjustable Rate Mortgage Loan Trust, Mortgage Pass-Through Certificates, Series 2005-18
Present Holder of the Mortgage
Telephone: (401) 234-9200
MLG File No.: 17-09049

December 20, 27, 2019
January 3, 2020

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Public Notice

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE

Premises: 14 Sycamore Drive, Townsend, Massachusetts 01469 By virtue and in execution of the Power of Sale contained in a certain mortgage given by Richard M. Dagenais to Mortgage Electronic Registration Systems, Inc., as nominee for Residential Mortgage Services, Inc., said mortgage dated March 31, 2017, and recorded in the Middlesex County (Southern District) Registry of Deeds, in Book 69088 at Page 276 and now held by Freedom Mortgage Corporation by virtue of an assignment from Mortgage Electronic Registration Systems, Inc., as nominee for Residential Mortgage Services, Inc. to Freedom Mortgage Corporation dated January 28, 2019 and recorded in the Middlesex County (Southern District) Registry of Deeds, in Book 72169 at Page 199 for breach of the conditions in said mortgage and for the purpose of foreclosing the same, will be sold at Public Auction on January 20, 2020 at 3:00 PM Local Time upon the premises, all and singular the premises described in said mortgage, to wit:

Schedule A

A certain parcel of land with the buildings thereon situated on Sycamore Drive, Townsend, Middlesex County, Massachusetts, being shown as Lot 146 on a plan entitled "Section 2 Definitive Plan Timberlee Park Subdivision Plan of Land in Townsend, Mass." Dana F. Perkins & Sons, Inc., dated December 3, 1971, duly recorded with Middlesex South District Registry of Deeds in Book 12469, Page 553, to which plan reference is hereby made for a more particular description. Said parcel contains 20,002 square feet of land according to said plan. Said premises are conveyed subject to and with the benefit of easements and restrictions of record, if any, insofar as now in force and applicable. Said premises are now known and numbered 14 on Sycamore Drive. There is excluded from this conveyance the fee in the street opposite said lot, but there is hereby granted the right to use the streets and roads shown on said plan in common with others entitled thereto for all purposes for which streets and roads are commonly used in Townsend to the extent necessary to secure access to the nearest public way.

For title reference see deed recorded herewith.

The description of the property that appears in the mortgage to be foreclosed shall control in the event of a typographical error in this publication. For Mortgagors' Title see deed dated March 31, 2017, and recorded in Book 69088 at Page 273 with the Middlesex County (Southern District) Registry of Deeds.

TERMS OF SALE. Said premises will be sold and conveyed subject to all liens, encumbrances, unpaid taxes, tax titles, municipal liens and assessments, if any, which take precedence over the said mortgage above described.

FIVE THOUSAND ($5,000.00) Dollars of the purchase price must be paid by a certified check, bank treasurer's or cashier's check at the time and place of the sale by the purchaser. The balance of the purchase price shall be paid in cash, certified check, bank treasurer's or cashier's check within sixty (60) days after the date of sale. Other terms to be announced at the sale.

BENDETT & MCHUGH, PC
270 Farmington Avenue
Farmington, CT 06032
Attorney for Freedom Mortgage Corporation
Present Holder of the Mortgage
(860) 677-2868

December 27, 2019
January 3, 10, 2020

Planning Board Special Permit and Site Plan Review Off Shaker Road

The Town of Ayer Planning Board will hold a public hearing on January 14, 2020 at 6:15 PM in the First Floor Meeting Room at Ayer Town Hall, 1 Main Street, to consider a Special Permit and Site Plan Application associated with the definitive subdivision proposed off Shaker Road by Aho Development, Inc. The project proposes a 16-lot development as an Open Space Residential Development (OSRD) subdivision. The lots will be a mix of 10 single family and 6 two-family dwelling for a total of 22 dwelling units. A Special Permit is required under Section 5.2 of the Table of Use Regulation for Two-Family dwellings within the A-2 Zoning District. Section 10.2.1 B gives the Planning Board the Special Permit Granting Authority. Along with the Special Permit, Site Plan Review is required under Section 9.6 of the Ayer Zoning Bylaw for clearing or grading of more than 10,000 square feet of land.

Property Location: off Shaker Road.
Applicant: Aho Development

Application and plans can be viewed at the Planning Board and Town Clerk's Office during their business hours. Any person interested or wishing to be heard on the proposed plan should appear at the time and place designated or provide written comment by January 6 th to the Ayer Planning Office.

Signed,
Ayer Planning Board

December 27, 2019
January 3, 2020

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Middlesex Probate and Family Court,
208 Cambridge Street, Cambridge, MA 02141
Docket No. MI18P0534PM
CITATION GIVING NOTICE OF CONSERVATOR'S ACCOUNT

In the matter of: **Ryan J. Wilson** of Shirley, MA, Protected Person/Disabled Person/Respondent; To the named Respondent and all other interested persons, you are hereby notified pursuant to Rule 72 of the Supplemental Rules of the Probate & Family Court, that the 1st account of Susan S. Wilson of Shirley, MA as Conservator of the property of said Respondent has or have been presented to the Court for allowance. You have the right to object to the account. If you wish to do so, you or your attorney must file a written appearance and objection at this court on or before 10:00 AM on the return date of 01/21/2020. This day is NOT a hearing date, but a deadline date by which you have to object to the account. If you fail to file the written appearance and objection by the return date, action may be taken in this matter without further notice to you, including the allowance of the account. Additionally, within thirty days after said return day (or within such such other time as the Court upon motion may order), you must file a written affidavit of objections stating the specific facts and grounds upon which each objection is based and a copy shall be served upon the Conservator pursuant to Rule 3 of the Supplemental Rules of the Probate & Family Court. You have the right to send to the Conservator, by registered or certified mail, a written request to receive a copy of the Petition and account at no cost to you.

IMPORTANT NOTICE: The outcome of this proceeding may limit or completely take away the above-named person's right to make decisions about personal affairs or financial affairs or both. The above-named person has the right to ask for a lawyer. Anyone may make this request on behalf of the above-named person. If the above-named person cannot afford a lawyer, one may be appointed at State expense. Witness, Hon. Maureen H Monks, First Justice of this Court; Date: December 11, 2019; TARA E. DeCRISTOFARO, Register of Probate

January 3, 2020

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Middlesex Division
Docket No. **MI19P5820EA**
INFORMAL PROBATE PUBLICATION NOTICE
Estate of:
Constance Griffin Bartovics
Also Known As: Constance J. Griffin, Constance G. Bartovics
Date of Death 09/20/2019

To all persons interested in the above captioned estate, by Petition of Petitioner Albert F. Bartovics of Pepperell MA
Albert F. Bartovics of Pepperll, MA has been informally appointed as the Personal Representative of the estate to serve **without surety** on the bond. The estate is being administered under informal procedure by the Personal Representative under the Massachusetts Uniform Probate Code without supervision by the Court. Inventory and accounts are not required to be filed with the Court, but interested parties are entitled to notice regarding the administration from the Personal Representative and can petition the Court in any matter relating to the estate, including distribution of assets and expenses of administration. Interested parties are entitled to petition the Court to institute formal proceedings and to obtain orders terminating or restricting the powers of Personal Representatives appointed under informal procedure. A copy of the Petition and Will, if any, can be obtained from the Petitioner.

January 3, 2020

510 Help Wanted General

Exalpha seeks Training Development Manager for position in Shirley, MA to build team and operations. Requires MS in Psychology, 6 mos exp as Operations Manager in Life Sciences industry, 1 yr exp in training/development. Send resume to info@exalpha.com.

Groton School is seeking a **year round housecleaner** to work five hours per day, Monday through Friday, with occasional Saturdays. Position includes benefits. Will be responsible for the daily, weekly, monthly, and seasonal cleaning of a private residence. Responsibilities include, but not limited to the general cleaning, polishing, ironing, sweeping and mopping floors and stairs, vacuuming rugs, cleaning and dusting furniture, washing windows and glass, cleaning all bathrooms and kitchens, changing beds, and other responsibilities that help maintain a clean and pleasant environment. This job requires the ability to work individually, attention to detail, physical strength, and the stamina to work long shifts. Candidate should be professional in mindset and must always use discretion. High School degree or equivalent, and previous work experience necessary. Please send all resumes to **jobs@groton.org** and reference "house" in the subject line. Please provide references with your resume.

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Shaker Meadows, Shirley Immediate Availability 2nd floor, 1 bdrm apt. elderly preference community $970 until rental assistance becomes avail. rental assistance based on 30% of income. Call Lydia at EastPoint Properties [illegible]. This Institution is an Equal Opportunity Provider and Employer

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Notice of Self Storage Sale: Please take notice **US Storage Centers – Waltham** located at 115 Bacon Street, Waltham, MA 02451 intends to hold an auction to sell the goods stored by the following tenants at the storage facility. The sale will occur as an online auction via www.usstorage centers.com/auctions on 1/14/2020 at 10:00 AM. Unless stated otherwise the description of the contents are household goods and furnishings. Ahmed Sekamate unit #132; Christom Larsin/ Self Employed unit #165; Austin Nicholas Stewart unit #343; Tarhonda Wells unit #351; Chris Merrill unit #648. All property is being stored at the above self-storage facility. This sale may be withdrawn at any time without notice. Certain terms and conditions apply. See manager for details.

December 29, 2019
January 5, 2020

Public Hearing
Lowell Zoning Board Variance
70 Fox Street
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by Jennifer Sargent for Variance approval to build a single family home on a vacant lot at 70 Fox Street. The property is located in the Suburban Single-Family (SSF) zoning district. 70 Fox Street requires Variance approval under Section 5.1 to encroach on the minimum lot size, minimum frontage, and for any other relief required of the Lowell Zoning Ordinance. The public hearing with the Zoning Board will be held on Monday, January 13, 2020 at 6:30 PM in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m.
Lowell Zoning Board
Gary Perrin, Chairperson

December 29, 2019
January 5, 2020

Public Notice

Public Hearing
Lowell Zoning Board Variance
18 Morton Street
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by Silvia Jaiman for Variance approval to construct an approximately 296 sq. ft. addition to the existing single-family home at 18 Morton Street. The home is in the Traditional Neighborhood Single-Family (TSF) zoning district and requires a Variance under Section 5.1 to exceed the maximum Floor Area Ratio (FAR) and for any other relief required of the Lowell Zoning Ordinance.
The public hearing with the Zoning Board will be held on **Monday, January 13, 2020 at 6:30 PM** in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m.
Lowell Zoning Board
Gary Perrin, Chairperson

December 29, 2019
January 5, 2020

Public Hearing
Lowell Zoning Board Variance
75 Technology Drive
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by Sign Design c/o Microchip for Special Permit approval to replace an existing internally illuminated sign with a new internally illuminated sign at 75 Technology Drive. The property is located in the Office/Research Park (OP) zoning district. 75 Technology Drive requires Variance approval under Section 6.3 to install an internally illuminated sign, and for any other relief required of the Lowell Zoning Ordinance. The public hearing with the Zoning Board will be held on Monday, January 13, 2020 at 6:30 PM in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m.

December 29, 2019
January 5, 2020

Lowell Zoning Board
Gary Perrin, Chairperson

Public Notice

Public Hearing
Lowell Zoning Board Variance
15 Whipple Street
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by Hector Rodriguez for Variance and Special Permit approval to convert a vacant commercial first-floor space into a housing unit, converting the property from a 1-family home into a 2-family home. The property is located in the Traditional Mixed-Use (TMU) zoning district. 15 Whipple Street requires Variance approval under Section 5.1 to encroach on the minimum lot size, minimum lot area per dwelling unit, minimum lot frontage, side setback, and rear setback. 15 Whipple Street also requires Variance approval under Section 6.1 for relief from off-street parking requirements, and for any other relief required of the Lowell Zoning Ordinance. The public hearing with the Zoning Board will be held on Monday, January 27, 2020 at 6:30 PM in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m.
Lowell Zoning Board
Gary Perrin, Chairperson

January 12, 2020
January 19, 2020

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Public Hearing
Lowell Zoning Board Variances
19-21 Warnesit Street & 22 Abbott Street
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by Attorney John Geary on behalf of **James Zorbas and Jeffrey Crowley** for Variance approval to construct a new single-family home at 22 Abbott Street, a vacant lot that has merged with 19-21 Warnesit Street for the purposes of zoning. 19-21 Warnesit Street is in the Traditional Neighborhood Multi-Family (TMF) zoning district and 22 Abbott Street is in the Traditional Neighborhood Two-Family (TTF) zoning district. Unmerging the lots requires Variances for the preexisting, non-conforming duplex at 19-21 Warnesit Street and for the proposed single-family home at 22 Abbott Street under Section 5.1 for minimum lot size, minimum lot area per dwelling unit, minimum frontage, minimum front yard setback, and minimum side yard setback; 19-21 Warnesit Street also requires additional Variances under Section 5.1 for minimum rear yard setback and under Section 5.3.2 for minimum usable open space per dwelling unit; 22 Abbott Street also requires an additional Variance under Section 5.1.10 for minimum lot width; and for any other relief required of the Lowell Zoning Ordinance. The public hearing with the Zoning Board will be held on Monday, January 13, 2020 at 6:30 PM in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m. Lowell Zoning Board
Gary Perrin, Chairperson

December 29, 2019, January 5, 2020

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Public Notice

Public Hearing
Lowell Zoning Board
Special Permit
1212 Westford Street
The Lowell Zoning Board will hold a public hearing to listen to all interested persons relative to an application by **Hazel Wood Hopkins on behalf of McGovern Ford** to install an internally illuminated, channel letter sign for the car dealership at 1212 Westford Street. The proposed sign would be 101 sq. ft. and would replace an existing one. The property is in the Regional Retail zoning district and the sign requires Special Permit approval under Section 6.3.4 and any other relief required under the Lowell Zoning Ordinance. The public hearing with the Zoning Board will be held on Monday, January 13, 2020 at 6:30 PM in the City Council Chambers, City Hall, 375 Merrimack Street, Lowell, MA 01852. The Board will consider this matter at the conclusion of their public hearing. Information relative to this project is available at the Division of Development Services, City Hall, 375 Merrimack Street, Room 51, Lowell, MA 01852, Monday, Wednesday, and Thursday, 8:00 a.m. to 5:00 p.m., Tuesday, 8:00 a.m. to 8:00 p.m. and Friday, 8:00 a.m. to 12:00 p.m.
Lowell Zoning Board
Gary Perrin, Chairperson

December 29, 2019
January 5, 2020

102 Autos for Sale

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'14 Honda AccordHybrid Base auto,40k miles stk# H200179..$15,298

'14 Honda Odyssey EX auto,59k miles stk# H1917561..$17,498

'17 Honda Accord EX auto, 18k miles stk# HP6629...$18,698

'16 Honda Civic LX auto, 15k miles stk# H191980....$15,698

'16 Honda Civic LX auto, 15k miles stk# HP6634..$14,998

'17 Honda Civic LX auto, 18k miles stk# HP6549...$14,998

'17 Honda Pilot Touring auto, 30k miles stk# H200040...$33,698

'16 Hyundai Sonata Hybrid AWD, auto, 27k miles stk# H191914..$11,498

'15Kia Sorento LX AWD auto, 55k miles stk# H200028...$13,998

'18 Kia Sorento LX AWD auto,45k miles stk# H191977...$18,498

'18 Kia Optima SXL auto, 20k miles stk# HP6623XX..$21,998

'17 Lexus IS 300 Lux auto, 7k miles stk# H1916171...$30,998

'11 Toyota Rav4 auto, 95k miles stk# H191883...$9,698

'16 Toyota Rav4 XLE auto, 45k miles stk# H200125...$17,998

'17 Nissan Murano S AWD auto, 21k miles stk# H191823...$19,998

'13 Subaru Crosstrek Prem Wagon, auto, 74k miles stk# HP66111...$12,998

'16 Subaru Legacy Prem auto,76k miles stk# H200132...$13,998

'17 Volkswagen Jetta Turbo auto, 25K miles H191720...$12,698

'15 Volkswagen GTI Hatch auto, 58k miles H191807...$14,698

Public Notice

PUBLIC NOTICE FOR FIVE-YEAR REVIEW
FORMER FORT DEVENS SUPERFUND SITE
DEVENS, MASSACHUSETTS

The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five-Year Review of remedial actions taken at the former Fort Devens Federal Superfund Site, Devens, MA. The purpose of the Five-Year Review is to evaluate whether the cleanup methods put in place at the site are working as designed and continue to remain protective of human health and the environment as required by the Superfund law. It is anticipated that this Five-Year Review will be completed in September 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The next RAB meeting will occur on January 16, 2020 (7PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://ftdevens.org

BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Devens was placed on the National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination. Since its placement on the NPL, long term monitoring and remediation activities have taken place at the contaminated sites, which have proved to be successful. For more information on the upcoming Five-Year Review process please contact:
Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 3 & 5, 2020

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510 Help Wanted General

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ID# 20-123 • Former rowing club property located on a 1.83± acre site w/ 297± feet of frontage along the westerly shoreline of the Merrimack River • Improved by a one-story and basement wood frame commercial building w/ 1,800± SF that is located in the RR – Rural Residential District • 1957 built structure features five restrooms, vinyl siding, overhead door to basement area, FHA/gas heat and all public utilities • Additional amenities include: gated storage yard, 10 boat slips & wooden docks • Tax Map 318, Block 166, Lot 9Q, Assessed Value $333,900 • Mortgage Reference: Essex North District Registry in Book 15429, Page 74. Sale per order of Mortgagee by its Attorneys: REGNANTE STERIO LLP by Paul G. Crochiere, Esq. **Terms:** $ 10,000 deposit at the time of sale, balance of purchase price due within 30 days from sale. **Preview:** By appointment with auctioneer. Other terms may be announced at time of sale. All information herein is believed but not warranted to be correct. The Mortgagee does not warrant the condition or existence of any feature described above.

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206 Appraising

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327 Miscellaneous

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To place your advertisement in our Marketplace section or to place an ad in our Service Directory, call 866-896-4979

Public Notice

CARE AND PROTECTION, TERMINATION OF PARENTAL RIGHTS, SUMMONS BY PUBLICATION, DOCKET NUMBER: 19CP0049LE, Trial Court of Massachusetts, Juvenile Court Department, COMMONWEALTH OF MASSACHUSETTS, Worcester County Juvenile Court, 25 School Street, Leominster, MA 01453
TO: Victor John and/or Unknown/Unnamed father of Joseph Mikey Tene: A petition has been presented to this court by DCF (Leominster), seeking, as to the following child, Joseph M Tene, that said child be found in need of care and protection and committed to the Department of Children and Families. The court may dispense the rights of the person(s) named herein to receive notice of or to consent to any legal proceeding affecting the adoption, custody, or guardianship or any other disposition of the child named herein, if it finds that the child is need of care and protection and that the best interests of the child would be served by said disposition. You are hereby ORDERED to appear in this court, at the court address set forth above, on the following date and time: 01/30/2020 at 9:30 AM Pre Trial Conference (CR/CV) You may bring an attorney with you. If you have a right to an attorney and if the court determines that you are indigent, the court will appoint an attorney to represent you. If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter. For further information call the Office of the Clerk-Magistrate at 978-537-3722.
WITNESS: Hon. Carol A. Erskine, FIRST JUSTICE
Brendan J. Moran, Acting Clerk-Magistrate,
DATE ISSUED: 12/17/2019

December 27, 2019
January 3, 6, 2020

City of Leominster
Conservation Commission
Public Hearing Notice
Pursuant to MGL CH 131 § 40 as amended, there will be a public hearing to consider a request for an Amended Order of Conditions by Central District Realty, regarding proposed changes to site a plan and stormwater previously approved under **DEP File# 199-1094. Address: 133 Nashua St– Map 379, Parcel 5.** The public hearing will be held on Tuesday, January 21, 2020 at 6:00 PM in Leominster City Hall, Room 10. Plans are available for viewing by appointment at the Office of the Conservation Commission in City Hall by calling (978) 962-3549
Daniel Brodeur, Chairman

January 10, 2020

PUBLIC NOTICE FOR FIVE-YEAR REVIEW FORMER FORT DEVENS SUPERFUND SITE DEVENS, MASSACHUSETTS
The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five Year Review (FYR) of remedial cleanup actions taken at the former Fort Devens Federal Superfund Site, Devens, MA. The purpose of the Five-Year Review is to provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program policy when hazardous substances remain on site above levels that permit unlimited use and unrestricted exposure. It is anticipated that this Five-Year Review will be completed in the fall of 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The purpose of community interviews is to determine the appropriate level of community involvement at the site and to ensure that the public is properly informed on site status and activities. The next RAB meeting will occur on January 16, 2020 - (6:30PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://fldevens.org
BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment, in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to CERCLA, Devens was placed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination.
The Five-Year Review will assess the protectiveness of remedies implemented at sites where contamination remains above levels that allow for unrestricted use. For more information on the upcoming Five- Year Review process please contact:
Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 10, 2020

510 Help Wanted General

DRIVERS (FT/PT) For ready mixed concrete trucks. CDL REQUIRED. We will train you. Excellent wages & benefits. Plants & garages, Sterling & Oxford. Apply in person:
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COMMONWEALTH OF MASSACHUSETTS
LAND COURT
DEPARTMENT OF THE TRIAL COURT
19 SM 006706
ORDER OF NOTICE
TO: **Jason W. Chisholm and Caitlyn M. Chisholm** and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. c. 50 §3901 (et seq) Freedom Mortgage Corporation claiming to have an interest in a mortgage covering real **property in Ashby, 195 County Road,** given by Jason W. Chisholm and Caitlyn M. Chisholm to Mortgage Electronic Registration Systems, Inc. as nominee for Stearns Lending, LLC, dated August 30, 2017, and recorded at Middlesex County (Southern District) Registry of Deeds in Book 69857, Page 577, has filed with this court a complaint for determination of Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before February 3, 2020 or you may lose the opportunity to challenge the foreclosure on ground of noncompliance with the Act.
Witness,
GORDON H. PIPER,
Chief Justice of said Court
on December 18, 2019
Attest:
Deborah J. Patterson
Recorder

January 10, 2020

Seal
Commonwealth of Massachusetts
Land Court
Department of the Trial Court
Docket # **19 SM 005846**
ORDER OF NOTICE
TO: **Chue Yang**
and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C.c.50 §3901 (et seq). PennyMac Loan Services, LLC claiming to have an interest in a Mortgage covering real property in **Fitchburg, numbered 50 Lionel Avneue, given by** Chue Yang to Mortgage Electronic Registration Systems, Inc., as nominee for Bank of America, N.A. dated March 28, 2011, and recorded in Worcester County (Northern District) Registry of Deeds in Book 7382, Page 248, now held by Plaintiff by Assignment, has filed with this court a complaint for determination of Defendant's Servicemembers status. If you now are, or recently have been in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above-mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before **JAN 20 2020** or you may lose the opportunity to challenge the foreclosure on the ground of noncompliance with the Act.
Witness,
Gordon H. Piper,
Chief Justice of this Court
on DEC 3 2019
Attest:
Deborah J Patterson
Recorder

January 10, 2020

(SEAL)
COMMONWEALTH OF MASSACHUSETTS
LAND COURT
DEPARTMENT OF THE TRIAL COURT
Docket:**19 SM 005179**
ORDER OF NOTICE
TO: **Cheryl A. Smith**
and to all persons entitled to the benefit of the Servicemembers Civil Relief Act:, 50 U.S.C.c. 50 §3901(et seq): **HSBC Bank USA, National Association, as Trustee for Fremont Home Loan Trust 2006-E, Mortgage-Backed Certificates, Series 2006-E,** claiming to have an interest in a Mortgage covering real property in Ashburnham, numbered **124 Ashby Road,** given by **Cheryl A. Smith** to **Mortgage Electronic Registration Systems, Inc., as nominee for Fremont Investment & Loan, its successors and assigns, dated July 31, 2006, and recorded in Worcester County (Northern District) Registry of Deeds in Book 6193, Page 118,** and now held by plaintiff by assignment, has/have filed with this court a complaint for determination of Defendant's/Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above-mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at **Three Pemberton Square, Boston, MA 02108** on or before **February 3, 2020** or you may lose the opportunity to challenge the foreclosure on the ground of noncompliance with the Act.
Witness,
GORDON H. PIPER
Chief Justice of this Court
on December 17, 2019
Attest:
Deborah J. Patterson
Recorder
(19-008982 Orlans)

January 10, 2020

CARE AND PROTECTION, TERMINATION OF PARENTAL RIGHTS, SUMMONS BY PUBLICATION, DOCKET NUMBER: 18CP0210SP, Trial Court of Massachusetts, Juvenile Court Department, COMMONWEALTH OF MASSACHUSETTS, Hampden County Juvenile Court, 80 State Street, Springfield, MA 01103
TO: **Danilo Carlos Pacheco**, father of Shane Michael Howard Jr born on 11/21/2011 and Lilly Marie Howard born on 05/17/2018 to Kelli Marie Blanchard: A petition has been presented to this court by DCF Springfield, seeking, as to the following children, Shane Michael Howard Jr, Lilly Marie Howard, that said children be found in need of care and protection and committed to the Department of Children and Families. The court may dispense the rights of the person(s) named herein to receive notice of or to consent to any legal proceeding affecting the adoption, custody, or guardianship or any other disposition of the children named herein, if it finds that the children are in need of care and protection and that the best interests of the childen would be served by said disposition. You are hersby ORDERED to appear in this court, at the court address set forth above, on the following date and time: 02/18/2020 at 09:00 AM Other Hearing You may bring an attorney with you. If you have a right to an attorney and if the court determines that you are indigent, the court will appoint an attorney to represent you. If you fail to appear, the court may proceed on that date and any date thereafter with a trial on the merits of the petition and an adjudication of this matter. For further information, call the Office of the Clerk - Magistrate at (413)748-7714.
WITNESS: Hon. Lois M. Eaton, FIRST JUSTICE,
Donald P. Whitney,
Clerk-Magistrate, DATE ISSUED: 12/04/2019

January 10, 13, 20, 2020

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508-353-6384

764 $251-$500

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10" Bench Table Saw Alltrade 1 3/4 HP 4800RPM $50.00 978-386-5533

12 ton shop press $50 978-957-3669

BowFlex Power Pro Home Gym. Power Man Rods $75.00 978-386-5533

Brand New Portable Toilet $10 978-957-3669

Craftsman Power Router 1 HP, 2500 RPM, mod # 315-17580, w case $65 978-386-5533

Harley Davidson Leather Pants, ex-Condition 32-32 $75.00 978-386-5533

Kitchen Table Oblong 60" x "34 $50.00 978-874-5970

New Whistlin Tea Kettle $20 978-957-3669

Universal Plainer Miter Saw, Stand Heavy Duty Delta Mod 36-136 $125. 978-386-5533

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Miscellaneous Household Items, $500 or less
Transportation Items, $1000 or less

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Disqualifications: Ad copy exceeds 10 words. Commercial ads and advertisers. Nine(9) or more ads per month, per household. Ad copy that does not have sale price included or price exceeds the limit of $500 per household item or $1000 per transportation. We reserve the right to refuse publication at any time. Other restrictions may apply.

Email: classified@mediaonene.com
Mail to: Attn: Brian Robinson, Sentinel & Enterprise, 491 Dutton St., Lowell, MA 01854.
Ads not accepted via telephone.

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Phone: _____
Address: _____
City _____
State/Zip: _____

Sentinel & Enterprise

Ph: ( )

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The ad deadline is 4:30pm for publication the following day. (Friday @ 4:30pm for publication Sunday or Monday).

POLICIES/ADJUSTMENTS: Please check your ad and report errors immediately. Adjustments to billing will be made to the incorrect portion of the first insertion only. We are not responsible for failure to publish and reserve the right to reject, edit or cancel any ad. All ads are subject to credit approval or prepayment prior to publication. We accept Visa, Mastercard, AMEX, cash or check only.

327 Miscellaneous

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510 Help Wanted General

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40 Hours/week
Monday thru Friday
Job Qualifications: The position requires telephone skills and interaction with clients, experience with computers and organization skills.
Job Description: Answering the telephone, greeting and scheduling clients. Scanning documents utilizing our Tax Software, reviewing and responding to emails.
Starting at the beginning of February to mid April. Commitment needed.
Email resume to lisa@belcourtcpa.com or call for interview at 978.263.0212.

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Middlesex Division
Docket No. MI19P5846EA
INFORMAL PROBATE PUBLICATION NOTICE

Estate of: ALINE Marie-Claire JACQUES; Also Known As: Aline Jacques, Aline M. Jacques, Aline D. Jacques; Date of Death: September 13, 2019

To all persons interested in the above captioned estate, by Petition of Petitioner VICTORINE C JACQUES of CHELMSFORD, MA, a Will has been admitted to informal probate. VICTORINE C JACQUES of CHELMSFORD, MA has been informally appointed as the Personal Representatives of the estate to serve without surety on the bond. The estate is being administered under informal procedure by the Personal Representatives under the Massachusetts Uniform Probate Code without supervision by the Court. Inventory and accounts are not required to be filed with the Court, but interested parties are entitled to notice regarding the administration from the Personal Representatives and can petition the Court in any matter relating to the estate, including distribution of assets and expenses of administration. Interested parties are entitled to petition the Court to institute formal proceedings and to obtain orders terminating or restricting the powers of Personal Representatives appointed under informal procedure. A copy of the Petition and Will, if any, can be obtained from the Petitioners

January 10, 2020

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No. SU19P2876GD
Suffolk Probate and Family Court
24 New Chardon Street
Boston, MA 02114
CITATION GIVING NOTICE OF PETITION FOR APPOINTMENT OF GUARDIAN FOR INCAPACITATED PERSON PURSUANT TO G.L. c. 190B, §5-304

In the matter of: **James Sargent** of Dracut, MA, RESPONDENT (Alleged Incapacitated Person) To the named Respondent and all other interested persons, a petition has been filed by Boston Medical Center of Boston, MA in the above captioned matter alleging that James Sargent is in need of a Guardian and requesting that Mary Marshall of Dracut, MA (or some other suitable person) be appointed as Guardian to serve Without Surety on the bond. The petition asks the court to determine that the Respondent is incapacitated, that the appointment of a Guardian is necessary, and that the proposed Guardian is appropriate. The petition is on file with this court and may contain a request for certain specific authority.

You have the right to object to this proceeding. If you wish to do so, you or your attorney must file a written appearance at this court on or before 10:00 A.M. on the return date of 02/11/2020. This day is NOT a hearing date, but a deadline date by which you have to file the written appearance if you object to the petition. If you fail to file the written appearance by the return date, action may be taken in this matter without further notice to you. In addition to filing the written appearance, you or your attorney must file a written affidavit stating the specific facts and grounds of your objection within 30 days after the return date.

IMPORTANT NOTICE: The outcome of this proceeding may limit or completely take away the above-named person's right to make decisions about personal affairs or financial affairs or both. The above-named person has the right to ask for a lawyer. Anyone may make this request on behalf of the above-named person. If the above-named person cannot afford a lawyer, one may be appointed at State expense. WITNESS, Hon. Brian J. Dunn, First Justice of this Court, Date: December 31, 2019

Register of Probate

January 10, 2020

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No. MI19P3645GD
Notice and Order: Petition for Resignation or Petition for Removal of Guardianship of a Minor

In the interests of Adrian M Wilson of Dracut, MA, minor

A hearing on a Petition to Resign as Guardian of a Minor or Petition for Removal of Guardian of a Minor filed by Randy Costello and Steven Dehate on 1/06/2020, will be held on **01/27/2020 at 8:30 AM, Guardianship of Minor Hearing. Located 208 Cambridge Street, Cambridge MA 02141.**

You may respond by filing a written response to the Petition or by appearing in person at the hearing. If you choose to file a written response, you need to file the original with the Court, and mail a copy to all interested parties at least five (5) business days before the hearing. The minor (or an adult on behalf of the minor) has the right to request that counsel be appointed for the minor. A minor over age 14 has the right to be present at any hearing, unless the Court finds that it is not in the minor's best interests.

THIS IS A LEGAL NOTICE: An important court proceeding that may affect your rights has been scheduled. If you do not understand this notice or other court papers, please contact an attorney for legal advice.

Date: January 6, 2020
Tara DeCristofaro
Register of Probate

January 10, 2020

Public Notice

THE COMMONWEALTH OF MASSACHUSETTS
LAND COURT
DEPARTMENT OF THE TRIAL COURT
Docket Number: 19 SM 006284
ORDER OF NOTICE

To: **Lauren M. Bucci, Joseph E. Greathead** and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. c. 50 §3901 (et seq): PennyMac Loan Services, LLC claiming to have an interest in a Mortgage covering real property in Lowell, numbered 100 Lafayette Street, given by Lauren M. Bucci and Joseph E. Greathead to Mortgage Electronic Registration Systems, Inc., as nominee for Wintrust Mortgage, a Division of Barrington Bank and Trust Co., N.A., dated October 26, 2016, and recorded in the Middlesex County (Northern District) Registry of Deeds in Book 30611, Page 239, and now held by the Plaintiff by assignment, has/have filed with this court a complaint for determination of Defendant's/Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above-mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before February 10, 2020, or you may lose the opportunity to challenge the foreclosure on the ground of noncompliance with the Act. Witness, Gordon H. Piper, Chief Justice of this Court on December 26, 2019

Attest: Deborah J. Patterson Recorder 18121

January 10, 2020

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Docket No. MI19P6063GD
Notice and Order: Petition for Appointment of Guardian of a Minor

In the interests of Adrian M Wilson of Dracut, MA, minor

A hearing on a Petition for Appointment of Guardian of a Minor filed on 12/02/2019 by Nicole B. Roth of Bolton, MA, Greg Roth of Bolton, MA, will be held on **01/27/2020 at 8:30 AM, Guardianship of Minor Hearing. Located 208 Cambridge Street, Cambridge MA 02141.**

You may respond by filing a written response to the Petition or by appearing in person at the hearing. If you choose to file a written response, you need to file the original with the Court, and mail a copy to all interested parties at least five (5) business days before the hearing. The minor (or an adult on behalf of the minor) has the right to request that counsel be appointed for the minor. If you are a parent of the minor child who is the subject of this proceeding you have a right to be represented by an attorney. If you want an attorney and cannot afford to pay for one and if you give proof that you are indigent, an attorney will be assigned to you. Your request for an attorney should be made immediately by filling out the Application of Appointment of Counsel form. Submit the application form in person or by mail at the court location where your case is going to be heard. A minor over age 14 has the right to be present at any hearing, unless the Court finds that it is not in the minor's best interests.

THIS IS A LEGAL NOTICE: An important court proceeding that may affect your rights has been scheduled. If you do not understand this notice or other court papers, please contact an attorney for legal advice.

Date: January 6, 2020
Tara DeCristofaro
Register of Probate

January 10, 2020

Public Notice

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
Premises: 140 Oak Knoll Road, Carlisle and Billerica, Massachusetts

By virtue and in execution of the Power of Sale contained in a certain mortgage given by Russell K. Materne and Ellen G. Materne to National City Mortgage Co., said mortgage dated August 26, 2002, and recorded in the Middlesex County (Northern District) Registry of Deeds, in Book 13666 at Page 1 and now held by Bank of America, National Association, by virtue of an assignment from HSBC Bank USA, National Association as Trustee for Merrill Lynch Mortgage Investors Trust, Series 2006-A4, to Bank of America, National Association, dated February 7, 2017 and recorded in the Middlesex County (Northern District) Registry of Deeds, in Book 31035 at Page 119, previouslyassigned by Bank of America, NA, to HSBC Bank USA, National Association as Trustee for Merrill Lynch Mortgage Investors Trust, Series 2006-A4, dated September 24, 2014 and recorded in the Middlesex County (Northern District) Registry of Deeds, in Book 28542 at Page 229, previously assigned by PNC Bank, NA, successor by merger to National City Mortgage Co., to Bank of America, NA, dated November 17, 2011 and recorded in the Middlesex County (Northern District) Registry of Deeds, in Book 25948 at Page 214 for breach of the conditions in said mortgage and for the purpose of foreclosing the same, will be sold at Public Auction on January 13, 2020 at 1:00 PM Local Time upon the premises, all and singular the premises described in said mortgage, to wit:

THE LAND IN BILLERICA AND CARLISLE, MIDDLESEX COUNTY, MASSACHUSETTS, WITH THE BUILDINGS THEREON, BEING SHOWN AS LOT B-5A AND PARCEL B-6, ON A PLAN OF LAND, IN BILLERICA & CARLISLE, MASSACHUSETTS, (MIDDLESEX COUNTY) FOR DELANEY, OWNED BY D.J. & L. CONSTRUCTION, INC., SCALE: 1" = 60', DATED JUNE 20, 1986, REVISED AUGUST 4, 1986, RECORDED IN MIDDLESEX NORTH DISTRICT REGISTRY OF DEEDS, PLAN BOOK 155, PLAN 83. ALSO SHOWN ON PLAN #24385, RECORDED IN SAID REGISTRY IN PLAN BOOK 148, PLAN 119, AND TO WHICH BOTH PLANS REFERENCE IS HEREBY MADE FOR A MORE PARTICULAR DESCRIPTION. LOT B-5A, CONTAINS 2.086 ACRES AND PARCEL B-6, CONTAINS 3.574 ACRES MORE OR LESS. SUBJECT TO A 40', WIDE COMMON DRIVEWAY, UTILITY EASEMENT AND A 4', WIDE FOOTPATH EASEMENT ALL AS SHOWN ON SAID PLAN AND BEING FOR THE BENEFIT OF THE OWNERS OF LOTS B-3A AND B-5A, WITH THE CONDITION THAT BOTH THE OWNERS OF LOTS B-3A AND B-5A EQUALLY SHARE THE COST OF SNOW REMOVAL AND NLAINTENANCE FOR APPROXIMATELY 235' OF THE COMMON DRIVEWAY, BEGINNING AT A POINT ON OAK KNOLL ROAD TO THE SOUTHERLY SIDE OF THE DRIVEWAY CUT OF LOT B-3A, AS SHOWN ON SAID PLAN. SNOW REMOVAL AND DRIVEWAY MAINTENANCE THEN SOLELY BECOMES THE RESPONSIBILITY OF THE OWNER OF LOT B-5A. THE OWNER OF LOT B-5A, SHALL HAVE THE RIGHT TO MAINTAIN THE AREA 4', OFF THE COMMON DRIVEWAY ON BOTH SIDES OF THE COMMON DRIVEWAY TO REMOVE OVERGROWN OR DEAD VEGETATION WHICH MAY INTERFERE WITH SAFETY ALONG SAID COMMON DRIVEWAY

The description of the property that appears in the mortgage to be foreclosed shall control in the event of a typographical error in this publication.

For Mortgagors' Title see deed dated December 19, 1991, and recorded in Book 5742 at Page 70 with the Middlesex County (Northern District) Registry of Deeds.

TERMS OF SALE: Said premises will be sold and conveyed subject to all liens, encumbrances, unpaid taxes, tax titles, municipal liens and assessments, if any, which take precedence over the said mortgage above described.

FIVE THOUSAND ($5,000.00) Dollars of the purchase price must be paid by a certified check, bank treasurer's or cashier's check at the time and place of the sale by the purchaser. The balance of the purchase price shall be paid in cash, certified check, bank treasurer's or cashier's check within sixty (60) days after the date of sale. Other terms to be announced at the sale.

BENDETT & MCHUGH, PC
270 Farmington Avenue
Farmington, CT 06032
Attorney for Bank of America, National Association
Present Holder of the Mortgage
(860) 677-2868

December 27, 2019
January 3 & 10, 2020

Dracut Conservation Commission
Legal Notice of Public Hearing
Wetlands Protection Act

A scrivener's error existed in a legal notice of public hearing that was published in the Lowell Sun on Friday January 3, 2020. Through error and inadvertence, the legal notice for the public hearing for a Notice of Intent filing for property at 796 Methuen Street, Dracut, MA was erroneously listed as 806 Methuen Street, Dracut, MA. The correct legal notice for 796 Methuen Street, Dracut, MA appears below. A public hearing will be held for a Notice of Intent filed by Charles Burgess & Cheryl Clark, Trustees of the Burgess Family Trust, II proposing to construct a single family dwelling, driveway, driveway infiltration, cut and clear trees, associated grading and utilities within 100 feet of the buffer zone of a Bordering Vegetated Wetland at 796 Methuen Street Dracut, MA. Meeting will be held in connection with Chapter 131, Section 40 of the M.G.L. and the Dracut Wetlands Bylaws on Wednesday, January 15, 2020 at 7:00pm at Town Hall, 62 Arlington Street, Dracut MA. To obtain this document in an alternative format (Braille, large print) or to make a reasonable accommodation (hearing device, signer, etc.), please contact Christine Lindberg at (978) 453-9492.

Dracut Conservation Commission
James Jendro, Chairman
978-458-4478

January 10, 2020

Public Notice

Public Notice

PUBLIC NOTICE FOR FIVE-YEAR REVIEW
FORMER FORT DEVENS SUPERFUND SITE
DEVENS, MASSACHUSETTS

The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five-Year Review (FYR) of remedial cleanup actions taken at the former Fort Devens Federal Superfund Site, Devens, MA. The purpose of the Five-Year Review is to provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program policy when hazardous substances remain on site above levels that permit unlimited use and unrestricted exposure. It is anticipated that this Five-Year Review will be completed in the fall of 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The purpose of community interviews is to determine the appropriate level of community involvement at the site and to ensure that the public is properly informed on site status and activities.

The next RAB meeting will occur on January 16, 2020 (6:30PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://ftdevens.org

BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment, in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to CERCLA, Devens was placed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination.

The Five-Year Review will assess the protectiveness of remedies implemented at sites where contamination remains above levels that allow for unrestricted use. For more information on the upcoming Five- Year Review process please contact:

Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 10, 2020

STATE OF WISCONSIN CIRCUIT COURT
COUNTY OF DANE
BRANCH 3

COMMERCIAL RENOVATION SERVICES, INC.
107 Mountain Brook Drive, Suite 108
Canton, GA 30115,
Plaintiff,
vs.
DOULOS FLOORING INC. d/b/a AMERICAN FLOORING UNITED
1500 Shawsheen Street, Unit 7
Tewksbury, MA 01876,
Defendant.
Case #2019CV003200
Case Type: 30701 & 30301

PUBLICATION SUMMONS

THE STATE OF WISCONSIN,
To each person named above as a Defendant:

You are hereby notified that the Plaintiff named above has filed a lawsuit or other legal action against you. Within 40 days after December 27, 2019, you must respond with a written demand for a copy of the complaint. The demand must be sent or delivered to the court, whose address is 215 S. Hamilton Street, Madison, WI 53703-3285, and to Law Offices of Kay & Andersen, LLC, Plaintiff's attorney, whose address is 1 Point Place, Suite 201, Madison, WI 53719. You may have an attorney help or represent you. If you do not demand a copy of the complaint within 40 days, the court may grant judgment against you for the award of money or other legal action requested in the complaint, and you may lose your right to object to anything that is or may be incorrect in the complaint. A judgment may be enforced as provided by law. A judgment awarding money may become a lien against any real estate you own now or in the future, and may also be enforced by garnishment or seizure of property.

If you need help in this matter because of a disability, call (608) 266-4311 (TTY Relay 7-1-1) and ask for the Court ADA Coordinator.

Dated this 23rd day of December, 2019.
LAW OFFICES OF KAY & ANDERSEN, LLC
Robert A. Mich, Jr.
State Bar No. 01026557
Electronically signed by Robert A. Mich, Jr.
Attorneys for Plaintiff Commercial Renovation Services, Inc.
Post Office Address:
One Point Place, Suite 201
Madison, Wisconsin 53719
Telephone: (608) 833-0077
Fax: (608) 833-3901
E-Mail: rmich@kayandandersen.com

December 27, 2019
January 3, 10, 2020

102 Autos for Sale

Herb Chambers
33 Cambridge St.
Burlington, MA 01803
(877)889-4952
herbchambershondaofburlington.com

'13 Honda CRV EXL AWD
auto, 76K miles
stk# H191703 $14,998

'16 Honda Odyssey EX
auto, 41K miles
stk# HP6573 $21,998

'14 Honda Odyssey SE
auto,59k miles
stk# H1917561 $17,498

'16 Honda Civic LX
auto, 15k miles
stk# H191980 $15,698

'17 Honda Civic LX
auto, 18k miles
stk# HP6549 $14,998

'16 Hyundai Sonata Hybrid AWD, auto, 27k miles
stk# H191914 $11,498

'18 Kia Sorento LX AWD
auto,45k miles
stk# H191977 $18,498

'17 Lexus IS 300 Lux
auto, 7k miles
stk# H1916171 $30,998

'16 Toyota Rav4 XLE
auto, 45k miles
stk# H200125 $17,998

'13 Subaru Crosstrek Prem
Wagon, auto, 74k miles
stk# HP66111 $12,998

'17 Volkswagen Jetta Turbo
auto, 25K miles
H191720 $12,698

102 Autos for Sale

'16 Honda CRV LX AWD
auto,34k miles
stk# HP6603 $18,698

'14 Honda AccordHybrid Base
auto,40k miles
stk# H200179 $15,298

'17 Honda Accord EX
auto, 18k miles
stk# HP6629 $18,698

'16 Honda Civic LX
auto, 15k miles
stk# HP6634 $14,998

'17 Honda Pilot Touring
auto, 30k miles
stk# H200040 $33,698

'15Kia Sorento LX AWD
auto, 55k miles
stk# H200026 $13,998

'18 Kia Optima SXL
auto, 20k miles
stk# HP6623XX $21,998

'11 Toyota Rav4
auto, 95k miles
stk# H191883 $9,698

'17 Nissan Murano S AWD
auto, 21k miles
stk# H191823 $19,998

'16 Subaru Legacy Prem
auto,76k miles
stk# H200132 $13,998

'15 Volkswagen GTI Hatch
auto, 58k miles
H191807 $14,698

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Desk/Vanity French Provincial Beige w. Gold Trim $100 978-692-6263

New Whistlin Tea Kettle $20 978-957-3669

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978-667-0828

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The ad deadline is 12:00pm Noon on Wednesday prior, for publication each Friday.

POLICIES/ADJUSTMENTS: Please check your ad and report errors immediately. Adjustments to billing will be made to the incorrect portion of the first insertion only. We are not responsible for failure to publish and reserve the right to reject, edit or cancel any ad. All ads are subject to credit approval or prepayment prior to publication. We accept Visa, Mastercard, AMEX, cash or check only.

Public Notice

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Middlesex Probate and Family Court
208 Cambridge Street
Cambridge, MA 02141
(617)768-5800
Docket No. MI19C1116CA
CITATION ON PETITION TO CHANGE NAME
In the matter of:
Aarish Balasuriya
A Petition to Change Name of Minor has been filed by Aarish Balasuriya requesting that the court enter a Decree changing their name to:
Aarish Krishanthan
IMPORTANT NOTICE
Any person may appear for purposes of objectiong to the petition by filing an appearance at: Middlesex Probate and Family Court before 10:00 a.m. on the return day of 01/23/2020. This is NOT a hearing date, but a deadline by which you must file a written appearance if you object to this proceeding. WITNESS, Hon. Maureen H Monks, First Justice of this Court.
Date: December 24, 2019
Tara E DeCristofaro
Register of Probate

Janaury 10, 2020

Public Notice

Devens Enterprise Commission
The Devens Enterprise Commission will conduct a Public Hearing on Thursday, February 6, 2020 at 7:30 AM in the Vicksburg Conference Room at 33 Andrews Parkway, Devens, MA to consider a Level 2 Unified Permit application submitted by Bristol-Myers Squibb for an amendment to their existing site plan and Flammables and Combustibles License to accommodate the expansion of an existing emergency generator fuel storage area, including two (2) additional 15,000 gallon above-ground diesel storage tanks, an expanded spill containment area, and associated site improvements.
Property located at 38 Jackson Road (Parcel ID # 9-4-200), Devens, MA in the Innovation & Technology Business District. Plans and supporting information may be viewed at the Town Halls of Ayer, Harvard, Shirley and at the Devens Enterprise Commission office during normal business hours.

January 3, 10, 2020

ORDER OF NOTICE BY PUBLICATION
The Trial Court of Massachusetts
The Superior Court
Docket No. 2019-3652
Middlesex County Superior Court,
200 Trade Center, 2nd Floor, Woburn, MA 01801
Eastern Bank vs
Frank E. Squibb
TO: Frank E. Squibb, all in said Commonwealth; and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. App. §501 et seq,; claiming to have an interest in a Mortgage covering real property in Lot 5, Autumn Leaf Drive, Groton, MA 01450 given by Frank E. Squibb to Eastern Bank dated 11/15/2004, and recorded in Middlesex So. County District Registry of Deeds, in Book 44089, Page 351 has/have filed with this Court a Complaint for determination of Defendant's/Defendants' Servicemember status. If you now are, or recently have been, in active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. if you object to a foreclosure of the above -mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at 200 Trade Center 2nd Fl., Woburn, MA 01801 on or before 1/27/20 or you may be forever barred from claiming that you are entitled to the benefits of said Act. Witness, Judith Fabricant, Esquire, Chief Justice of the Superior Court, at Woburn, Massachusetts, this 13th day of December, 2019. Michael A. Sullivan, Clerk of Courts.

January 3, 2020

Public Notice

LEGAL NOTICE MORTGAGEE'S SALE OF REAL ESTATE
By virtue of and in execution of the Power of Sale contained in a certain mortgage given by **Darrell B. Laws** to Mortgage Electronic Registration Systems, Inc., as mortgagee, acting solely as nominee for Nationstar Mortgage LLC, dba Greenlight Loans, dated September 10, 2015 and recorded in Middlesex County (Southern District) Registry of Deeds in Book 66084, Page 253 (the "Mortgage") of which mortgage U.S. Bank Trust National Association, as trustee of Lodge Series IV Trust is the present holder by Assignment from Mortgage Electronic Registration Systems, Inc., as mortgagee, as nominee for Nationstar Mortgage LLC, d/b/a Greenlight Loans, its successors and assigns to Nationstar Mortgage LLC d/b/a Mr. Cooper dated December 20, 2017 and recorded at said Registry of Deeds in Book 70528, Page 107, and Assignment from Nationstar Mortgage LLC d/b/a Mr. Cooper to New Penn Financial, LLC d/b/a Shellpoint Mortgage Servicing dated October 16, 2018 and recorded at said Registry of Deeds in Book 71754, Page 466, and Assignment from NewRez LLC f/k/a New Penn Financial, LLC d/b/a Shellpoint Mortgage Servicing to U.S. Bank Trust National Association as trustee of Lodge Series IV Trust dated August 26, 2019 and recorded at said Registry of Deeds in Book 73201, Page 143, for breach of conditions of said mortgage and for the purpose of foreclosing the same, the mortgaged premises located at 47 Shaker Road, Shirley, MA 01464 will be sold at a Public Auction at 11:00 AM on January 30, 2020, at the mortgaged premises, more particularly described below, all and singular the premises described in said mortgage, to wit: The tract or parcels of land situated on the northwesterly side of Shaker Road (a/k/a Phoenix Street) Shirley, Middlesex County, Massachusetts, being shown as Lot A-1, on a plan of land entitled "Plan of Land in Shirley, Mass, prepared for SPL Development Group, LLC, Scale 1"=40' dated May 2002," and recorded with the Middlesex South District Registry of Deeds as Plan No. 674 of 2002, and being bounded and described as follows: BEGINNING at a point which is the most southeasterly corner of the within described premises; THENCE N. 65 degrees 27' 42" W, for a distance of 210.84 feet, as bounded by land now or formerly of Carol A. Glover, as shown on said plan, to a point. THENCE N. 32 degrees 55' 24" E., for a distance of 189.19, as bounded by land now or formerly of Michelle Fitch, as shown on said plan, to a point; THENCE S. 57 degrees 05' 23" E., for a distance of 206.65 feet, as bounded by Lot A-2 as shown on said plan, to a point; THENCE S. 32 degrees, 13' 26" W., fora distance of 158.51 feet, as bounded by shaker Road to the point of beginning. Said Lot A-1 contains 36,108 square feet of land, according to said plan. Being that same property conveyed to Darrell B. Laws by Deed from D'Boss & Son Builders, Inc. dated August 20, 2004 and recorded August 23, 2004 in Book 43568 Page 352 in the Office of the Register of Deeds in and for Middlesex County, Massachusetts. For mortgagor's title see deed recorded with the Middlesex County (Southern District) Registry of Deeds in Book 43568, Page 352. The premises will be sold subject to any and all unpaid taxes and other municipal assessments and liens, and subject to prior liens or other enforceable encumbrances of record entitled to precedence over this mortgage, and subject to and with the benefit of all easements, restrictions, reservations and conditions of record and subject to all tenancies and/or rights of parties in possession. Terms of the Sale: Cash, cashier's or certified check in the sum of $5,000.00 as a deposit must be shown at the time and place of the sale in order to qualify as a bidder (the mortgage holder and its designee(s) are exempt from this requirement); high bidder to sign written Memorandum of Sale upon acceptance of bid; balance of purchase price payable in cash or by certified check in thirty (30) days from the date of the sale at the offices of mortgagee's attorney, Korde & Associates, P.C., 900 Chelmsford Street, Suite 3102, Lowell, MA 01851 or such other time as may be designated by mortgagee. The description for the premises contained in said mortgage shall control in the event of a typographical error in this publication. Other terms to be announced at the sale. U.S. Bank Trust National Association, as trustee of Lodge Series IV Trust Korde & Associates, P. C. 900 Chelmsford Street Suite 3102 Lowell, MA 01851 (978) 256-1500 Laws, Darrell B., 17-031056

January 3, 10, 17, 2020

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
By virtue and in execution of the Power of Sale contained in a certain mortgage given by **Robert A. Mason, Elizabeth S. Mason** to Mortgage Electronic Registration Systems Inc., as nominee for Mortgage Master, Inc., dated March 21, 2013 and recorded in the Middlesex County (Southern District) Registry of Deeds in Book 61445, Page 57, of which mortgage the undersigned is the present holder, by assignment from: Mortgage Electronic Registration Systems, Inc., as nominee for Mortgage Master, Inc. to JPMorgan Chase Bank, National Association, recorded on July 19, 2017, in Book No. 69626, at Page 190 for breach of the conditions of said mortgage and for the purpose of foreclosing, the same will be sold at Public Auction at 2:00 PM on February 6, 2020, on the mortgaged premises located at 7 Penny Lane, Townsend, Middlesex County, Massachusetts, all and singular the premises described in said mortgage, TO WIT: A parcel of land situated on Penny Lane, in Townsend, Middlesex County, Massachusetts and shown as Lot 30 on the Definitive Subdivision Plan ("Plan") entitled "Subdivision Plan, Coppersmith Way Development, Townsend, Mass.", owned by Transformations, Inc., dated February 14, 2005 and recorded with the Middlesex South Registry of Deeds as Plan No. 1085 of 2005, and to which plan reference is hereby made for a more particular description. For title see Deed recorded herewith. For mortgagor's(s') title see deed recorded with Middlesex County (Southern District) Registry of Deeds in Book 61445, Page 52. These premises will be sold and conveyed subject to and with the benefit of all rights, rights of way, restrictions, easements, covenants, liens or claims in the nature of liens, improvements, public assessments, any and all unpaid taxes, tax titles, tax liens, water and sewer liens and any other municipal assessments or liens or existing encumbrances of record which are in force and are applicable, having priority over said mortgage, whether or not reference to such restrictions, easements, improvements, liens or encumbrances is made in the deed. TERMS OF SALE: A deposit of Five Thousand ($5,000.00) Dollars by certified or bank check will be required to be paid by the purchaser at the time and place of sale. The balance is to be paid by certified or bank check at Harmon Law Offices, P.C., 150 California St., Newton, Massachusetts 02458, or by mail to P.O. Box 610389, Newton Highlands, Massachusetts 02461-0389, within thirty (30) days from the date of sale. Deed will be provided to purchaser for recording upon receipt in full of the purchase price. The description of the premises contained in said mortgage shall control in the event of an error in this publication. Other terms, if any, to be announced at the sale. JPMORGAN CHASE BANK, N.A. Present holder of said mortgage By its Attorneys, HARMON LAW OFFICES, P.C. 150 California St. Newton, MA 02458 (617)558-0500 13651

January 10, 17, 24, 2020

Public Notice

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
By virtue and in execution of the Power of Sale contained in a certain mortgage given by **Carlos Colon, Cindy Augosto** to Mortgage Electronic Registration Systems, Inc. as nominee for Mortgage Network, Inc., dated December 22, 2016 and recorded in the Middlesex County (Southern District) Registry of Deeds in Book 68644, Page 347, of which mortgage the undersigned is the present holder, by assignment from: Mortgage Electronic Registration Systems, Inc. as nominee for Mortgage Network, Inc., its successors and assigns to JPMorgan Chase Bank, National Association, recorded on February 28, 2018, in Book No. 70677, at Page 13 for breach of the conditions of said mortgage and for the purpose of foreclosing, the same will be sold at Public Auction at 12:00 PM on January 24, 2020, on the mortgaged premises located at 61 Front Street, Shirley, Middlesex County, Massachusetts, all and singular the premises described in said mortgage, TO WIT: A certain parcel of land with the buildings thereon, situated in said Shirley being shown as Lot numbered 12 on Plan in Subdivision of the Dwelling Properties of Samson Cordage Works at Shirley, Mass., dated October 13, 1937, Wm. I. Thompson, C.E. recorded with Middlesex South District Registry of Deeds, Plan N0.1111 of 1937, bounded and described as follows: BEGINNING at a stone bound at the northeasterly corner of the lot herein described in the southerly line of Front Street; THENCE running South 9 degrees 42' West, by land of William Goinet, one hundred thirty-four and no hundredths feet to a point; THENCE running North 89 degrees 56' West, by lot 11 on said plan, seventy-nine feet to a point; THENCE running North 0 degrees 42' East by lot 13 on said plan, one hundred and thirty-three and 40/100 (133.40) feet to a point in the southerly line of Front Street; THENCE running North 89 degrees 38' East by the southerly line of Front Street, seventy-nine feet to the point of beginning. Said lot contains ten thousand five hundred and sixty-two feet of land according to said plan. For Grantor's title see deed recorded prior hereto and herewith. For mortgagor's(s') title see deed recorded with Middlesex County (Southern District) Registry of Deeds in Book 68644, Page 344. These premises will be sold and conveyed subject to and with the benefit of all rights, rights of way, restrictions, easements, covenants, liens or claims in the nature of liens, improvements, public assessments, any and all unpaid taxes, tax titles, tax liens, water and sewer liens and any other municipal assessments or liens or existing encumbrances of record which are in force and are applicable, having priority over said mortgage, whether or not reference to such restrictions, easements, improvements, liens or encumbrances is made in the deed. TERMS OF SALE: A deposit of Five Thousand ($5,000.00) Dollars by certified or bank check will be required to be paid by the purchaser at the time and place of sale. The balance is to be paid by certified or bank check at Harmon Law Offices, P.C., 150 California St., Newton, Massachusetts 02458, or by mail to P.O. Box 610389, Newton Highlands, Massachusetts 02461-0389, within thirty (30) days from the date of sale. Deed will be provided to purchaser for recording upon receipt in full of the purchase price. The description of the premises contained in said mortgage shall control in the event of an error in this publication. Other terms, if any, to be announced at the sale. JPMORGAN CHASE BANK, N.A. Present holder of said mortgage By its Attorneys, HARMON LAW OFFICES, P.C. 150 California St. Newton, MA 02458 (617)558-0500 12439

January 3, 10, 17, 2020

Public Notice

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
Premises: 14 Sycamore Drive, Townsend, Massachusetts 01469 By virtue and in execution of the Power of Sale contained in a certain mortgage given by Richard M. Dagenais to Mortgage Electronic Registration Systems, Inc., as nominee for Residential Mortgage Services, Inc., said mortgage dated March 31, 2017, and recorded in the Middlesex County (Southern District) Registry of Deeds, in Book 69088 at Page 276 and now held by Freedom Mortgage Corporation by virtue of an assignment from Mortgage Electronic Registration Systems, Inc., as nominee for Residential Mortgage Services, Inc. to Freedom Mortgage Corporation dated January 28, 2019 and recorded in the Middlesex County (Southern District) Registry of Deeds, in Book 72169 at Page 199 for breach of the conditions in said mortgage and for the purpose of foreclosing the same, will be sold at Public Auction on January 20, 2020 at 3:00 PM Local Time upon the premises, all and singular the premises described in said mortgage, to wit:
Schedule A
A certain parcel of land with the buildings thereon situated on Sycamore Drive, Townsend, Middlesex County, Massachusetts, being shown as Lot 146 on a plan entitled "Section 2 Definitive Plan Timberlee Park, Subdivision Plan of Land in Townsend, Mass." Dana F. Perkins & Sons, Inc., dated December 3, 1971, duly recorded with Middlesex South District Registry of Deeds in Book 12469, Page 553, to which plan reference is hereby made for a more particular description. Said parcel contains 20,002 square feet of land according to said plan. Said premises are conveyed subject to and with the benefit of easements and restrictions of record, if any, insofar as now in force and applicable. Said premises are now known and numbered 14 on Sycamore Drive. There is excluded from this conveyance the fee in the street opposite said lot, but there is hereby granted the right to use the streets and roads shown on said plan in common with others entitled thereto for all purposes for which streets and roads are commonly used in Townsend to the extent necessary to secure access to the nearest public way. For title reference see deed recorded herewith.
The description of the property that appears in the mortgage to be foreclosed shall control in the event of a typographical error in this publication. For Mortgagors' Title see deed dated March 31, 2017, and recorded in Book 69088 at Page 273 with the Middlesex County (Southern District) Registry of Deeds.
TERMS OF SALE: Said premises will be sold and conveyed subject to all liens, encumbrances, unpaid taxes, tax titles, municipal liens and assessments, if any, which take precedence over the said mortgage above described.
FIVE THOUSAND ($5,000.00) Dollars of the purchase price must be paid by a certified check, bank treasurer's or cashier's check at the time and place of the sale by the purchaser. The balance of the purchase price shall be paid in cash, certified check, bank treasurer's or cashier's check within sixty (60) days after the date of sale. Other terms to be announced at the sale.
BENDETT & MCHUGH, PC
270 Farmington Avenue
Farmington, CT 06032
Attorney for Freedom Mortgage Corporation
Present Holder of the Mortgage
(860) 677-2868

December 27, 2019
January 3, 10, 2020

Public Notice

NOTICE OF MORTGAGEE'S SALE OF REAL ESTATE
By virtue and in execution of the Power of Sale contained in a certain mortgage given by **Elaine Chase, Leonard P. Chase** to Fleet National Bank, dated February 12, 2004 and recorded in the Middlesex County (Southern District) Registry of Deeds in Book 42294, Page 8, of which mortgage the undersigned is the present holder, by assignment from: Bank of America, N.A., s/b/m Fleet National Bank to Wilmington Savings Fund Society, FSB, doing business as Christiana Trust, not in its individual capacity, but solely as trustee for BCAT 2015-14BTT, recorded on November 19, 2015, in Book No. 66402, at Page 269 for breach of the conditions of said mortgage and for the purpose of foreclosing, the same will be sold at **Public Auction at 12:00 PM on February 6, 2020, on the mortgaged premises located at 55 Park Street, Pepperell, Middlesex County, Massachusetts,** all and singular the premises described in said mortgage,
TO WIT: THAT CERTAIN PIECE OF PARCEL OF LAND, AND THE BUILDINGS AND IMPROVEMENTS THEREON, IN THE TOWN OF PEPPERELL COUNTY OF MIDDLESEX AND STATE OF MASSACHUSETTS AND BEING MORE PARTICULARLY DESCRIBED IN A DEED RECORDED IN BOOK 14358, PAGE 278. For mortgagor's(s') title see deed recorded with Middlesex County (Southern District) Registry of Deeds in Book 14358, Page 278.
These premises will be sold and conveyed subject to and with the benefit of all rights, rights of way, restrictions, easements, covenants, liens or claims in the nature of liens, improvements, public assessments, any and all unpaid taxes, tax titles, tax liens, water and sewer liens and any other municipal assessments or liens or existing encumbrances of record which are in force and are applicable, having priority over said mortgage, whether or not reference to such restrictions, easements, improvements, liens or encumbrances is made in the deed.
TERMS OF SALE: **A deposit of Five Thousand ($5,000.00) Dollars by certified or bank check will be required to be paid by the purchaser at the time and place of sale.** The balance is to be paid by certified or bank check at Harmon Law Offices, P.C., 150 California St., Newton, Massachusetts 02458, or by mail to P.O. Box 610389, Newton Highlands, Massachusetts 02461-0389, within thirty (30) days from the date of sale. Deed will be provided to purchaser for recording upon receipt in full of the purchase price. The description of the premises contained in said mortgage shall control in the event of an error in this publication. Other terms, if any, to be announced at the sale.
WILMINGTON SAVINGS FUND SOCIETY, FSB, DOING BUSINESS AS CHRISTIANA TRUST, NOT IN ITS INDIVIDUAL CAPACITY, BUT SOLELY AS TRUSTEE FOR BCAT 2015-14BTT
Present holder of said mortgage
By its Attorneys,
HARMON LAW OFFICES, P.C.
150 California St.
Newton, MA 02458
(617)558-0500
2016040461

January 10, 17 & 24, 2020

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510 Help Wanted General

Groton School is seeking a **year round housecleaner** to work five hours per day, Monday through Friday, with occasional Saturdays. Position includes benefits. Will be responsible for the daily, weekly, monthly, and seasonal cleaning of a private residence. Responsibilities include, but not limited to the general cleaning, polishing, ironing, sweeping and mopping floors and stairs, vacuuming rugs, cleaning and dusting furniture, washing windows and glass, cleaning all bathrooms and kitchens, changing beds, and other responsibilities that help maintain a clean and pleasant environment. This job requires the ability to work individually, attention to detail, physical strength, and the stamina to work long shifts. Candidate should be professional in mindset and must always use discretion. High School degree or equivalent, and previous work experience necessary. Please send all resumes to **jobs@groton.org** and reference "house" in the subject line. Please provide references with your resume.

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Public Notice

PUBLIC NOTICE FOR FIVE-YEAR REVIEW
FORMER FORT DEVENS SUPERFUND SITE
DEVENS, MASSACHUSETTS
The U.S. Army Base Realignment and Closure Division (BRAC) is announcing the start of the fifth Five-Year Review (FYR) of remedial cleanup actions taken at the former Fort Devens Federal Superfund Site, Devens, MA. The purpose of the Five-Year Review is to provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program policy when hazardous substances remain on site above levels that permit unlimited use and unrestricted exposure. It is anticipated that this Five-Year Review will be completed in the fall of 2020. The Army invites the local community to take part in the review process by participating in a community interview or attending periodic Restoration Advisory Board (RAB) meetings. The purpose of community interviews is to determine the appropriate level of community involvement at the site and to ensure that the public is properly informed on site status and activities.
The next RAB meeting will occur on January 16, 2020 (6:30PM) at the Devens Commerce Center, MassDevelopment Offices, 33 Andrews Parkway, Devens, MA 01434. Information on RAB meetings, Five-Year Review progress and community involvement can be found at https://ftdevens.org
BACKGROUND: Camp Devens was established in 1917 as a temporary training area for soldiers during World War I. In 1932, the site was named Fort Devens and made a permanent installation with the primary mission of commanding, training, and providing logistical support for non-divisional troop units. After closure in 1996, portions of the property were retained by the Army as the Devens Reserve Forces Training Area, while the remaining sections were transferred to the Local Redevelopment Authority, MassDevelopment, in addition to other Federal agencies. The current and former facility is located in the towns of Ayer, Shirley, Lancaster, and Harvard. Pursuant to CERCLA, Devens was placed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) on December 21, 1989 because of environmental contamination at several locations. The contamination at the former Fort Devens site is associated with historic underground storage tanks/fuel depots and contaminated soils containing petroleum products and chemicals. The principal threats to human health and the environment are primarily groundwater, soil, and sediment contamination.
The Five-Year Review will assess the protectiveness of remedies implemented at sites where contamination remains above levels that allow for unrestricted use. For more information on the upcoming Five- Year Review process please contact:
Department of the Army
Base Realignment and Closure Division
U.S. Army Garrison Fort Devens
30 Quebec Street, Unit 100
Devens, MA 01434-4479
Office: 978-615-6090
Email: robert.j.simeone.civ@mail.mil

January 10, 2020

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Federal, State, Local Authority Questionnaire – Long Form

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **Devens – All Sites**	**Date:** **March 10, 2020**	**Time:** **1100**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: not applicable**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Engineer**	**Organization:** **Koman Government Solutions, LLC**
Individual Contacted		
Name: **Penelope Reddy**	**Title:** **Engineering Technical Lead**	**Organization:** **U.S. Army Corps of Engineers**
Telephone No.: 978-318-8160 **Email Address: penelope.reddy@usace.army.mil**	**Street Address: 696 Virginia Road** **City, State, Zip: Concord, MA 01742**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   The cleanup has been successful. Active treatment remains at two sites, AOC 50, Moore Army Airfield and Shepley's Hill Landfill. The tetrachloroethene plume at the airfield has been significantly reduced and arsenic continues to be removed at the landfill. The majority of the sites are long-term monitoring sites monitored for metals. Controls are in place to prevent exposure.

2. *Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please provide the purpose and results.*

   The Army conducts annual inspection, maintenance, and sampling of the sites per the record of decisions, which are reported in annual reports reviewed by stakeholders.

3. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   I am unaware of any violation of complaints.

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

5. *Have any breaches of the CERCLA remedy Land Use Controls (LUCs) occurred, complaints been filed, or unusual activities been noted at the site (e.g., citizens are consuming fish at a contaminated sediment site)? If so, how were they addressed?*

   I am unaware of any LUC violations in the past five years.

6. *Has the Army reported on the status of the LUCs as required?*

   The status of the LUCs have been reported in the annual reports per the land use control Implementation Plans (LUCIPs).

7. *What type of monitoring is currently being conducted or has been conducted to determine LUC compliance (e.g., follow-up inspections)?*

   The sites are inspected annually using the annual LUC inspections to ensure LUC compliance.

8. *Are LUCs being enforced? What is the enforcement plan in the event of an LUC breach?*

   LUCs are being enforced. If a breach of the LUC was determined, the Army would work with the property owner and local officials to remedy the breach and keep the property in compliance with LUC requirements.

9. *Are there any new developments, either constructed or planned, in the area of which the entity is aware?*

   Yes, there have been new developments and planned developments over the past five years through MassDevelopment at former Fort Devens Installation property.

10. *Has land use changed or is it anticipated to change (e.g., housing developments, either constructed or planned, exist in the area)?*

    No land use changes are planned or have changed.

11. *What procedures are in place for EPA and PRPs to receive notice of any proposed changes to the LUCs?*

    Procedures in place include current property deed and LUCIP requirements for notification and reporting to EPA, MassDEP, MassDevelopment and property owners when necessary.

12. *Does the entity have an LUC tracking system or other applicable database (e.g., GIS maps) to keep information about LUCs?*

    No, the BRAC office does not have GIS database tracking system for LUCs.

13. *Can the LUCs or engineering controls be registered in the state's one-call system?*

    I do not know the answer to this question.

14. *How has the LUC process been working and are there any suggestions for improvement?*

    The LUC process has been working effectively. All LUC notifications, implementation, compliance and reporting requirements are all being adequately performed.

    A database triggered by property transfer would be a suggested improvement for LUC tracking.

15. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

    No.

Federal, State, Local Authority Questionnaire – Long Form

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **Devens – All Sites**	**Date:** **February 24, 2020**	**Time:** **1100**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: not applicable**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Project Geologist**	**Organization:** **Koman Government Solutions, LLC**
Individual Contacted		
Name: **Robert Simeone**	**Title:** **Army BRAC Environmental Coordinator**	**Organization:** **US Army, Devens BRAC Office**
Telephone No.: 978-615-6090 **Fax No.:** **Email Address: robert.j.simeone.civ@mail.mil**	**Street Address: 30 Quebec Street** **City, State, Zip: Devens, MA 01434-4479**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   The cleanup has been highly successful. Over 95% of former Fort Devens property has been successfully transferred as a result of the environmental cleanup activities.

2. *Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please provide the purpose and results.*

   We have conducted many site visits in the past five years relating to long-term monitoring and cleanup activities at Devens. Results of LTM and cleanup activities are provided in the annual operations, maintenance, and monitoring reports for Main Post, AOC 50 and Shepley's Hill Landfill. PFAS is not part of the LTM program under this 5YR.

3. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   No violations have occurred during this 5 Year Review timeframe. No incidents have occurred, specifically no UXO incidents.

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

5. *Have any breaches of the CERCLA remedy Land Use Controls (LUCs) occurred, complaints been filed, or unusual activities been noted at the site (e.g., citizens are consuming fish at a contaminated sediment site)? If so, how were they addressed?*

   No LUC violations have occurred in the past five years.

6. *Has the Army reported on the status of the LUCs as required?*

   Yes, the Army has reported on the status of the LUCs pursuant to a sites specified remedy requirements as set forth in Records of Decision (ROD), property deed notices and requirements and LUC Implementation Plans (LUCIPs). These requirements are reported in site annual reports. LUC inspections for the Oak and Maple housing area has been implemented since the ROD ESD was completed.

7. *What type of monitoring is currently being conducted or has been conducted to determine LUC compliance (e.g., follow-up inspections)?*

   Annual LUC inspections as part of the LTM has been conducted over the past five years. LUC inspection and checklists are implemented annually for monitoring LUC compliance.

8. *Are LUCs being enforced? What is the enforcement plan in the event of a LUC breach?*

   LUCs are being enforced. If a breach of the LUC was determined, the Army would work with the property owner and local officials to remedy the breach and keep the property in compliance with LUC requirements.

9. *Are there any new developments, either constructed or planned, in the area of which the entity is aware?*

   Yes, there have been new developments and planned developments over the past five years through MassDevelopment at former Fort Devens Installation property.

10. *Has land use changed or is it anticipated to change (e.g., housing developments, either constructed or planned, exist in the area)?*

    No land use changes are planned or have changed.

11. *What procedures are in place for EPA and PRPs to receive notice of any proposed changes to the LUCs?*

    Procedures in place include current property deed and LUCIP requirements for notification and reporting to EPA, MassDEP, MassDevelopment and property owners when necessary. All proposed modifications to LUCs requires regulatory approval.

12. *Does the entity have an LUC tracking system or other applicable database (e.g., GIS maps) to keep information about LUCs?*

No, the BRAC office does not have GIS database tracking system for LUCs.

13. *Can the LUCs or engineering controls be registered in the state's one-call system?*

    It is not necessary for property with LUCs to register on the state's one call system. Any intrusive digging at Devens is required to follow the Devens Soil Management Policy and Call Dig Safe requirement in addition to any specific LUC requirements and soil management plan related to intrusive work.

14. *How has the LUC process been working and are there any suggestions for improvement?*

    The LUC process has been working effectively. All LUC notifications, implementation, compliance and reporting requirements are all being adequately performed.

    A database triggered by property transfer would be a suggested improvement for LUC tracking.

15. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

    No.

Federal, State, Local Authority Questionnaire – Long Form

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **Devens**	**Date:** **3/31/2020**	**Time:** **10:00 am**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: not applicable**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Project Geologist**	**Organization:** **Koman Government Solutions, LLC**
Individual Contacted		
Name: **Roy Herzig and Ron Ostrowski**	**Title:** **Environmental Engineer**	**Organization:** **MassDevelopment (MassDev)**
Telephone No.: 978-784-2917 **Fax No.:** **Email Address: RHerzig@Massdevelopment.com**	**Street Address: 33 Andrews Parkway** **City, State, Zip: Devens, MA 01434**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   Since 1991, with the start of the FFA, Army has performed a good job in keeping with the FFA. MassDev gives good ratings to Army and BRAC cleanup team with communication with regulators. There has been good continuity with BRAC cleanup team, no significant shifts in BRAC staffing in past 5 years, and overall consistency is good. As PFAS concerns ramp up, we are looking forward to increased coordination.

2. *Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please provide the purpose and results.*

   Over the years there has been some disagreement in use of terms, but good cooperation to work out issues through the BCT, RAB, email, calls and face-to-face meetings. Internally, MassDev has weekly meeting to discuss cleanup process and how it impacts MassDev operations. Devens Enterprise Commission (DEC) oversees land use control processes.

3. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   Signage at Grant Road, due to recent construction activities for family housing, required some maintenance. Signs were repaired/replaced. MassDev follows AULs and tracks incidents.

4. *Do you feel well informed about the site's activities and progress?*

   Yes, we feel we are well informed and routinely coordinate with Army directly or through BCT meetings, RAB, emails or calls. Bob Simeone has an open door policy that is conducive to being well informed. Anytime there is an issue or unclear on site activities, we feel free to talk with BCT members directly to get answers. Coordination has been good.

5. *Have any breaches of the Institutional Controls (ICs) occurred, complaints been filed, or unusual activities been noted at the site (e.g., citizens are consuming fish at a contaminated sediment site)? If so, how were they addressed?*

   No IC breaches have been identified at AOC 50, AOC 69W, or AOC 57 in past 5 years. A potential IC and GERE breach was identified at AOC 43J which is property owned by Bristol Meyers Squibb (BMS). BMS hired a contractor to perform geotechnical boring around the property but not near the contaminated areas. The Army, EPA and MassDEP were not notified of the boring activity prior to start of the boring program. The issue was resolved by notifying EPA and MassDEP and getting approval from the regulatory agencies. No additional borings were drilled after regulatory approval. The breach occurred due to a BMS staffing change who was not aware of the restrictions.

6. *Has the Army reported on the status of the ICs or LUCs as required?*

   Yes. Every year we receive the annual checklist and interviews to update IC and LUCs with the Army. We participate through emails and phone calls for the annual updates to the LUC checklists and interviews.

7. *What type of monitoring is currently being conducted or has been conducted to determine IC compliance (e.g., follow-up inspections)?*

   We don't accompany Army field inspections or field work but we do discuss monitoring through calls or emails and participate in annual checklists and surveys.

8. *Are ICs being enforced? What is the enforcement plan in the event of an IC breach?*

   Yes, ICs are being enforced and the enforcement plan is coordinated with Army, EPA, MassDEP on a case by case basis. Weekly meetings and internal coordination with DEC is conducted to review enforcement plans. When new projects come up, DEC watches for IC controls and enforcement.

9. *Are there any new developments, either constructed or planned, in the area of which the entity is aware?*

   For ongoing and past construction – housing development at Grant road is ongoing (Phase III currently). AOC 69W expanded the building footprint with an addition in past 5 years and coordinated with MassDev for ICs.

   For planning - BMS plans to extend capacity by adding additional buildings on their property. MassDev is planning a new entity at 111 Hospital Road at former Oak, Maple and Grant housing area including impact area. MassDev is planning a new entity at 105 Hospital Road as part of Oak and Maple housing area. At AOC 50 (former airfield) new contract negotiations for state police for training are underway.

10. *Has land use changed or is it anticipated to change (e.g., housing developments, either constructed or planned, exist in the area)?*

    About a year ago, land use change at Grant Road housing status was changed from "housing development" to "innovation technology". Engineering plans are available for viewing specifications of the area changes.

11. *What procedures are in place for EPA and PRPs to receive notice of any proposed changes to the ICs?*

    The routine BCT meetings are a good format for presenting any changes although no changes have occurred or plan to occur. Oak and Maple LUCs plan is still in draft and under review currently, however MassDev is already following the draft LUC plan for Oak and Maple housing areas.

12. *Does the entity have an IC tracking system or other applicable database (e.g., GIS maps) to keep information about ICs?*

    DEC has a list and map to check against and we are in process of developing a GIS system for internal use initially with anticipation of future public access use. The GIS database tracking process has started. Currently daily IC tracking is done through internal weekly meetings that include discussions on real estate, general operations and close coordination with DEC.

13. *Can the ICs or engineering controls be registered in the state's one-call system?*

    We don't know but interested in finding out more about one-call system. If emergency, currently we would enable a one call within MassDev system but not within the state's one-call system.

14. *How has the IC process been working and are there any suggestions for improvement?*

    ICs are working well. The annual reviews are adequate. It is important to maintain well informed staff, property owners, MassDev, and Army and by adding an online GIS tracking system, it will improve communications. We have GERE and ICs to monitor environmental issues at both the state and federal level.

15. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

    We hope the success of the past Army actions will continue into the future with the new PFAS challenges. We would like to see the same level of success and communication under the PFAS investigations.

Federal, State, Local Authority Questionnaire – Long Form

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **Devens – All Sites**	**Date:** **2/21/20**	**Time:** **0900**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: Not Applicable**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Project Geologist**	**Organization: KGS**
Individual Contacted:		
Name: **Ira Grossman**	**Title:** **Sanitarian/Environmental Administrator**	**Organization:** **Nashoba Associated Boards of Health**
Telephone No.: 978-772-3335 X306 **Fax No.: NA** **Email Address: igrossman@nashoba.org**	**Street Address: 30 Central Ave** **City, State, Zip: Ayer MA 01432**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   Positive. Cleanup has gone well.

2. *Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please provide the purpose and results.*

   Our office has not gone onsite, however, the BOH has asked for water quality testing for sections of town and requests have been granted.

3. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   No.

4. *Do you feel well informed about the site's activities and progress?*

   Yes.

5. *Have any breaches of the Institutional Controls (ICs) occurred, complaints been filed, or unusual activities been noted at the site (e.g., citizens are consuming fish at a contaminated sediment site)? If so, how were they addressed?*

"Question 5 makes me think: Should there be a question about posting waterways that are known to have PFAS in the sediment to warn people against swimming? against fishing? Should there be outreach/partnership with e.g. Fish and Wildlife? So maybe the question is, "Is there adequate communication to all concerned (postings at contaminated water ways, outreach to BOH, outreach to media... "?"

6. *Has the Army reported on the status of the ICs or LUCs as required?*

   Yes.

7. *What type of monitoring is currently being conducted or has been conducted to determine IC compliance (e.g., follow-up inspections)?*

   Not Applicable.

8. *Are ICs being enforced? What is the enforcement plan in the event of an IC breach?*

   Not Applicable.

9. *Are there any new developments, either constructed or planned, in the area of which the entity is aware?*

   No. A submittal for approval of a building application for a proposed 40B affordable housing development located near Wendy's rotary and Barnum Road in the spring of 2020 is in process.

10. *Has land use changed or is it anticipated to change (e.g., housing developments, either constructed or planned, exist in the area)?*

    See #9 comment.

11. *What procedures are in place for EPA and PRPs to receive notice of any proposed changes to the ICs?*

    Not Applicable.

12. *Does the entity have an IC tracking system or other applicable database (e.g., GIS maps) to keep information about ICs?*

    Nashoba Associated Boards of Health has a database for public community wells and Harvard private wells.

13. *Can the ICs or engineering controls be registered in the state's one-call system?*

    If there were an emergency, we would be notified through the one-call system.

14. *How has the IC process been working and are there any suggestions for improvement?*

    The IC process has been working well. We get timely submissions and drafts of Devens reports.

15. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

    The process is working well from my perspective.

Former Fort Devens Army Installation
Five Year Review
General Public Questionnaire

Respondent Contact Information		
Name: [redacted]	**Title:** Resident	**Organization:**
Telephone No.: [redacted] **Fax No.:** **Email Address:** [redacted]	**Street Address:** [redacted] **City, State, Zip:** [redacted]	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

It is very comprehensive and seems to be progressing in a very thorough and rigorous manner. The law that established the Super Fund process appears to be driving this work and that law must be quite comprehensive.

2. *What effects has cleanup at Devens had on the surrounding community?*

Before I moved to Devens from Littleton, I knew little about the Super Fund process. However, after moving here three plus years ago, I have learned quite a bit about what has gone on and what is currently going on with regard to the clean-up. The effect on Devens is very positive in that much progress has been made to the point that we have moved here with some confidence that the Army has cleaned up the munitions around the housing area and that other contaminants are identified, possibly cleaned up and at least stabilized in the landfill and other areas. Ayer, Shirley and Harvard are most effected by the Devens contamination. Ayer has been the most effected and I've been following the reaction in Ayer by attending the PACE meetings in Ayer.

3. *Are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.*

Of course, there is concern about the details of the clean-up. People in Ayer, Harvard and Shirley and in Devens are concerned about our water, air and other pollution. People are following the RAB process and accessing the effectiveness of the clean-up. The recent PFAS discoveries are very concerning. But, the response by MassDevelopment and the Army are helping to sooth those concerns.

4. *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 provide details.*

As far as I know, there haven't been any incidents although I don't see the police reports.

5. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site?*

I've attended the RAB meetings and am a member of the Devens Committee, so I've tried to follow the investigations and reports of what is going on regarding PFAS and other contaminants. The drilling and monitoring along with the wells that are being monitored is very obvious and is crucial to this process.

6. *Do you feel comfortable in the process that Devens is utilizing to keep the contaminants from migrating off site?*

I am very concerned about the PFAS at Moore Airfield leaking into the Nashua River and off-site. We can't let this contaminant pollute the down-river water and effect the wildlife of the river. When and if Vicksburg Square is renovated, there should be great care to limit any air or water pollution from that site.

7. *Do you feel informed about the site's activities and progress?*

Yes, by attending the RAB meetings, but I don't think that the general public is hearing about the work that goes on here. People need to hear about this Superfund site and why it is here. We need to be reminded that the Superfund Law was a by-partisan law that was passed by the Congress to protect the citizens and that its intent is being carried out on Devens with taxpayer money that is well spent.

8. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*

More publicity needs to be done in local and regional media or on-line about the progress at Devens. We should be reminded that Congress can do good things for the citizens of this country especially in this polarized political climate.

Former Fort Devens Army Installation
Five Year Review
General Public Questionnaire

Respondent Contact Information		
Name: **Laurie Nehring**	**Title:** **Community Member**	**Organization:** **PACE**
Telephone No.: 978-772-9749 **Fax No.:** **Email Address: lnehring100@gmail.com**		**Street Address: 35 Highland Avenue** **City, State, Zip: Ayer, MA 01432**

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   Overall, it's pretty reasonable, considering the immense projects that have been undertaken. There are times, however, where Army wants to stop remedial processes or LTM when the project is not yet completed.

2. *What effects has cleanup at Devens had on the surrounding community?*

   For people that are following these issues, the impact is huge! For some, it's a great indication of an area that has contamination issues that are being addressed. For others, it may mean just the opposite - a depression of real estate values, for example, for properties adjacent to the boundary of Devens and perhaps subject to arsenic plume in groundwater, or for those who consume what is perceived as PFAS contaminated drinking water.

3. *Are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.*

   Yes. Main concerns currently are about the drinking water contamination caused by PFAS. Previously, focus was on groundwater contamination from Moore Army Airfield (TCE/Arsenic) and arsenic from SHL.

4. *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 provide details.*

   Train spills and accidents - I believe from Pan Am (formerly Guildford RR). Likely trespassing near / on SHL where frisbee golf is played in the woods along the hill adjacent to SHL. Possible homeless shelters along Grove Pond and Plow Shop pond. Also following closely the PFAS contamination issues in groundwater, soils and getting into public water supplies.

5. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site?*

   A lot of land use controls are used, which are cost effective from the Army's perspective, but from an abutter or future real estate sales, NOT ideal.

6. *Do you feel comfortable in the process that Devens is utilizing to keep the contaminants from migrating off site?*

Some of it - see note above about and use controls in Devens, Ayer and Shirley. I am also VERY concerned about the huge PFAS levels recently identified at Moore Army Airfield, traveling toward and likely into the Nashua River.

7. *Do you feel informed about the site's activities and progress?*

   I am about as well informed as any citizen can be, as an active member of PACE. Because RAB meetings now occur only 4X per year, I believe there is a void of knowledge between meetings - where remediation projects are being worked on through the CERCLA process, but we're not around to hear about them.

   We do get the reports, but this does not help highlight the key or problem some issues that come up during the field work or the interpretation of field results, for example.

8. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*

   Outreach to the community could be improved, as discussed in the CIP Update submitted by Laurie Nehring. Proactive outreach to local towns, where BCT members present to town officials such as Boards of Selectmen, Health, Conservation Commission, etc. would be helpful. Also, since Ayer really has no newspaper outlet, recommend the use of social media for info outreach, particularly official sources managed by the Towns.

O&M Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: Shepley's Hill Landfill Arsenic Treatment Plant	**Date: 21 February 2020**	**Time: 11:00 a.m.**
Type: ☐ Telephone ☐ Visit X Other **Location of Visit: Emailed Questionnaire**		
Contact Made By:		
Name: Lynne Klosterman	**Title: Senior Project Geologist**	**Organization: KOMAN Government Solutions, LLC**
Individual Contacted		
Name: Steven Passafaro	**Title: Senior Project Manager**	**Organization: Sovereign Consulting Inc.**
Telephone No.: 508-339-3200 **Fax No.: 508-339-3248** **Email Address: spassafaro@sovcon.com**	**Street Address: 9 Payson Road, Suite 150** **City, State, Zip: Foxborough, MA 02035**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?* My overall impression of the environmental cleanup is that it is appropriate for the nature and extent of the contamination identified at the site.

2. *Is the remedy functioning as expected? How well is remedy performing?* The remedy is functioning and performing as designed.

3. *What does the monitoring data show? Are there trends that show contaminant levels are decreasing?* The monthly influent and effluent data shows that the system is operating as designed and that dissolved arsenic is effectively removed from the raw groundwater prior to discharge from the plant. I am not aware of and therefore cannot comment on the data collected as part of the long-term monitoring conducted at the site.

4. *Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of inspections and activities.* O&M technicians are present at the ATP a minimum of 3 half-days a week. During the week of a clean-in-place which is conducted monthly to maintain the plant's microfilters, O&M technicians are present for two full days and an additional 2 half-days following these activities. If additional maintenance is required due to performance of the system and/or individual system components, the frequency and duration of O&M visits are increased as needed during a week. When technicians are not present, the SCADA system monitors plant functions and calls the lead technician in the event of an alarm.

5. *Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines 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 to system sampling routines as sampling requirements are dictated by MassDevelopment's discharge permit which has not changed in the preceding 5 years. In 2015, two additional microfilters were added which increased the overall effectiveness of the system. Otherwise, there have been no additional significant changes.

6. *Have there been unexpected O&M difficulties or costs at the site in the last five years? Of so, please give details.* In November 2018, the main electrical breaker in the plant unexpectedly failed rendering the system inoperable until a new custom breaker could be fabricated and installed. In June 2019, the PLC on the chlorine dioxide skid also failed, and because the manufacturer no longer produced or could provide support for the PLC, a new unit was obtained, and a new operating system was written. In both cases, the failure was due to normal operational wear and the overall age of the system, and the system was offline for several weeks.

7. *Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.* Normal O&M efforts are continuously evaluated to seek ways to optimize overall operations and maintenance. Currently and since installation of the additional microfilters in 2015, the system is operating at its maximum capacity and efficiency. As noted above, sampling efforts are dictated by the MassDevelopment discharge permit, and these efforts have not changed in the past 5 years.

8. *Do you have any comments, suggestions, or recommendations regarding the project?* No.

Property Owner or Lessee Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: AOC-50 Oxbow National Wildlife Refuge	**Date: 02/13/2020**	**Time: 2:30 pm**
Type: ☐ **Telephone** ☐ **Visit** **X Other** **Location of Visit:**		
Contact Made By:		
Name: Lynne Klosterman	**Title: Senior Project Geologist**	**Organization: Koman Government Solutions, LLC**
Individual Contacted		
Name: Thomas Eagle	**Title: Deputy Project Leader**	**Organization: USFWS Eastern MA NWR Complex**
Telephone No.: 978-579-4027 **Fax No.: 978-443-2898** **Email Address:tom_eagle@fws.gov**	**Street Address: 73 Weir Hill Rd** **City, State, Zip: Sudbury MA 01776**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*
   To be honest I do not know the extent of all of the clean-up that has occurred on the refuge since the USFWS took ownership. I understand there are now concerns regarding PFAS and measures are being taken to address this.

2. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site? (this question only applicable to SHL, DCL, AOC 50 interviewees).*
   No.

3. *Do you feel informed about the site's activities and progress?*
   Yes, we receiver reports and updates.

4. *Are property owners and lessees aware of and complying with ICs?*
   Yes.

5. *Does the property owner/lessee have any plans to drill wells on the property?*
   No.

6. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*
   No.

Property Owner or Lessee Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: AOC 43J	**Date:** 26 February 2020	**Time:** NA
Type: ☐ **Telephone** ☐ **Visit** X **Other** **Location of Visit:** Contacted via email		
Contact Made By:		
Name: Lynne Klosterman	**Title:** Senior Project Geologist	**Organization:** KOMAN Government Solutions, LLC
Individual Contacted:		
Name: Deanna Trudeau	**Title:** Associate Director, EHS	**Organization:** Bristol-Myers Squibb
Telephone No.: 978-588-6946 **Fax No.:** NA **Email Address:** Deanna.Trudeau@bms.com	**Street Address:** 38 Jackson Road **City, State, Zip:** Devens, MA 01434	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

   The Army is following the CERCLA process and collaborating with EPA and MassDEP. Cleanup is ongoing under MassDevelopment who is also collaborating with EPA and MassDEP.

2. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site? (this question only applicable to SHL, DCL, AOC 50 interviewees)*

   Not Applicable.

3. *Do you feel informed about the site's activities and progress?*

   Yes, I receive periodic email updates about the site activities and progress. The site also receives periodic site visits for well sampling. In addition, BMS recently hosted a MassDevelopment Oxygen Biochem pilot injection program to decrease compounds of concern. The managing consultant includes me on distribution for correspondence, reports, and other updates around the remediation activities.

4. *Are property owners and lessees aware of and complying with ICs?*

   Yes, Institutional controls are written into the MassDevelopment and Devens Enterprise Commission rules and regulations for the area.

5. *Does the property owner/lessee have any plans to drill wells on the property?*

   No

6. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*

   No other comments, suggestions, or recommendations regarding the work conducted at Devens.

Property Owner or Lessee Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **AOC 69W (Francis W. Parker Charter Essential School)**	**Date:** **2/14/20**	**Time:** **12:30 pm**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: N/A**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Project Geologist**	**Organization:** **KGS**
Individual Contacted		
Name: **Michelle McKenna**	**Title:** **Business Manager**	**Organization:** **Francis W. Parker Charter Essential School**
Telephone No.: 978-772-3293 Ext. 113 **Fax No.:** **Email Address: mmckenna@theparkerschool.org**	**Street Address: 49 Antietam Street** **City, State, Zip: Devens, MA 01434**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?* The Army has been responsive and informative.

2. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site? (this question only applicable to SHL, DCL, AOC 50 interviewees).* Not applicable to AOC 69W.

3. *Do you feel informed about the site's activities and progress?* Yes.

4. *Are property owners and lessees aware of and complying with ICs?* Yes.

5. *Does the property owner/lessee have any plans to drill wells on the property?* No.

6. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens*? No additional comments.

Property Owner or Lessee Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: Shepley's Hill Landfill	Date: March 3, 2020	Time: 0926
Type: X Telephone Location of Visit: not applicable	☐ Visit	☐ Other
Contact Made By:		
Name: Lynne Klosterman	Title: Senior Project Geologist	Organization: Koman Government Solutions, LLC
Individual Contacted		
Name: [redacted]	Title: Property owner [redacted]	Organization:
Telephone No.: [redacted] Fax No.: Email Address: [redacted]	Street Address: [redacted] City, State, Zip: [redacted]	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*
   From a neighbor perspective, it has been quiet since the drilling approximately 3 years ago with the exception that a vacuum truck comes every other Tuesday to the treatment plant from 7:30 to 10:30 am and makes a lot of noise cleaning out the filters. It would be better for the neighborhood if the vacuum truck could come later in the morning to clean out the filters at the treatment plant. Overall, the environmental cleanup at SHL is fine. I want the landfill to remain a quiet area, and maintain the diverse wildlife habitat there. We have spotted hawks, foxes, deer, rabbits, coyotes, wild turkeys, bobcats and bear on the landfill.

2. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site? (this question only applicable to SHL, DCL, AOC 50 interviewees)*
   Yes. I understand the extraction wells are extracting arsenic groundwater and treating the water at the plant.

3. *Do you feel informed about the site's activities and progress?*
   I asked to be contacted by email prior to any large activity at the landfill or mowing of the landfill.

4. *Are property owners and lessees aware of and complying with Institutional Controls (ICs)?*
   Yes, I am aware of institutional controls.

5. *Does the property owner/lessee have any plans to drill wells on the property?* No.

6. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*
   If there is large vehicle activity, I suggest construction crews enter from the South gate of landfill. Also please don't cut trees down near property line unless consultation with me first. Please consult/email before activities start when possible.

Property Owner or Lessee Questionnaire

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **South Post Impact Area**	**Date:** **10 February 2020**	**Time:** **13:20**
Type: ☐ **Telephone** ☐ **Visit** **X** **Other** **Location of Visit: Contacted via email.**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Geologist**	**Organization:** **KOMAN Government Solutions LLC**
Individual Contacted		
Name: **Suzanne Richardson**	**Title:** **Natural Resource Specialist**	**Organization:** **Fort Devens, DPW**
Telephone No.: 978-615-6086 **Fax No.: NA** **Email Address: suzanne.f.richardson2.civ@mail.mil**	**Street Address: 30 Quebec Street,** **City, State, Zip: Devens, MA, 01434**	

1. *What is your overall impression of the environmental cleanup at the Former Fort Devens Army Installation (Devens)?*

I only have detailed knowledge of the environmental cleanup associated with the South Post Impact Area (SPIA) as it is the only open CERCLA site on the current United States Army Garrison (USAG) Fort Devens property. In my role at the USAG Fort Devens Directorate of Public Works (DPW) I'm responsible for overseeing compliance with the 1996 Record of Decision (ROD) issued by the EPA for the SPIA. My overall impression of the environmental cleanup of the SPIA is that the long term monitoring of the site established as the remedy in the 1996 ROD is protective of human health and the environment as documented annually in the long term monitoring reports.

I have a general situational awareness of the other sites associated with Former Fort Devens but no detailed knowledge. My overall impression of the larger cleanup process for Former Fort Devens is that the Army is proactive and diligent in ensuring it's compliance with both the letter and the spirit of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

2. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site? (this question only applicable to SHL, DCL, AOC 50 interviewees)*

Not Applicable.

3. *Do you feel informed about the site's activities and progress?*

Yes, I feel that I am adequately informed of the site activities and progress.

4. *Are property owners and lessees aware of and complying with ICs?*

Yes, the property owner is aware of and in compliance with all Institutional Controls (IC'S) established in the ROD for the SPIA. Compliance is overseen by the DPW Environmental Division and enforced through the Garrison's National Environmental Protection (NEPA) compliance program that requires all proposed activities have a Record of Environmental Consideration (REC) approved by the DPW Environmental Division prior to any action taking place.

5. *Does the property owner/lessee have any plans to drill wells on the property?*

The USAG Fort Devens DPW does not have any plans to drill any additional wells on the current USAG Fort Devens property at this time. USAG Fort Devens South Post has an existing series of monitoring wells located inside the SPIA monitored area. USAG Fort Devens South Post also has a series of drinking water wells located outside of the SPIA monitored area that are permitted by MassDEP as transient non-community public drinking water system.

6. *Do you have any other comments, suggestions or recommendations regarding the work conducted at Devens?*

I do not have any other comments, suggestions or recommendations regarding the work conducted at Devens.

Routinely communication is provided by the Army and Army contractor (KGS) on various aspects of the Devens and SHL sites. No site visits or inspections have been necessary by our office. Annual reporting and quarterly RAB meetings are the primary ways for receiving communications from the Army.

5. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   A complaint from a Sculley Road neighbor indicated that the Army contractors damaged the road and would the Army fix it. However the Town responded that it was not an Army concern.

6. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site?*

   Yes. I am familiar with the pump and treat system at SHL with two extraction wells removing groundwater and treating for arsenic at the treatment plant.

7. *Do you feel comfortable in the process that Devens is utilizing to keep the contaminants from migrating off site?*

   Yes.

8. *Do you feel informed about the site's activities and progress?*

   Yes.

9. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

   No, however, in general, it seems to take a long time (i.e. from the paperwork trail) to seeing site results at Devens.

Federal, State, Local Authority Questionnaire – Short Form

FIVE YEAR REVIEW INTERVIEW RECORD		
Former Fort Devens Army Installation		
Site Name: **Shepley's Hill Landfill (SHL)**	**Date:** **March 10, 2020**	**Time:** **2:26 pm**
Type: X Telephone ☐ **Visit** ☐ **Other** **Location of Visit: Not Applicable**		
Contact Made By:		
Name: **Lynne Klosterman**	**Title:** **Senior Project Geologist**	**Organization:** **Koman Government Solutions, LLC**
Individual Contacted		
Name: **Mark Wetzel**	**Title:** **Department of Public Works, Superintendent**	**Organization:** **Town of Ayer**
Telephone No.:978-772-8240 **Fax No.: 978-772-8244** **Email Address: mwetzel@ayer.ma.us**	**Street Address: 25 Brook Street** **City, State, Zip: Ayer, MA 01432**	

1. *What is your overall impression of the project at the Former Fort Devens Army Installation (Devens)?*

   Operations at SHL are fine. Good presentations at RAB meetings and a clear understanding of who is doing what.

2. *What effects has cleanup at Devens had on the surrounding community?*

   The effects of the SHL cleanup is not a major issue with community directly but there are community groups focused on SHL. No negative impacts on cleanup to community.

3. *Are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.*

   When the LUCs first came out the community had concerns in what it meant to property owners and their property rights. No private wells have been installed within the LUCs and all property within the LUCs is serviced by the Town of Ayer water department.

4. *Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please provide the purpose and results.*

Routinely communication is provided by the Army and Army contractor (KGS) on various aspects of the Devens and SHL sites. No site visits or inspections have been necessary by our office. Annual reporting and quarterly RAB meetings are the primary ways for receiving communications from the Army.

5. *Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please provide details.*

   A complaint from a Sculley Road neighbor indicated that the Army contractors damaged the road and would the Army fix it. However the Town responded that it was not an Army concern.

6. *Are you familiar with the various processes that Devens is utilizing to contain the contamination on site?*

   Yes. I am familiar with the pump and treat system at SHL with two extraction wells removing groundwater and treating for arsenic at the treatment plant.

7. *Do you feel comfortable in the process that Devens is utilizing to keep the contaminants from migrating off site?*

   Yes.

8. *Do you feel informed about the site's activities and progress?*

   Yes.

9. *Do you have any other comments, suggestions or recommendations regarding the site's management or operations?*

   No, however, in general, it seems to take a long time (i.e. from the paperwork trail) to seeing site results at Devens.

APPENDIX C – Shepley's Hill Landfill

C.1 Shepley's Hill

Additional Background Information

Chronology of Events for Shepley's Hill Landfill

Event	Date
The Army initiates the Fort Devens Sanitary Landfill Closure Plan	1984
Fort Devens placed on NPL	December 1989
Waste disposal at Shepley's Hill Landfill (SHL) ends	July 1992
Landfill (LF) capping complete	May 1993
Remedial Investigation (RI) and Supplemental RI complete	December 1993
Feasibility Study (FS) complete	February 1995
Record of Decision (ROD) complete	September 1995
Long-Term Monitoring and Maintenance (LTMM) Plan complete	May 1996
Long-Term Monitoring begins	November 1996
Final SHL Capping Closure Report	March 1996
ROD Contingency Remedy 60% extraction design complete	November 1997
First SHL Five-Year Review (FYR) Report	August 1998
Second Five-Year Statutory Review Report	September 2000*
Supplemental Groundwater (GW) Investigations complete	May 2003
Draft Explanation of Significant Differences (ESD)	February 2004
Draft Final 60% and Draft 100% Extraction Design complete	September 2004
Performance Work Statement for Comprehensive Site Assessment (CSA) and Corrective Action Alternatives Analysis (CAAA)	March 2005
Contingency Remedy – Remedial Design/Remedial Action Work Plan 100% submittal for SHL GW Extraction, Treatment, and Discharge	May 2005
Final ESD for implementation of the Contingency Remedy	June 2005
SHL Contingency Remedy construction complete and start-up and testing of GW Extraction, Treatment, and Discharge System	August 2005
Third FYR Report	September 2005
SHL Contingency Remedy Long-Term Operations, Maintenance, and Monitoring commences	March 2006
Final Scope of Work for SHL Supplemental GW & LF Cap Assessment for LTMM (formerly CSA) to address Third FYR findings	May 2007
SHL Contingency Remedy – GW extraction pumping rate increased from 25 gallons per minute (gpm) to 45-50 gpm	June 2007
Draft Final SHL Supplemental GW & LF Cap Assessment for LTMM Report (SAR) completed	June 2009
Draft Focused FS for SHL Remedy Update (formerly CAAA)	September 2009
Fourth FYR for SHL	September 2010
Withdrawal of the Draft Final FFS	November 2011
Complete construction for SHL barrier wall	September 2012
Final Removal Action Completion Report for SHL barrier wall	July 2013
Final ESD – Land Use Controls to restrict groundwater use in NIA	December 2013
Final Land Use Control Implementation Plan (LUCIP) for implementing Land Use Controls in NIA	August 2014

Event	Date
LUCIP-directed Door-to-door Survey of residences in NIA	November 2014
Draft Final LTMMP Update	April 2015
Fifth FYR for SHL	September 2015
Draft SHL GW Flow Model Revision Report	September 2016
Draft Final LTMMP Update	December 2016
Former Fort Devens Installation- Dispute Resolution 2015 Devens FYR Report, EPA SOW Attachment 1, Phase I: 1d, 2c, and 3c	July-September 2017
SHL Monitoring Well Survey	November 2017
SHL LTMMP – Addendum	January 2018
SHL/ DCL Monitoring Well Survey	February 2018
SHL Groundwater Model Update Interim Submittal	May 2018
LUCIP-directed Door-to-door Survey of residences in NIA	September 2019
Draft Final SHL GW Flow Model Revision Report	November 2019
Final 2018 Annual Operations, Maintenance and Monitoring Report	February 2020
Draft 2019 Annual Operations, Maintenance and Monitoring Report	April 2020
Sixth FYR for SHL	September 2020

Physical Characteristics

SHL encompasses approximately 84 acres of the 9,600-acre Fort Devens Military Reservation and is situated in the northeast corner of the Main Post. As shown on the Ayer Quadrangle surficial geology map from the early 1940s, the SHL area was elongated in a north-south orientation along a pre-existing small valley containing at least two mapped swampy areas lying between the bedrock outcrop of Shepley's Hill to the west and a kame terrace (i.e. flat-topped glaciofluvial deposit) with an elevation of approximately 250 feet to the east, next to Plow Shop Pond (HLA, 2000). During landfilling activities, the valley was filled in and much of the kame terrace may have been used as cover material (HLA, 2000).

According to the Final Soil Arsenic Background Study at Former Fort Devens – Devens, Massachusetts (US Army, 2005), the geologic setting of the Fort Devens area include Paleozoic metasedimentary, metavolcanic, and granitic intrusive rocks that are believed to contain sulfidic minerals of manganese, nickel, and arsenic. In the vicinity of the Fort Devens site, coarse glacial sediments that have experienced little reworking are expected to contain background arsenic concentrations of approximately 17.5 mg/kg (US Army, 2005).

Land and Resource Use

SHL is situated between the bedrock outcropping of Shepley's Hill to the west and Plow Shop Pond to the east. To the north of SHL are a low-lying wooded wetlands and the Fort Devens Reservation boundary. Nonacoicus Brook, which drains Plow Shop Pond, also flows through this wooded wetland area and represents an important site feature. The southern portion of SHL borders the Defense Reutilization and Marketing Office (DRMO) yard, motor repair shops, and a warehouse. The Fort Devens Reuse Plan specifies that Army land bordering Plow Shop Pond is zoned for open space and rail-related uses.

History of Contamination

Contaminant History Landfill operations at SHL began as early as 1917 although field evidence suggests that glass shards obtained from trenches in the northwest portion of the landfill may have dated back to the mid-1800s (ABB-ES, 1995). The principal waste streams included incinerator ash, household garbage, glass, construction debris, asbestos-containing wastes, and spent shell casings. During the last few years of operation, approximately 6,500 tons per year of household refuse and garbage were disposed of in SHL.

Following the BRAC-related closure of Fort Devens in 1990, the Army began investigations at SHL to determine the nature and extent of contamination in impacted environmental media. Three AOCs were identified including AOC4 – the sanitary refuse incinerator, AOC5 – sanitary landfill No. 1, and AOC18 – the asbestos cell. All three AOCs are collectively referred to as SHL. A brief description of the salient contents and key timeframes associated with these AOCs is summarized as follows (ABB-ES, 1995):

- AOC4: the former sanitary refuse incinerator was located in former Building 38 near the end of Cook Street and within the 50-acre is closed in Phase I of the landfill capping sequence. The former incinerator was constructed in 1941, burned household refuse, and reportedly operated until the late 1940s. Incinerator ash was disposed of in the landfill and, in September 1967, the incinerator itself was demolished and buried in the landfill. The foundation for the former incinerator building was demolished and disposed of in the landfill in 1976.
- AOC5: refers to Sanitary Landfill No. 1 or SHL, primarily the areas closed in Phases I-III of the landfill capping sequence. Landfill operations were conducted over the timeframe from circa 1917 until July 1, 1992. Primary wastes received included household refuse, glass, construction debris, incinerator ash, and spent shell casings.
- AOC18: refers to the asbestos cell and is situated in the section of SHL closed during Phase IV of the landfill capping sequence. Between March 1982 and November 1985, an estimated 6.6 tons of asbestos-containing construction debris was disposed of in the area of SHL closed during Phase IV-A. Between 1990 and July 1992, a second asbestos waste cell was operated in the section of SHL closed during Phase IV-B.

Initial Response

To mitigate the potential for off-site impacts attributable to SHL, the Army initiated the Fort Devens Sanitary Landfill Closure Plan in 1984 in accordance with Massachusetts regulations entitled "The Disposal of Solids Wastes by Sanitary Landfill" (310 CMR 19.00; April 21, 1971). The Massachusetts Department of Environmental Protection (MassDEP) approved the closure plan in 1985 which contained the following requirements:

- Grading the landfill surface to a minimum 2 percent slope in non-operational areas of the landfill and 3 percent in operational areas;
- Removing waste from selected areas within 100 feet of the 100-year floodplain;
- Installing a gas venting system;
- Installing a low permeability cap and covering the cap with sand, gravel, loam, and seeding to provide cover vegetation and prevent erosion; and
- Implementing a groundwater monitoring program based on sampling five existing

monitoring wells every four months.

Capping activities were completed in phases over the timeframe of 1986 to 1993 as shown in Figure 2.2, Appendix C of the revised Shepley's Hill Landfill Supplemental Groundwater Investigation Report (Harding ESE, 2003) and as Figure 1-2 in the 2005 FYR, and summarized as follows (ABB-ES, 1995):

- Phase I: October 1986 – 50 acres;
- Phase II: November 1987 – 15 acres;
- Phase III: March 1989 – 9.2 acres; and
- Phase IV: 10 acres closed in two stages, IV-A in 1991 and IV-B in July 1992 although the geomembrane cap was not completed over stage IV-B until May 1993.

On July 21, 1995, the Army submitted a draft closure plan to MADEP pursuant to 310 CMR 19.000 to document that SHL was closed in accordance with plans and applicable regulatory requirements. Following a review by MADEP and implementation of specific recommendations regarding issues of concern, the Army submitted the final closure report for SHL pursuant to 310 CMR 19.000 in March 1996 and the Long Term Monitoring and Maintenance Plan in May 1996. Key elements of the implemented closure and associated infrastructure included the following (ABB-ES, 1995):

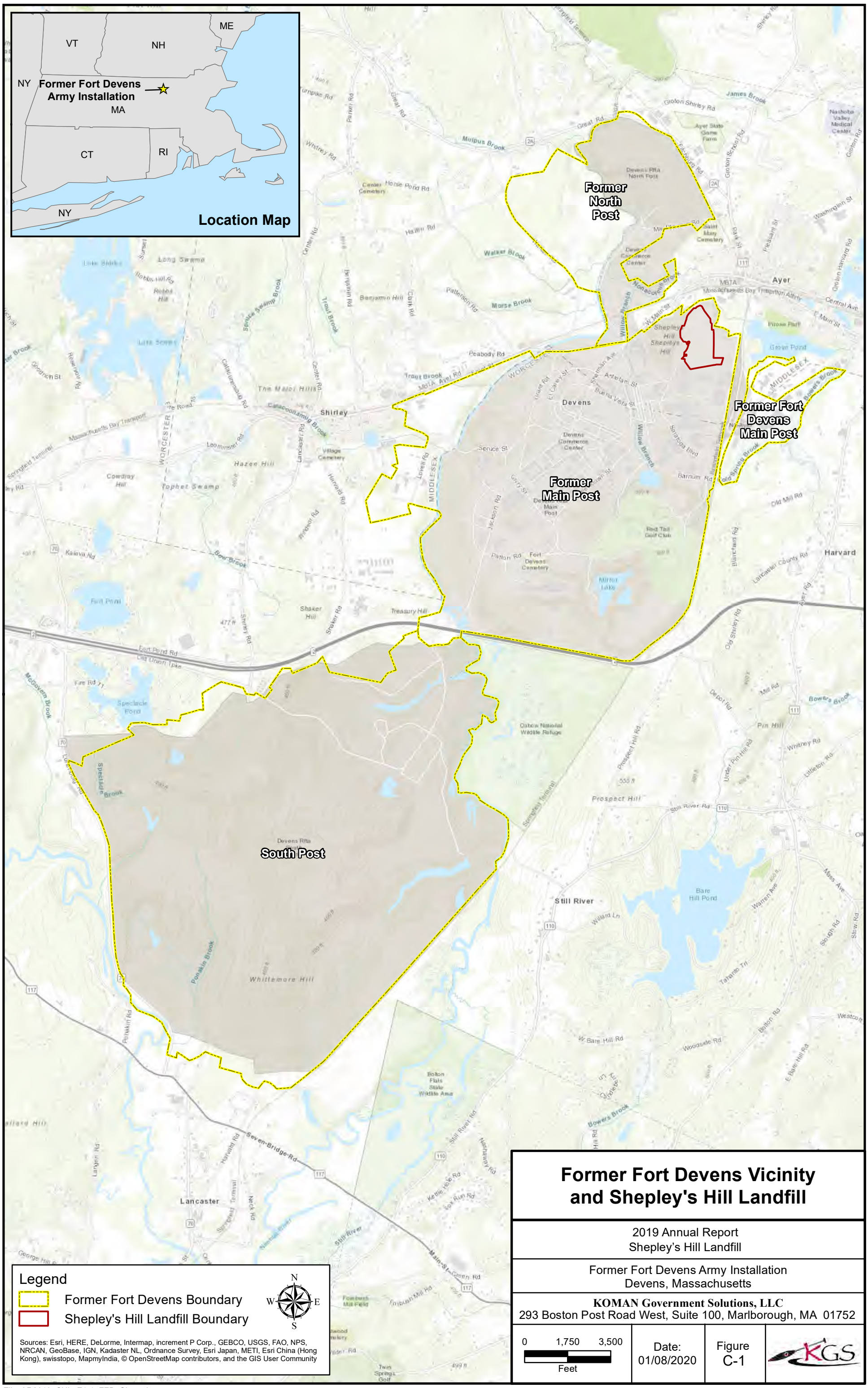
- Phases I through III of the closure were completed with 2-3 percent grades, because of the large area and shallow surface slopes of the existing landfill, but the slope was increased to 5 percent in the Phase IV-B closure;
- The capping system for Phases I through IV-A included a 30-mil polyvinyl chloride (PVC) geomembrane liner overlain by a 12-inch drainage layer and a 6-inch topsoil layer;
- The capping system for Phase IV-B, at the request of MassDEP, featured a thicker 40-mil PVC geomembrane liner overlain by a 6-inch drainage layer and a 12-inch topsoil layer;
- The landfill gas (LFG) collection system utilized for all closure Phases included 3-inch diameter gas collection pipes bedded in a minimum 6-inch thick venting layer installed beneath the PVC geomembrane;
- Gas vents were installed through the PVC geomembrane and were located at 400 foot centers; and
- By 1986, groundwater monitoring infrastructure at SHL included a total of nine wells, including five wells requested by USEPA and MassDEP to supplement the original four.

Following listing on the NPL and cessation of landfilling activities, the Army conducted a Remedial Investigation (RI) at SHL (E&E, 1993) and a then Supplemental RI (ABB-ES, 1993). These investigations determined that the primary environmental risk at SHL included human exposure to arsenic-containing groundwater and potential ecological risks to aquatic and semi-aquatic receptors exposed to surface water and sediments from Plow Shop Pond. A Feasibility Study (FS) was conducted in 1995 to evaluate potential remedies to reduce potential human exposure risks to arsenic-containing groundwater at SHL. In September 1995, the ROD for SHL operable unit was finalized by the Army, USEPA, and MassDEP. Also in 1995, the Plow Shop

Pond operable unit, designated as AOC-72 by the Army, was established to manage risks associated with exposure to arsenic-impacted sediments and surface waters at Plow Shop Pond.

C.2 Shepley's Hill

Figures



Former Fort Devens Vicinity and Shepley's Hill Landfill

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Shepley's Hill Landfill

Former Fort Devens Army Installation
Devens, Massachusetts

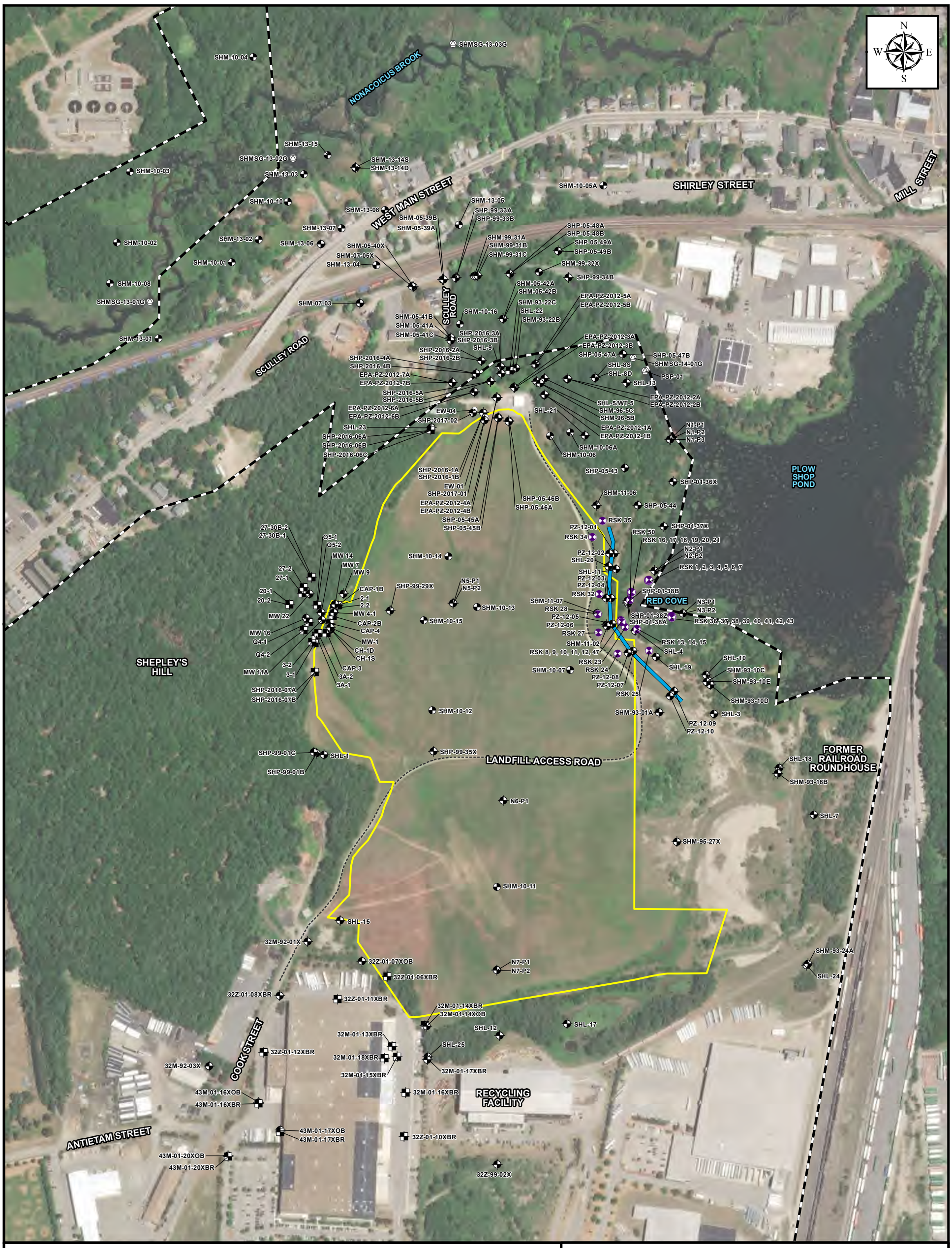
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 1,750 3,500
Feet

Date: 01/08/2020

Figure C-1

File: AR2019_SHL_F1-1_FFD_SL.mxd



Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Barrier Wall
- Landfill Access Road
- Shepley's Hill Landfill Boundary
- Former Fort Devens Boundary

References: LTMMP Update (Sovereign, 2015)

AerialSource: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

North Impact Area and Shepley's Hill Landfill Site Plan

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Shepley's Hill Landfill

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Devens, Massachusetts

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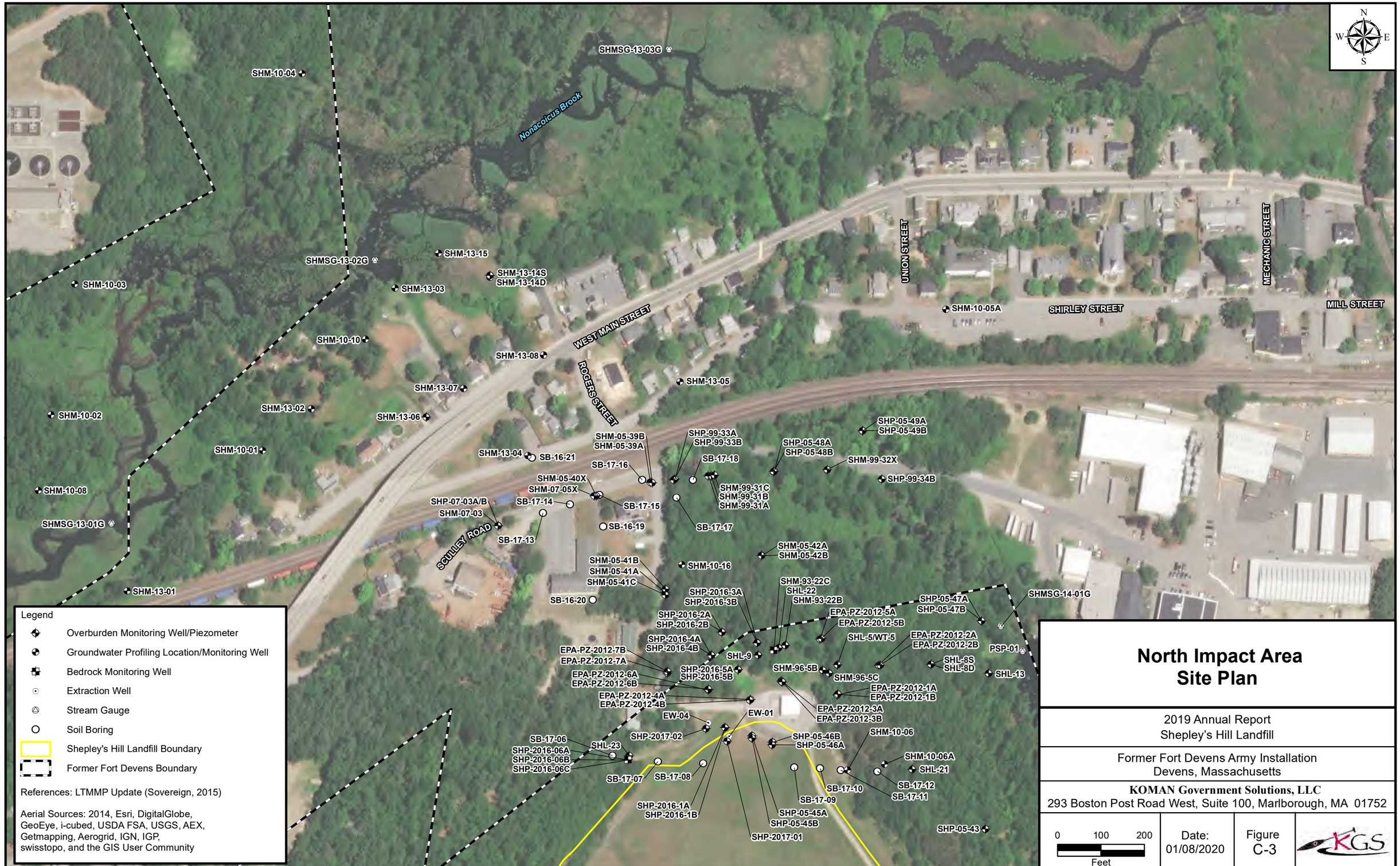
0 200 400
Feet

Date: 01/08/2020

Figure C -2

File: AR2019_SHL_F1-2_SITEPLAN.mxd



North Impact Area Site Plan

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Shepley's Hill Landfill

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Devens, Massachusetts

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Date: 01/08/2020

Figure C-3

File: AR2019_SHL_F1-3_NIA_SITEPLAN.mxd

Area of Land Use Controls

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Shepley's Hill Landfill

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Devens, Massachusetts

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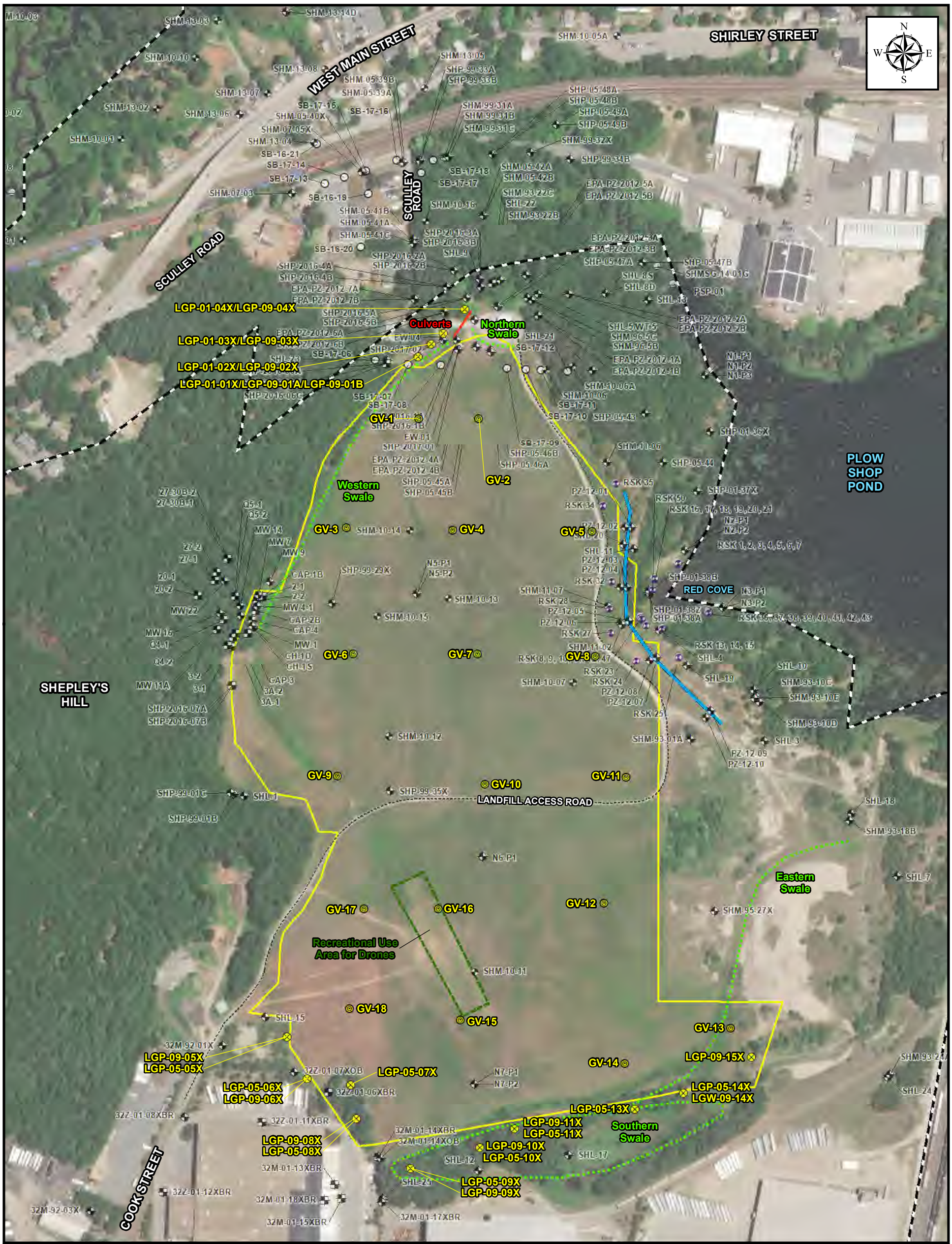
Figure C-4

File: AR2019_SHL_F1-4_LUC.mxd



Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Soil Boring
- Gas Vent
- Gas Probe
- Culvert
- Drainage Swale
- Landfill Access Road
- Barrier Wall
- Recreational Use Area for Drones
- Shepley's Hill Landfill Boundary
- Former Fort Devens Boundary

References: LTMMP Update (Sovereign, 2015)

AerialSource: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Shepley's Hill Landfill Gas Probes and Vents

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Devens, Massachusetts

KOMAN Government Solutions, LLC
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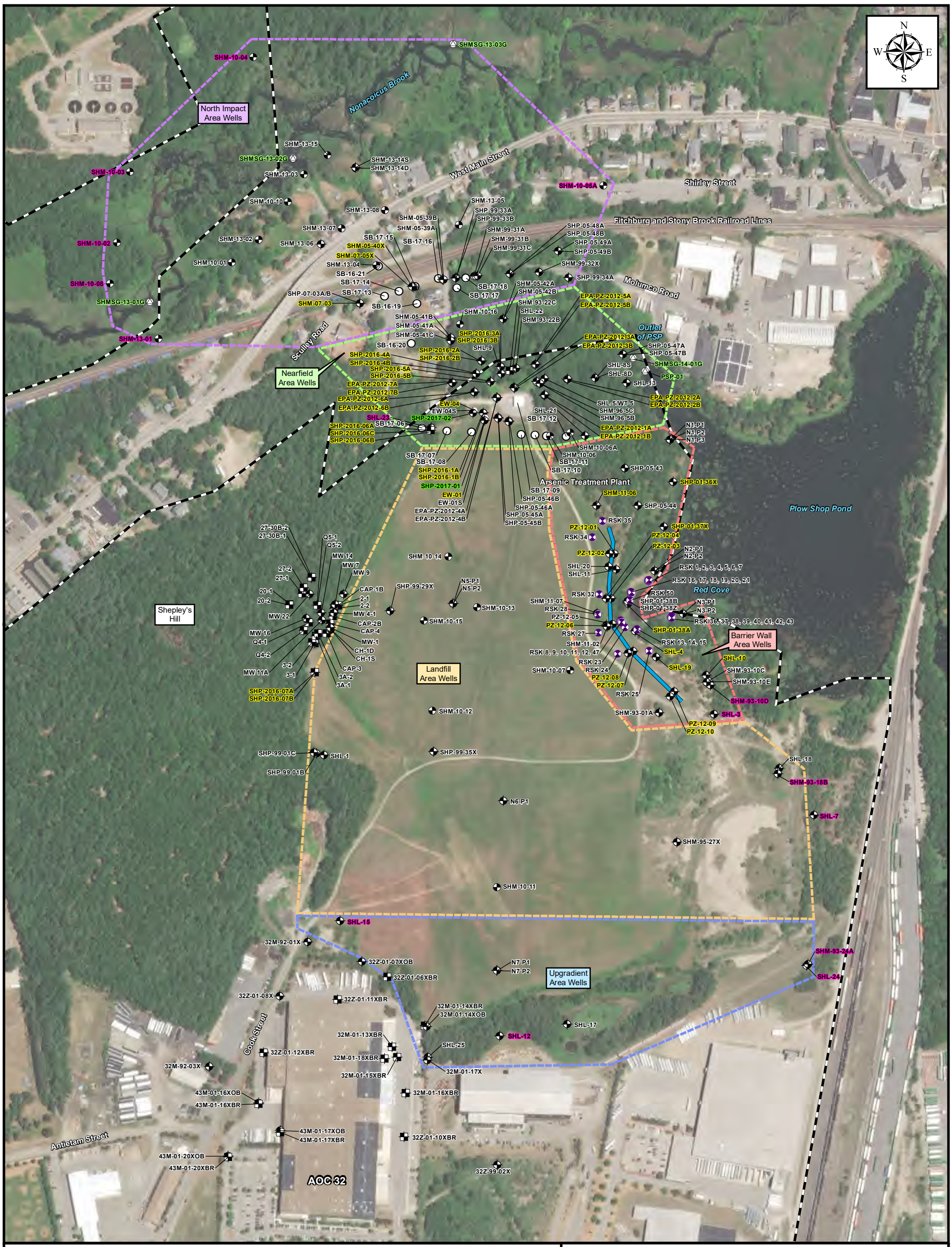
0 150 300 Feet

Date: 01/08/2020

Figure C-5

File: AR2019_SHL_F2-1_GASPTS.mxd



Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Soil Boring
- Barrier Wall
- Former Fort Devens Boundary

PZ-12-07	Well/Boring/Gauge Identification
SHM-13-01	LTM Well/Piezometer Annual Sampling (Fall)
SHL-10	LTM Well/PiezometerSemi-Annual Sampling (Spring/Fall)
SHP-99-01B	LTM Well/Piezometer Hydraulic Monitoring Only

References: LTMMP Update (Sovereign 2015) and selected EPA Added wells for 2017

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Long-Term Monitoring Well Network

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Shepley's Hill Landfill

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Devens, Massachusetts

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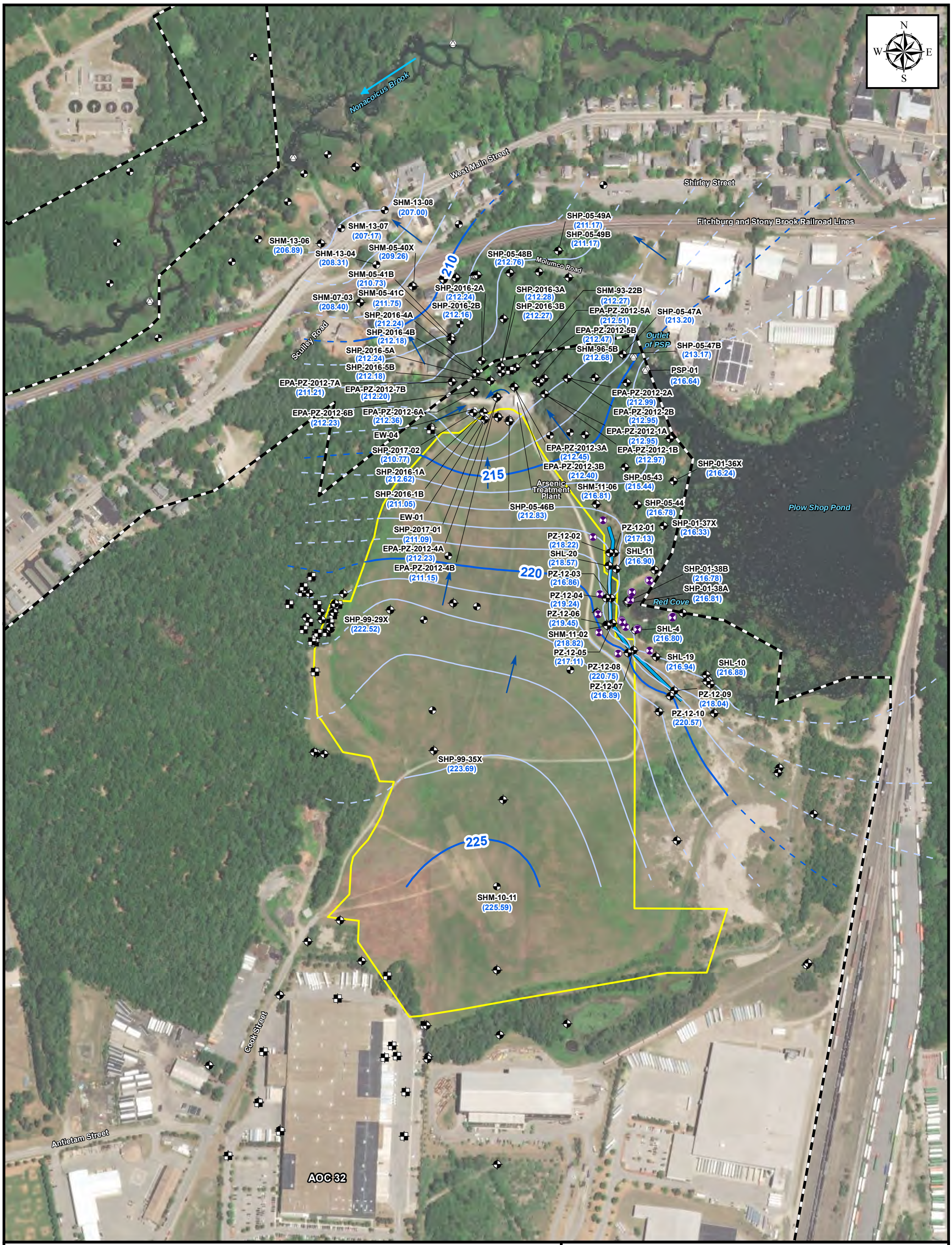
0 200 400
Feet

Date: 01/08/2020

Figure C-6

KGS

File: AR2019_SHL_F5-1_LTM.mxd



Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Barrier Wall
- Shepley's Hill Landfill Boundary
- Former Fort Devens Boundary
- (209.26) Groundwater Elevation - April 11, 2019
- Contour (5 Foot Interval)
- Contour (1 Foot Interval)
- Inferred Contour (5 Foot Interval)
- Inferred Contour (1 Foot Interval)
- Groundwater Flow Direction
- Surface Water Flow Direction

Notes:
1) Combined pumping rate of EW-01 and EW-04 on April 11, 2019 was 54.5 gpm.
2) Water levels plotted used average value of the cluster wells in creating the contour figure.

Aerial: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Groundwater Elevations April 11, 2019 North Impact Area and Shepley's Hill Landfill

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Shepley's Hill Landfill

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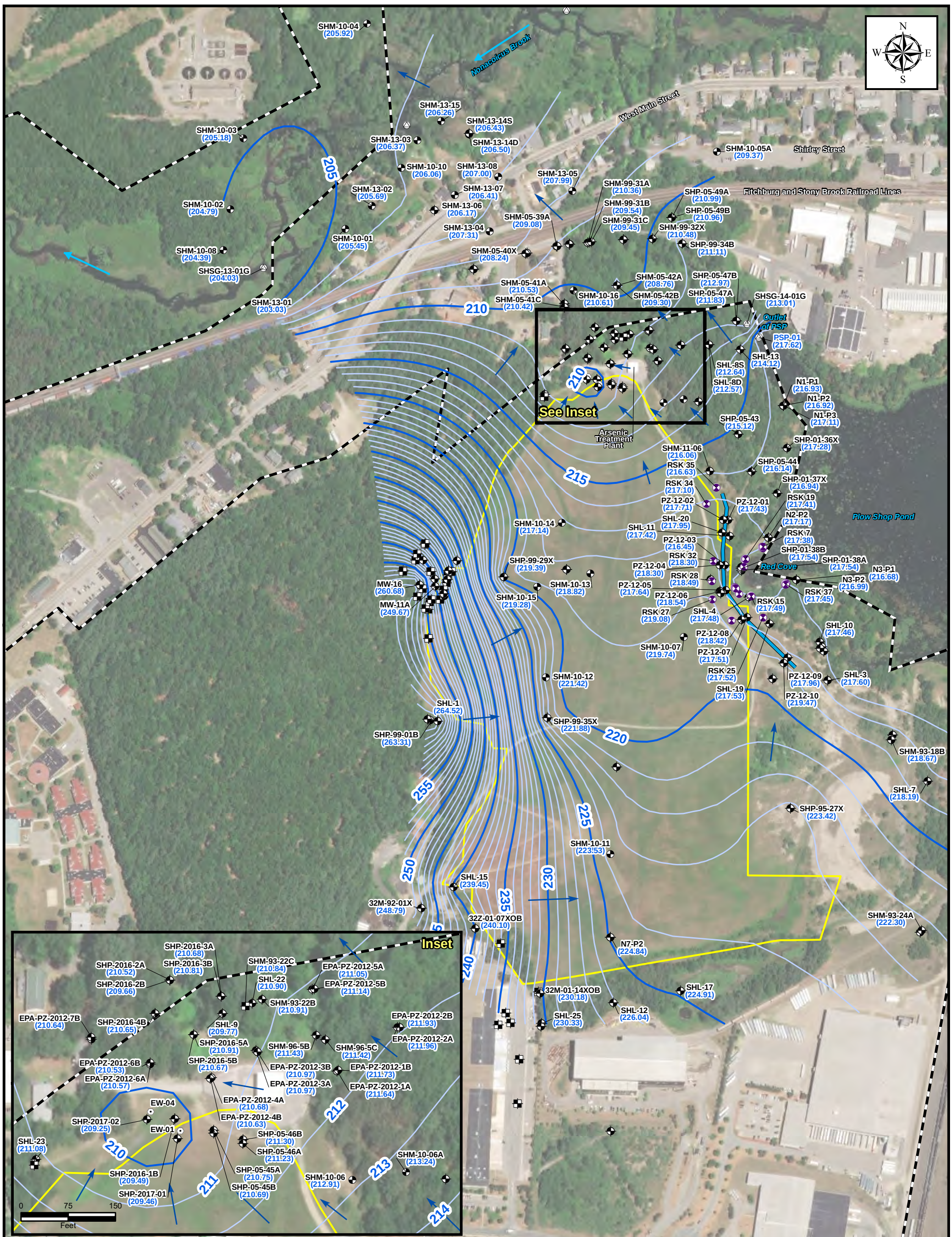
0 200 400
Feet

Date: 03/25/2020

Figure C - 7

File: AR2019_SHL_F5-2_GWC_April2019.mxd



Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Barrier Wall
- Shepley's Hill Landfill Boundary
- Former Fort Devens Boundary
- (213.24) Groundwater Elevation - October 22, 2019
- Contour (5 Foot Interval)
- Contour (1 Foot Interval)
- Inferred Contour (5 Foot Interval)
- Inferred Contour (1 Foot Interval)
- Groundwater Flow Direction
- Surface Water Flow Direction

Notes:
1) Combined pumping rate at EW-01 and EW-04 on October 22, 2019 was 53.4 gpm.
2) Water levels plotted used average value of the cluster wells in creating the contour figure.

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Groundwater Elevations October 22, 2019 North Impact Area and Shepley's Hill Landfill

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Shepley's Hill Landfill

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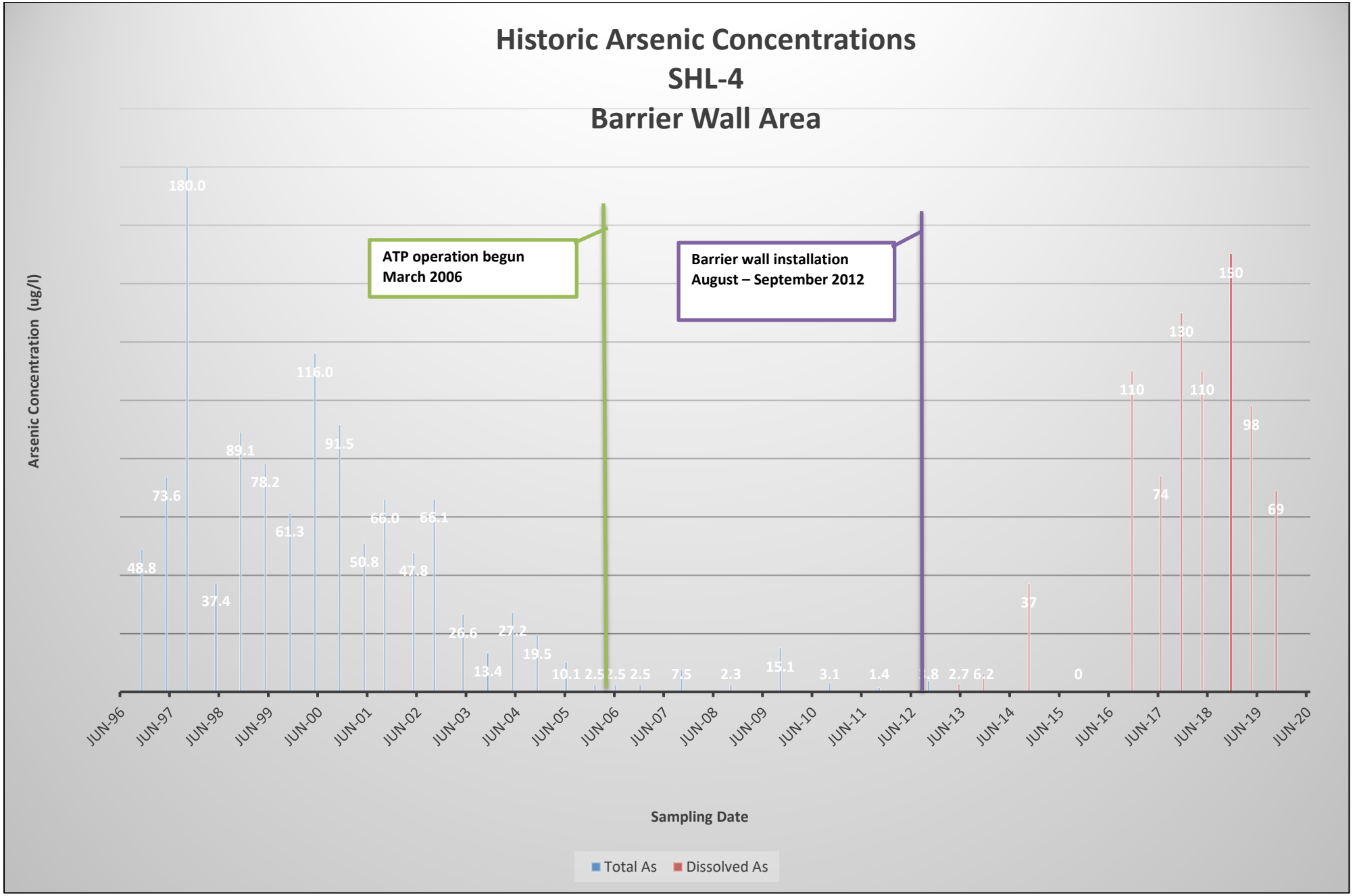
Date: 04/15/2020

Figure C-8

File: AR2019_SHL_F5-3_GWC_Oct2019_V2.mxd


Historic Arsenic Concentrations
SHL-4
Barrier Wall Area
Arsenic Concentration (ug/l)
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
48.8
73.6
180.0
37.4
89.1
78.2
61.3
116.0
91.5
50.8
66.0
47.8
66.1
26.6
13.4
27.2
19.5
10.1
2.5
2.5
2.5
7.5
2.3
15.1
3.1
1.4
2.7
6.2
37
0
110
74
130
110
150
98
69
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
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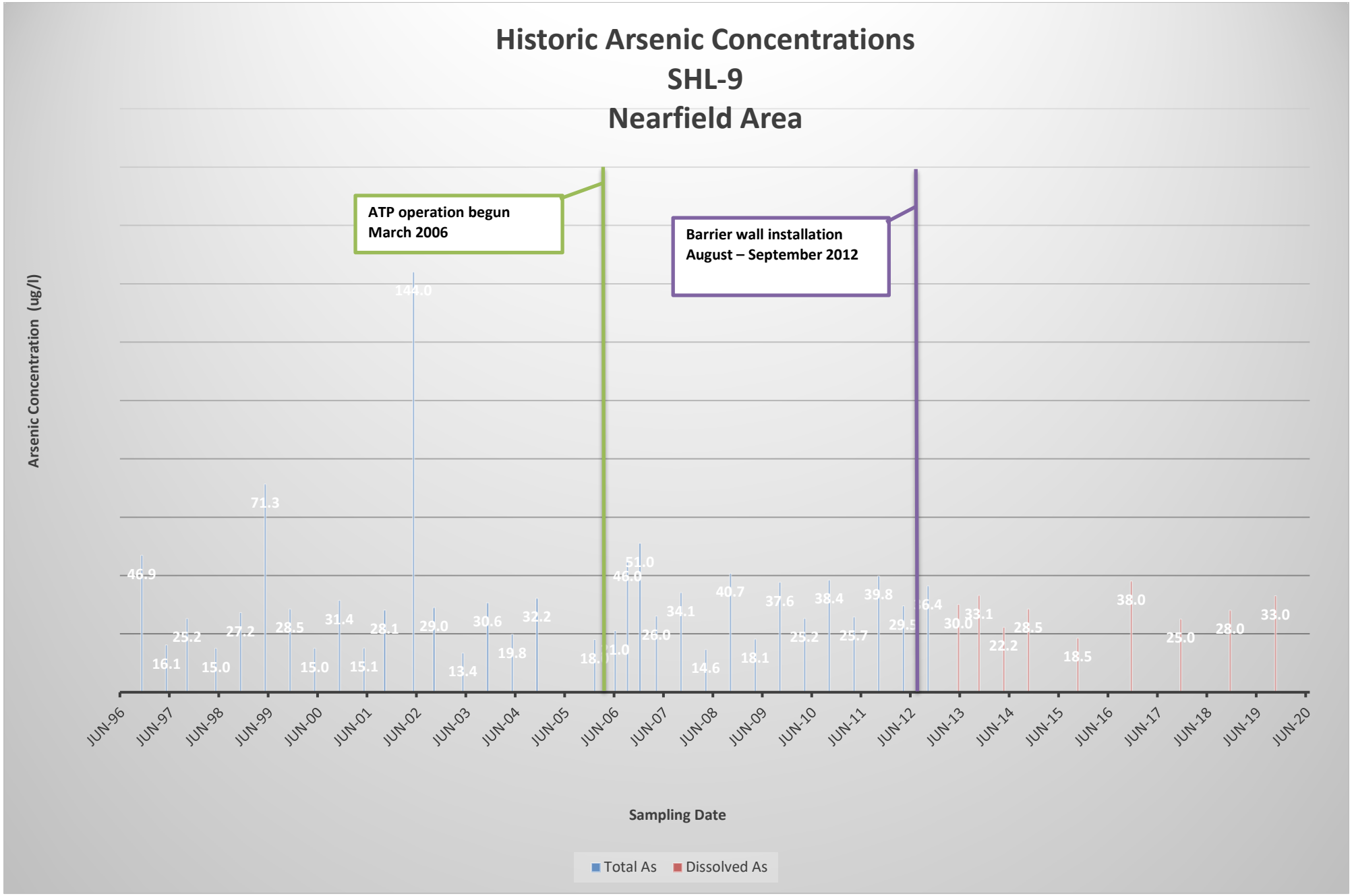
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHL-9
Nearfield Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
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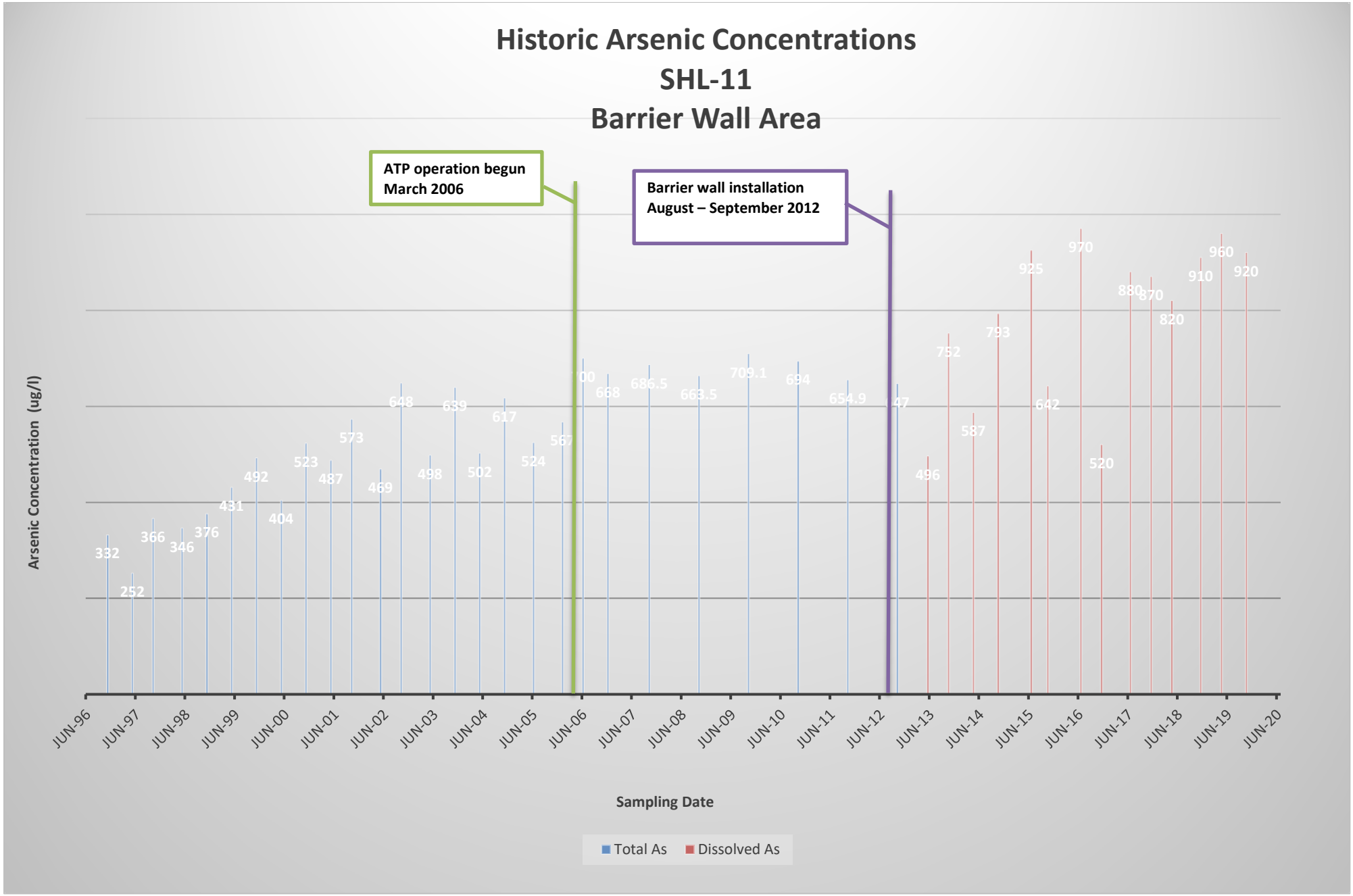
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
46.9
16.1
25.2
15.0
27.2
71.3
28.5
15.0
31.4
15.1
28.1
144.0
29.0
13.4
30.6
19.8
32.2
51.0
46.0
26.0
34.1
14.6
40.7
18.1
37.6
25.2
38.4
25.7
39.8
30.0
33.1
22.2
28.5
18.5
38.0
25.0
28.0
33.0


Historic Arsenic Concentrations
SHL-11
Barrier Wall Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
332
252
366
346
376
431
492
404
523
487
573
469
648
498
639
502
617
524
567
668
686.5
663.5
709.1
684
654.9
496
752
587
793
925
642
970
520
880
870
820
910
960
920
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
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JUN-11
JUN-12
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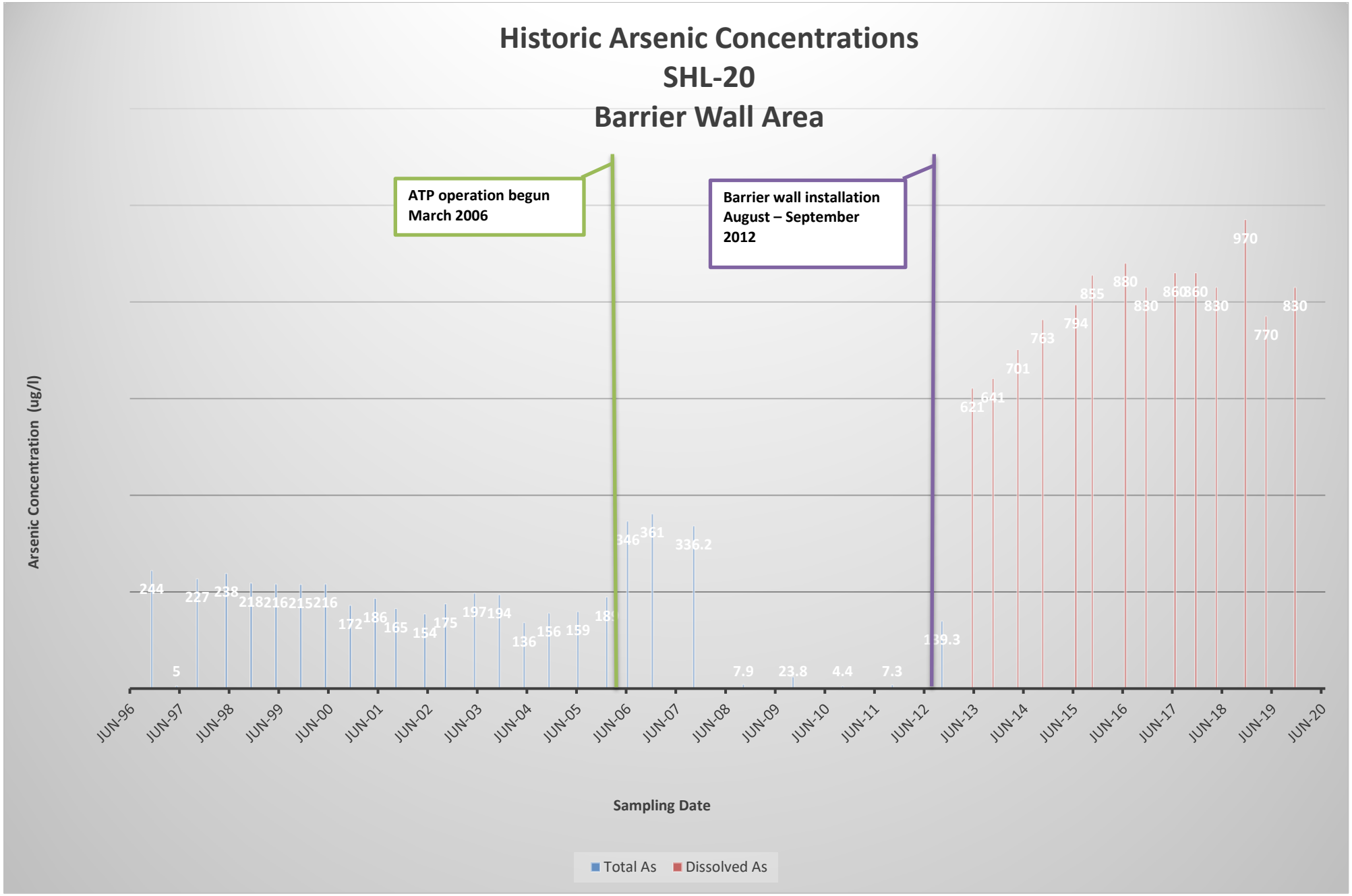
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHL-20
Barrier Wall Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
244
5
227
238
218
216
215
216
172
186
165
154
175
197
194
136
156
159
346
361
336.2
7.9
23.8
4.4
7.3
139.3
621
641
701
763
794
855
880
830
860
860
830
970
770
830
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
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JUN-10
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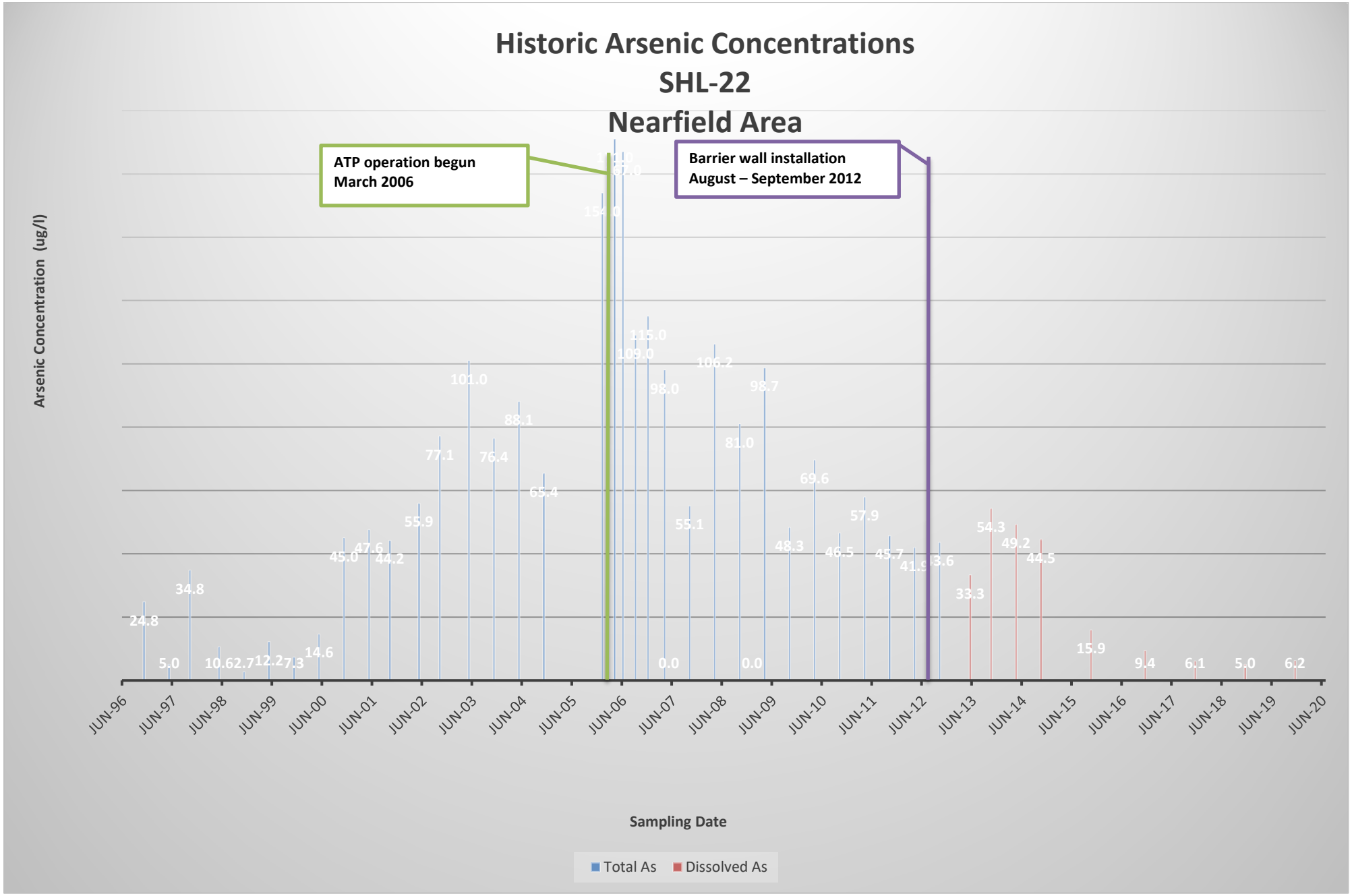
JUN-17
JUN-18
JUN-19
JUN-20


Historic Arsenic Concentrations
SHL-22
Nearfield Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
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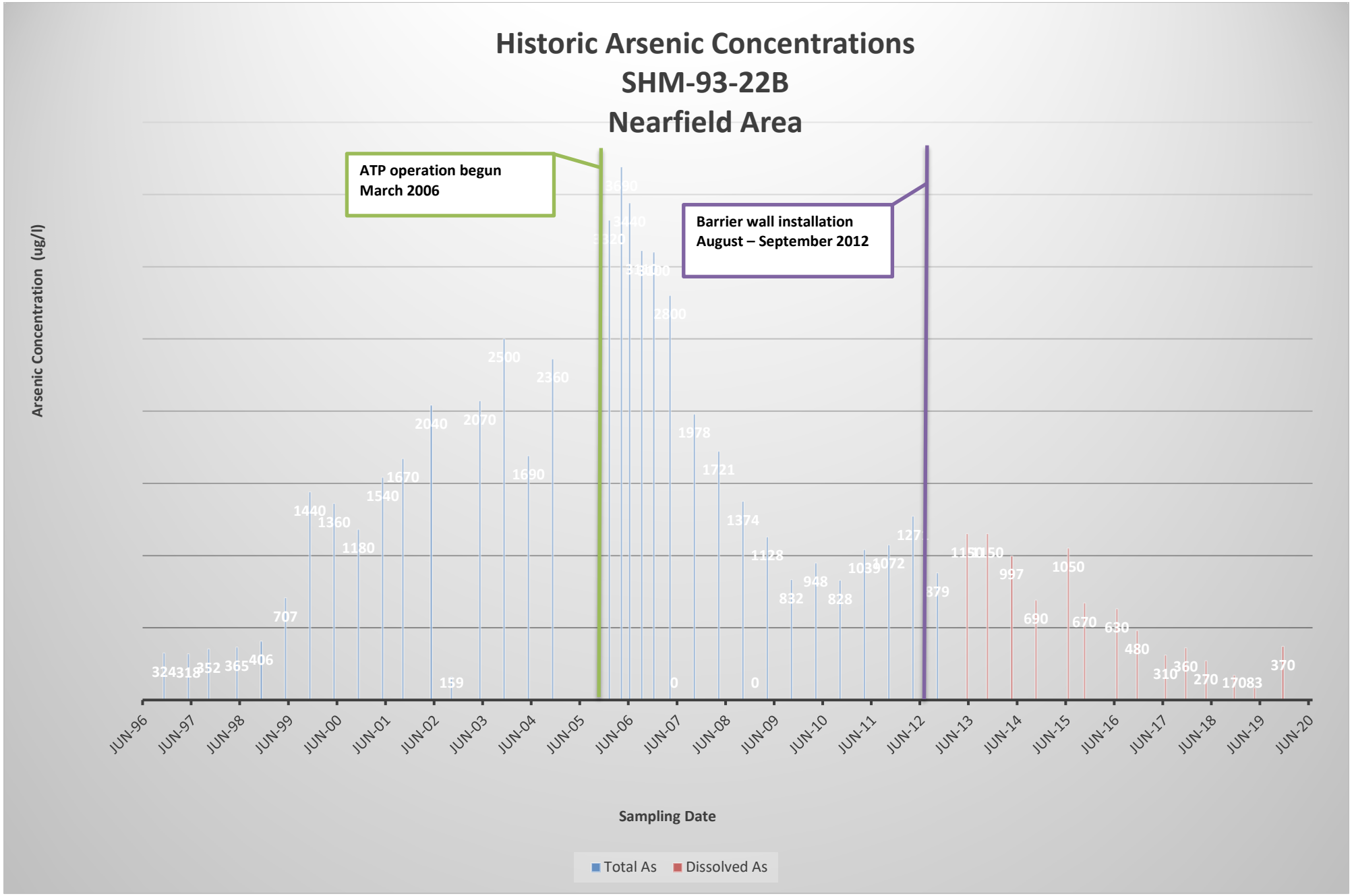
JUN-20
24.8
5.0
34.8
10.6
2.7
12.2
7.3
14.6
45.0
47.6
44.2
55.9
77.1
101.0
76.4
88.1
65.4
115.0
109.0
98.0
0.0
55.1
106.2
81.0
0.0
98.7
48.3
69.6
46.5
57.9
45.7
41.9
3.6
33.3
54.3
49.2
44.5
15.9
9.4
6.1
5.0
6.2


Historic Arsenic Concentrations
SHM-93-22B
Nearfield Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
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JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
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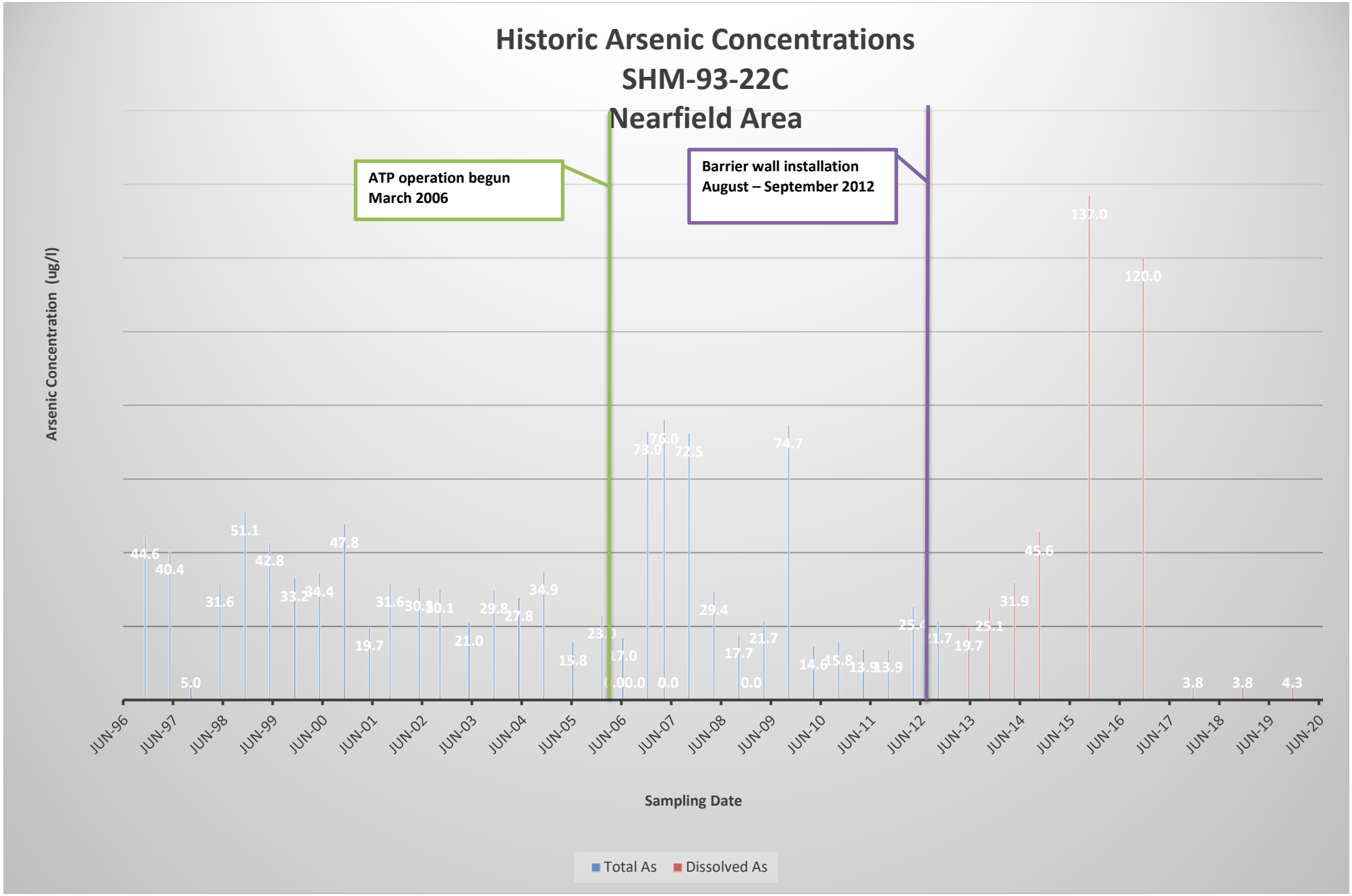
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-93-22C
Nearfield Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
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JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
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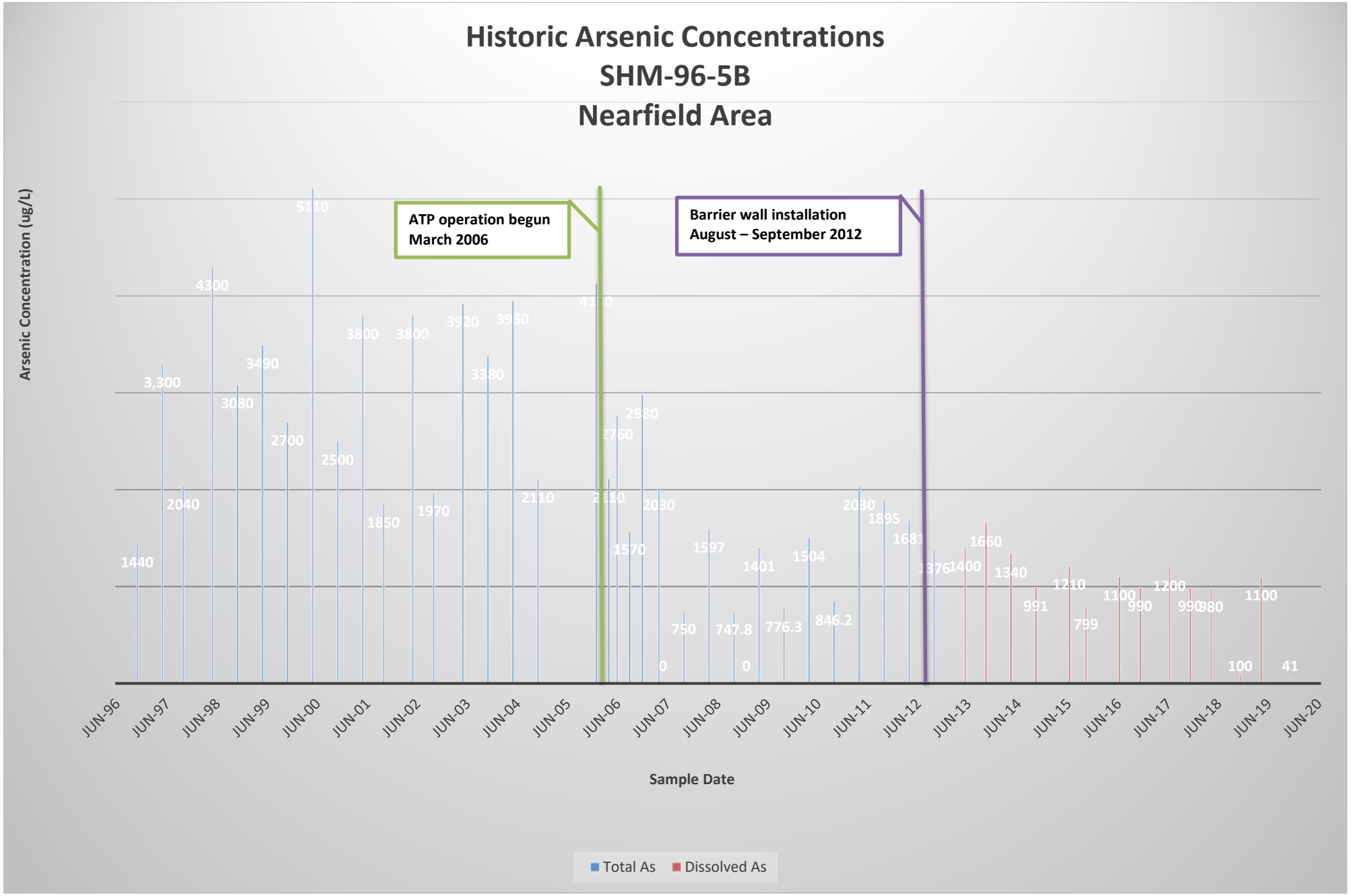
JUN-18
JUN-19
JUN-20
44.6
40.4
5.0
31.6
51.1
42.8
33.2
34.4
47.8
19.7
31.6
30.5
30.1
21.0
29.8
27.8
34.9
15.8
23.0
17.0
0.0
0.0
73.0
76.0
72.5
29.4
17.7
0.0
21.7
74.7
14.6
15.8
13.9
13.9
25.4
21.7
19.7
25.1
31.9
45.6
137.0
120.0
3.8
3.8
4.3
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-96-5B
Nearfield Area
Arsenic Concentration (ug/L)
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
1440
3,300
2040
4300
3080
3490
2700
5110
2500
3800
1850
3800
1970
3920
3380
3950
2110
4110
2760
2980
2110
1570
2030
0
750
1597
747.8
0
1401
776.3
1504
846.2
2030
1895
1681
1376
1400
1660
1340
991
1210
799
1100
990
1200
990
980
100
1100
41
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JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
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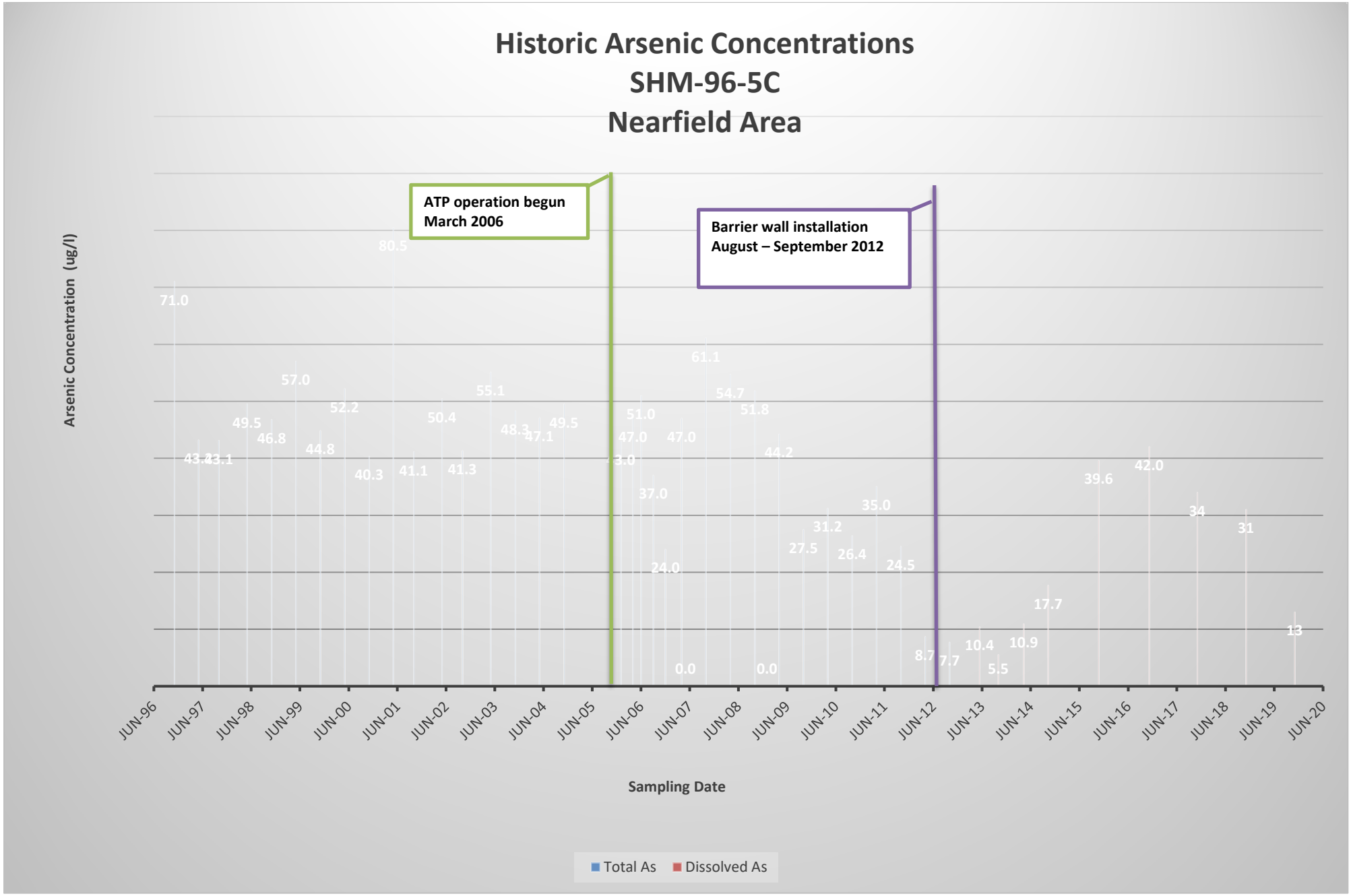
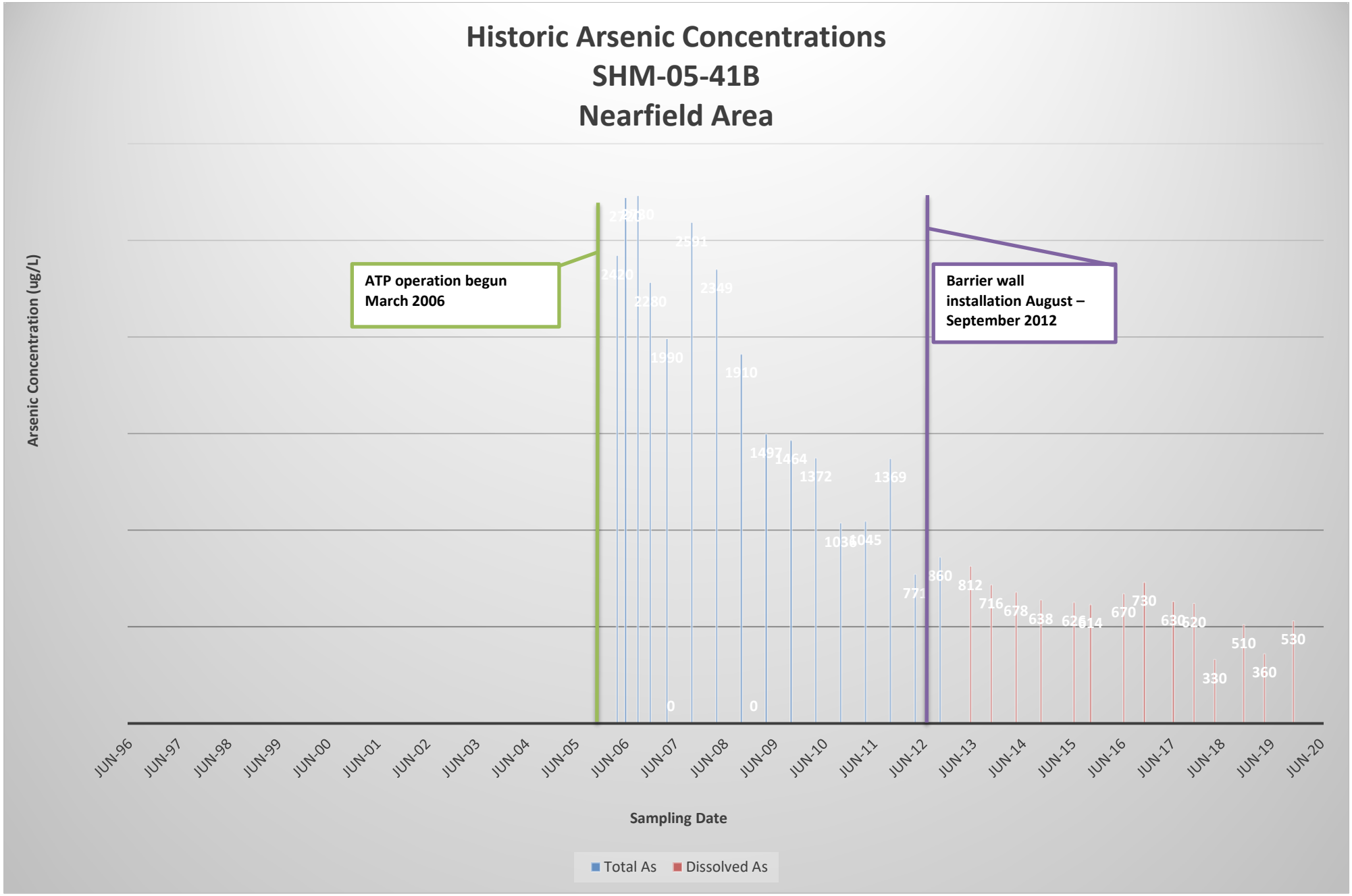
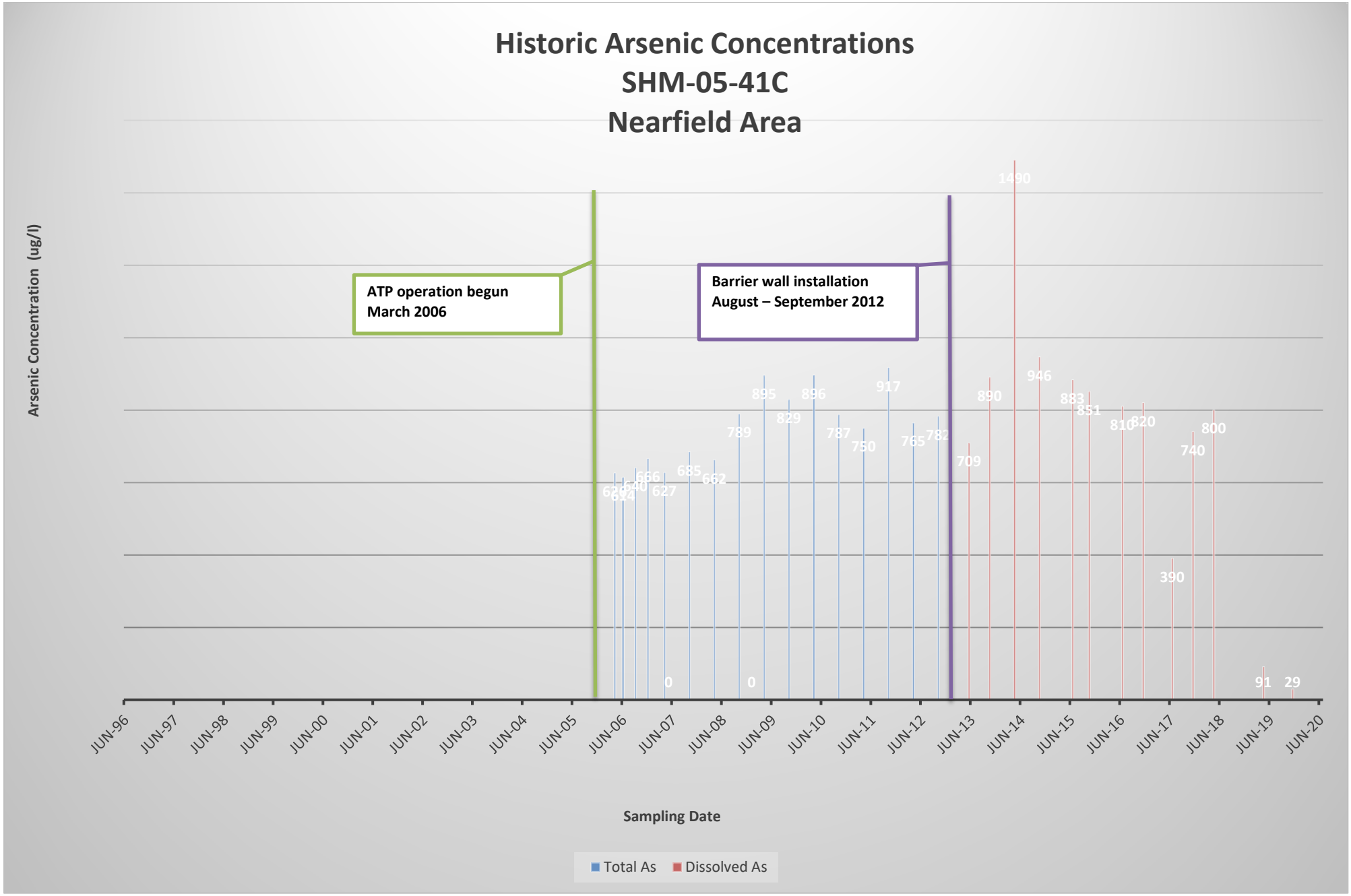
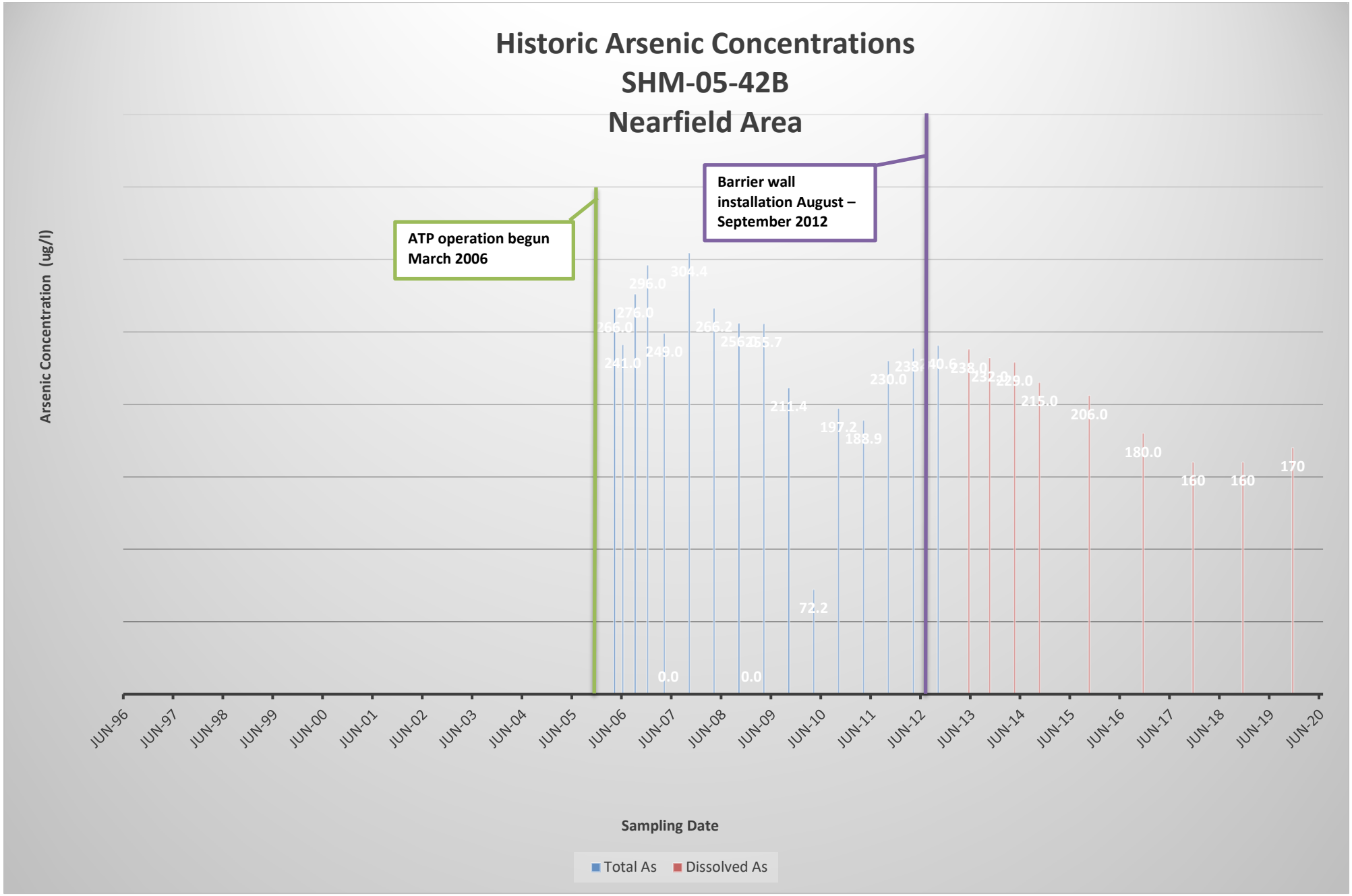
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sample Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-96-5C
Nearfield Area
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
71.0
43.8
43.1
49.5
46.8
57.0
44.8
52.2
40.3
80.5
41.1
50.4
41.3
55.1
48.3
47.1
49.5
51.0
47.0
37.0
24.0
0.0
47.0
61.1
54.7
51.8
44.2
0.0
27.5
31.2
26.4
35.0
24.5
8.7
7.7
10.4
5.5
10.9
17.7
39.6
42.0
34
31
13
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As

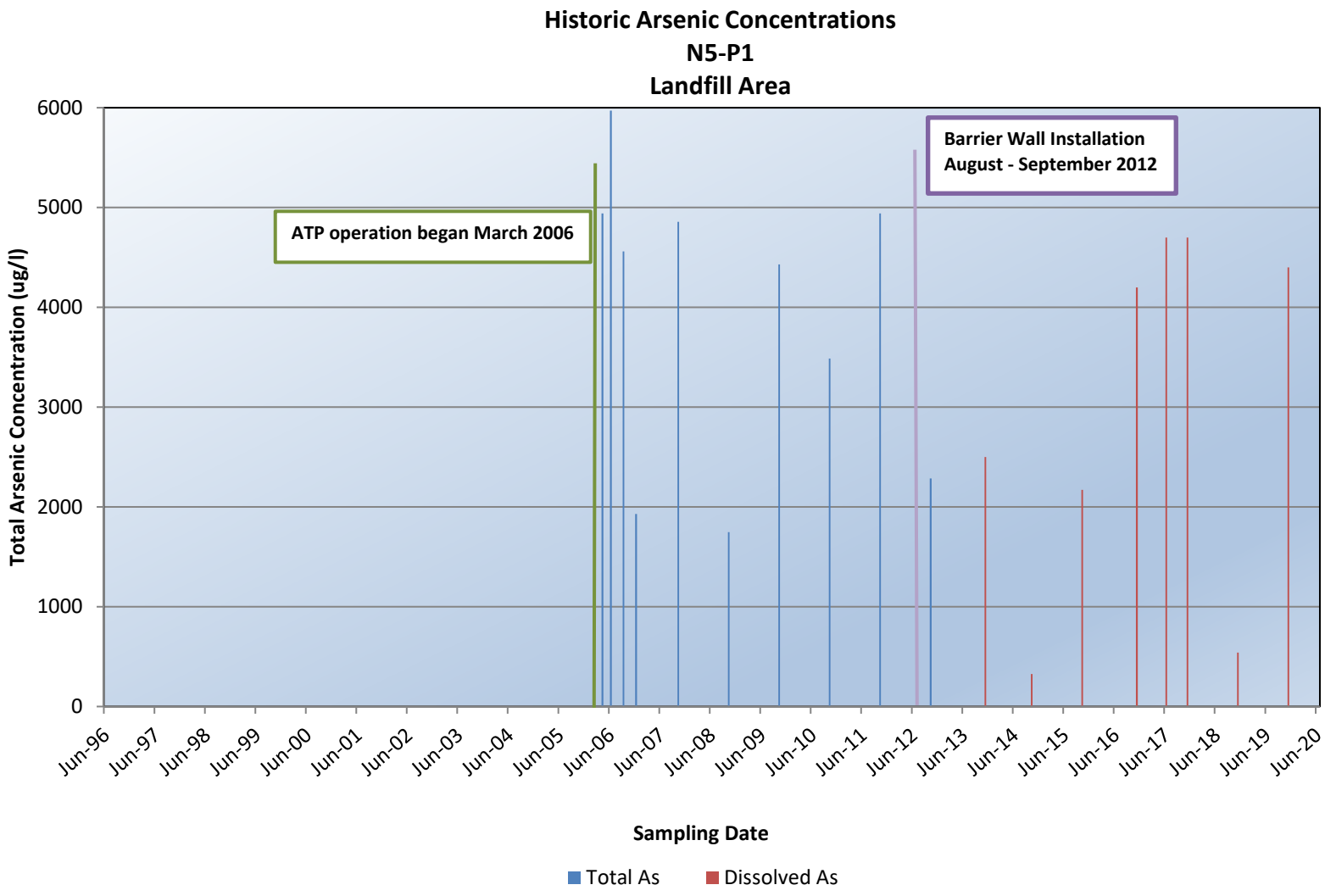

Historic Arsenic Concentrations
SHM-05-41B
Nearfield Area
Arsenic Concentration (ug/L)
ATP operation begun March 2006
Barrier wall installation August – September 2012
2420
2280
1990
2591
2349
1910
0
0
1497
1464
1372
1369
1045
771
860
812
716
678
638
670
730
630
620
330
510
360
530
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As

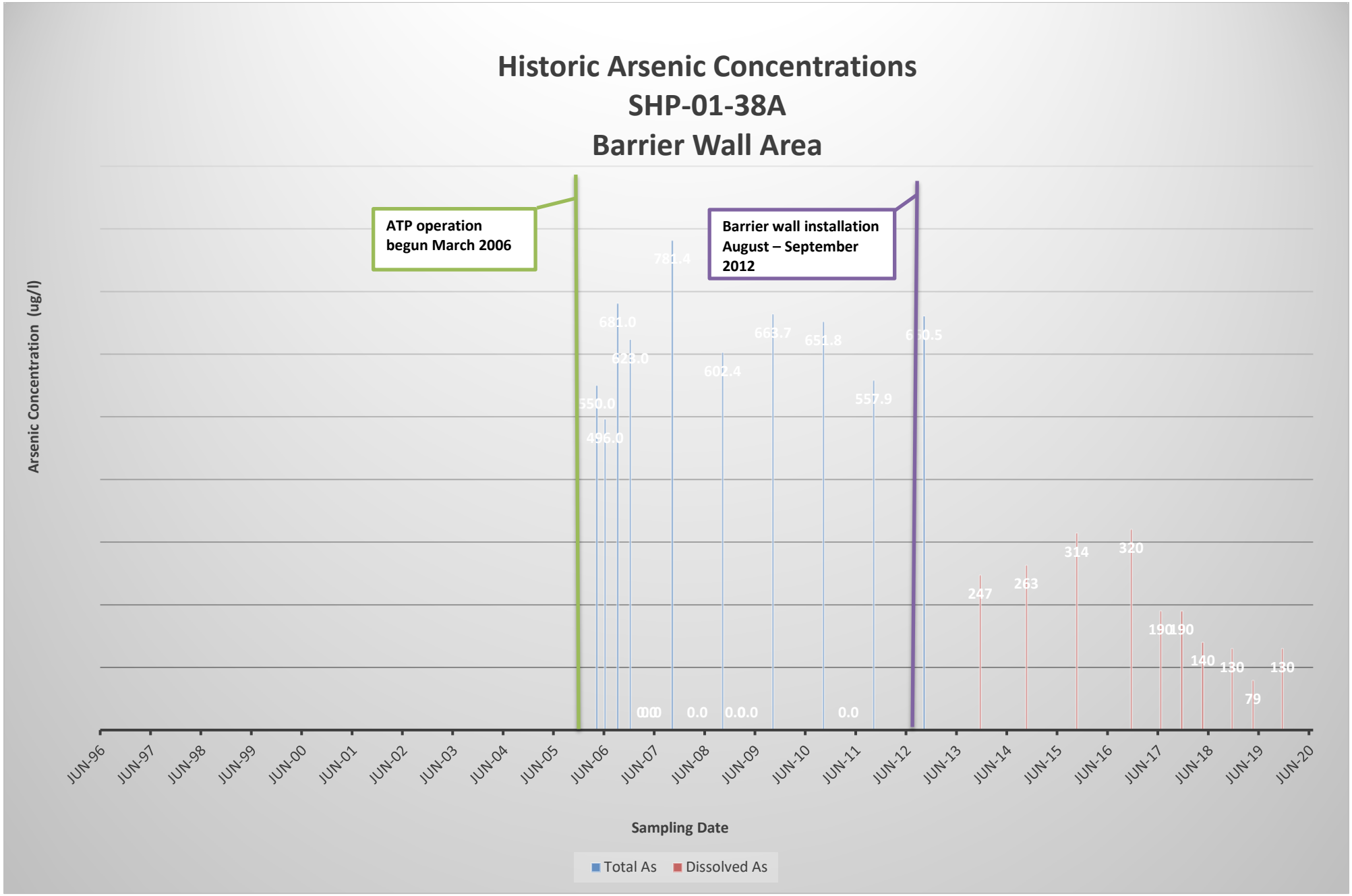


Historic Arsenic Concentrations
SHM-05-41C
Nearfield Area
Arsenic Concentration (ug/l)
ATP operation begun
March 2006
Barrier wall installation
August – September 2012
1490
946
883
851
810
820
800
740
390
91
29
890
917
895
896
829
789
787
750
765
782
709
685
662
666
640
627
614
0
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As

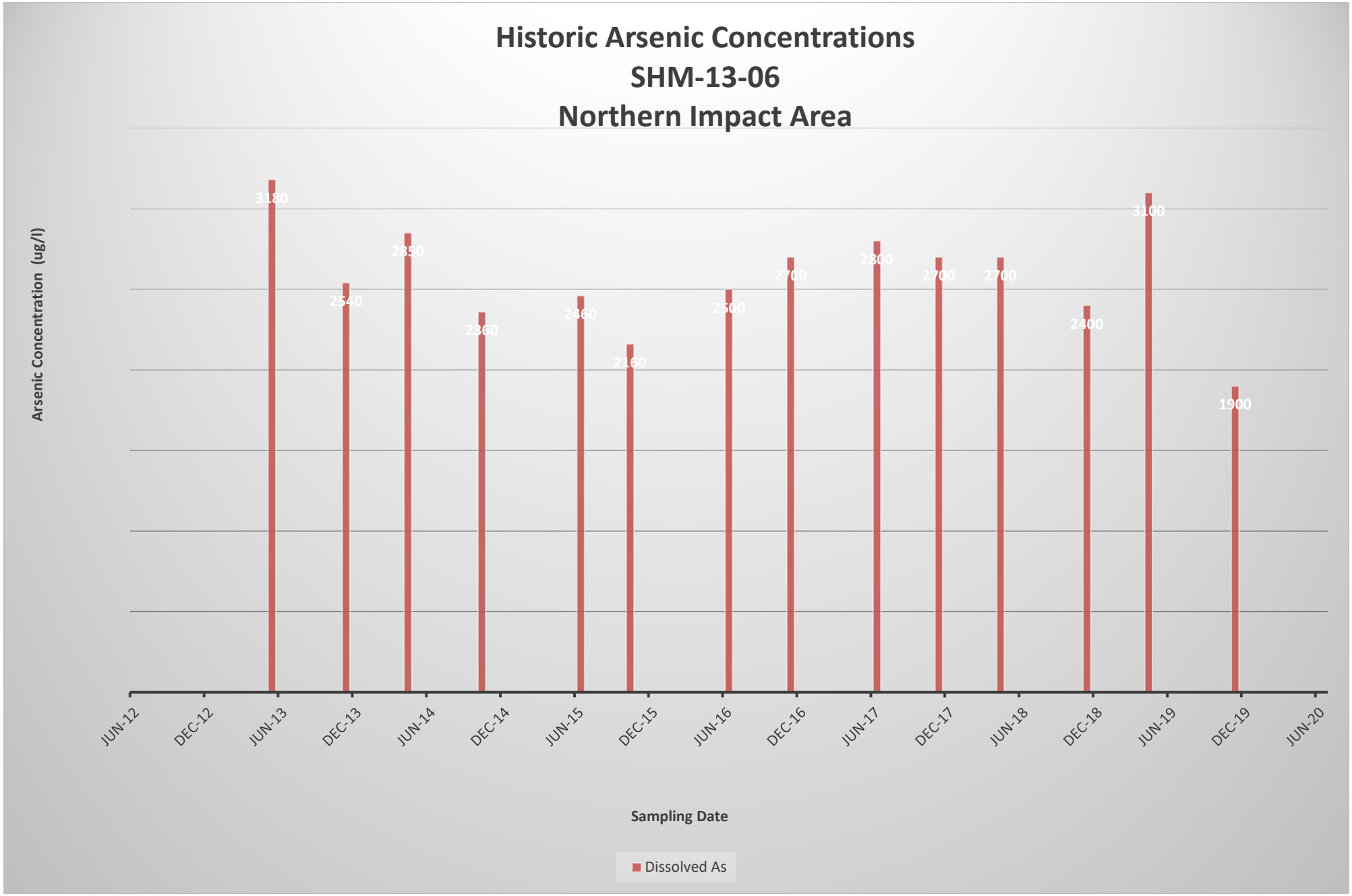


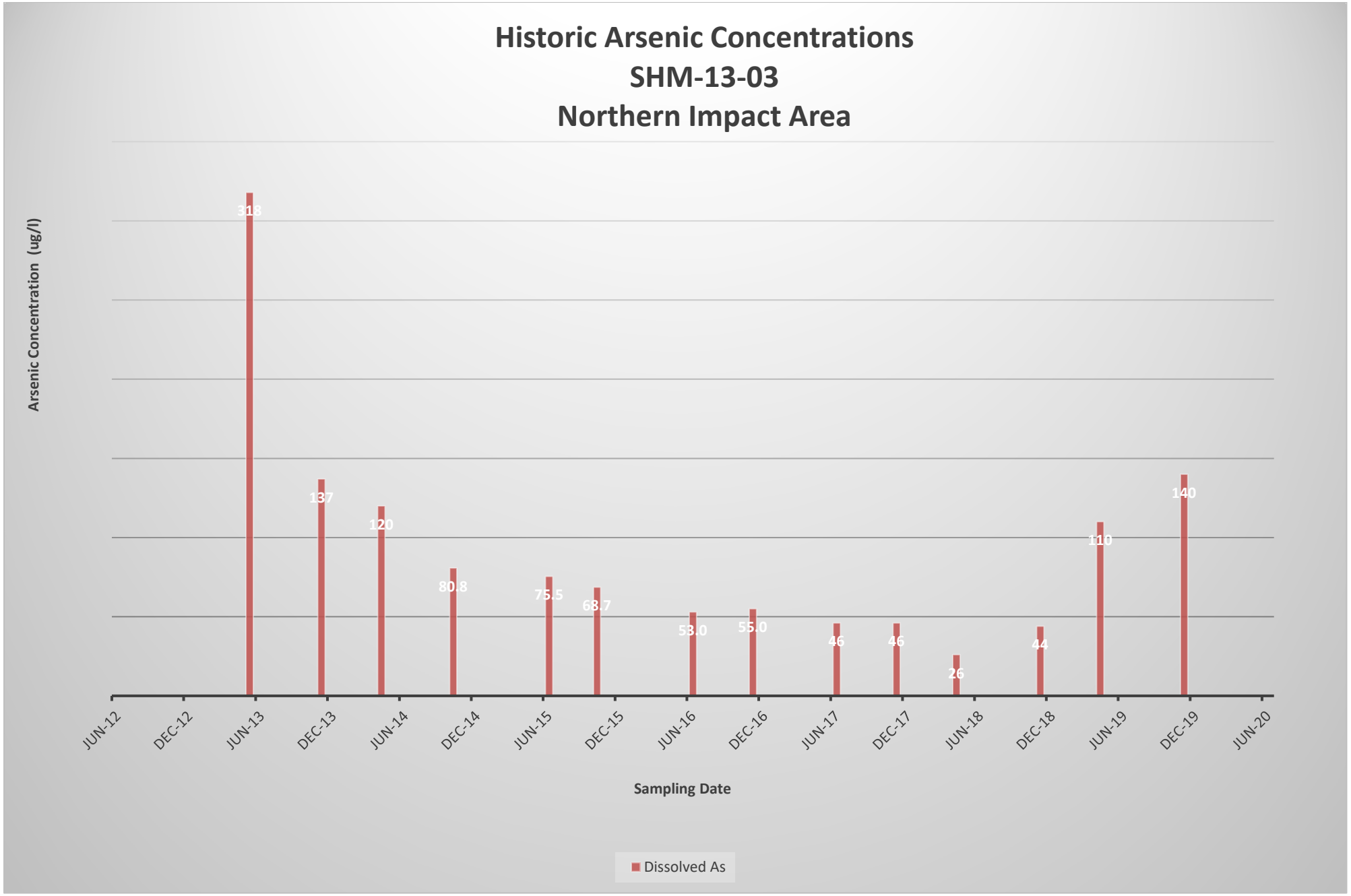
Historic Arsenic Concentrations
SHM-05-42B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
266.0
241.0
276.0
296.0
249.0
0.0
304.4
266.2
0.0
211.4
72.2
197.2
188.9
230.0
238.0
215.0
206.0
180.0
160
160
170

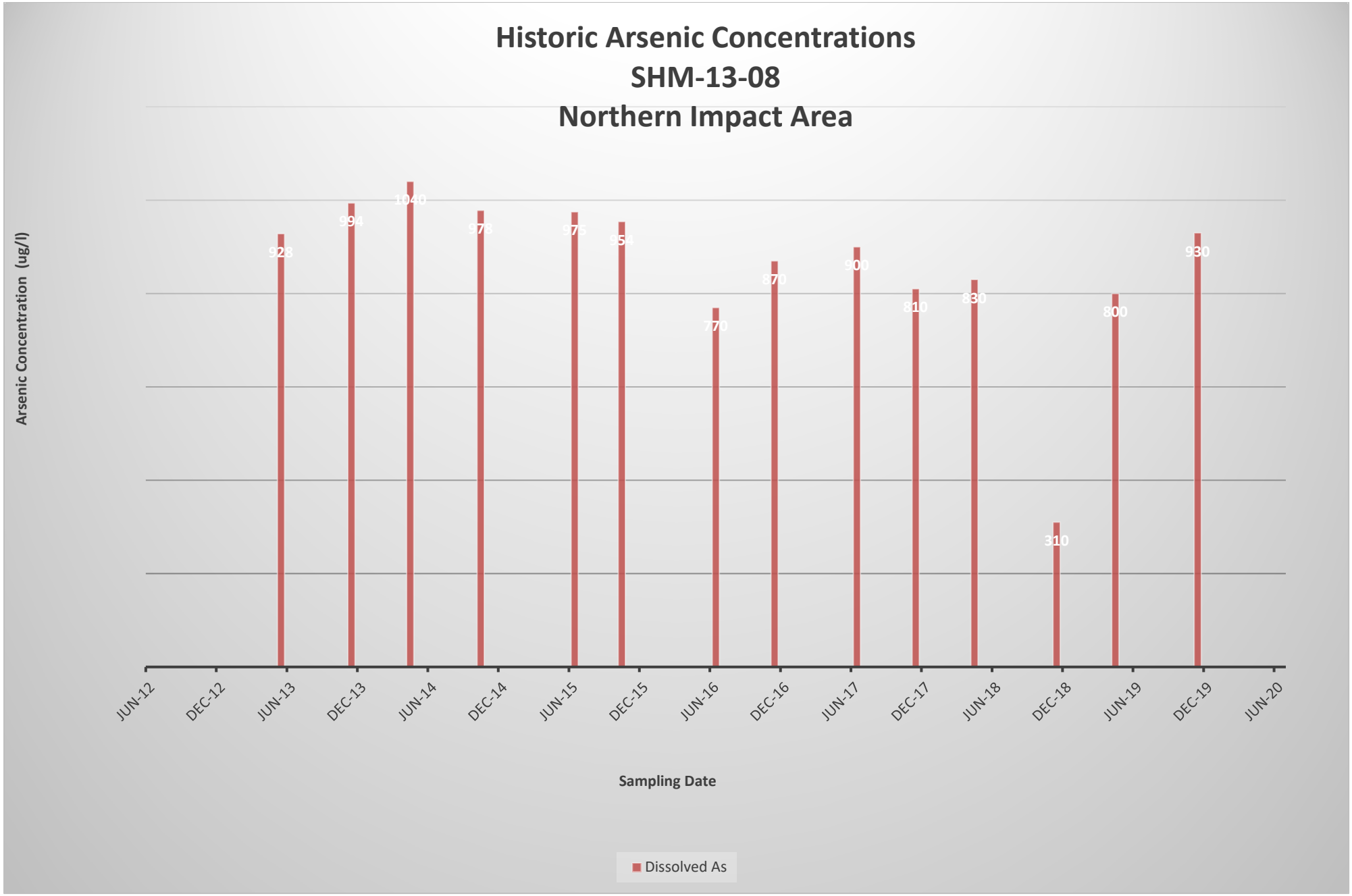

Historic Arsenic Concentrations
N5-P1
Landfill Area
Barrier Wall Installation
August - September 2012
ATP operation began March 2006
Total Arsenic Concentration (ug/l)
6000
5000
4000
3000
2000
1000
0
Jun-96
Jun-97
Jun-98
Jun-99
Jun-00
Jun-01
Jun-02
Jun-03
Jun-04
Jun-05
Jun-06
Jun-07
Jun-08
Jun-09
Jun-10
Jun-11
Jun-12
Jun-13
Jun-14
Jun-15
Jun-16
Jun-17
Jun-18
Jun-19
Jun-20
Sampling Date
Total As
Dissolved As

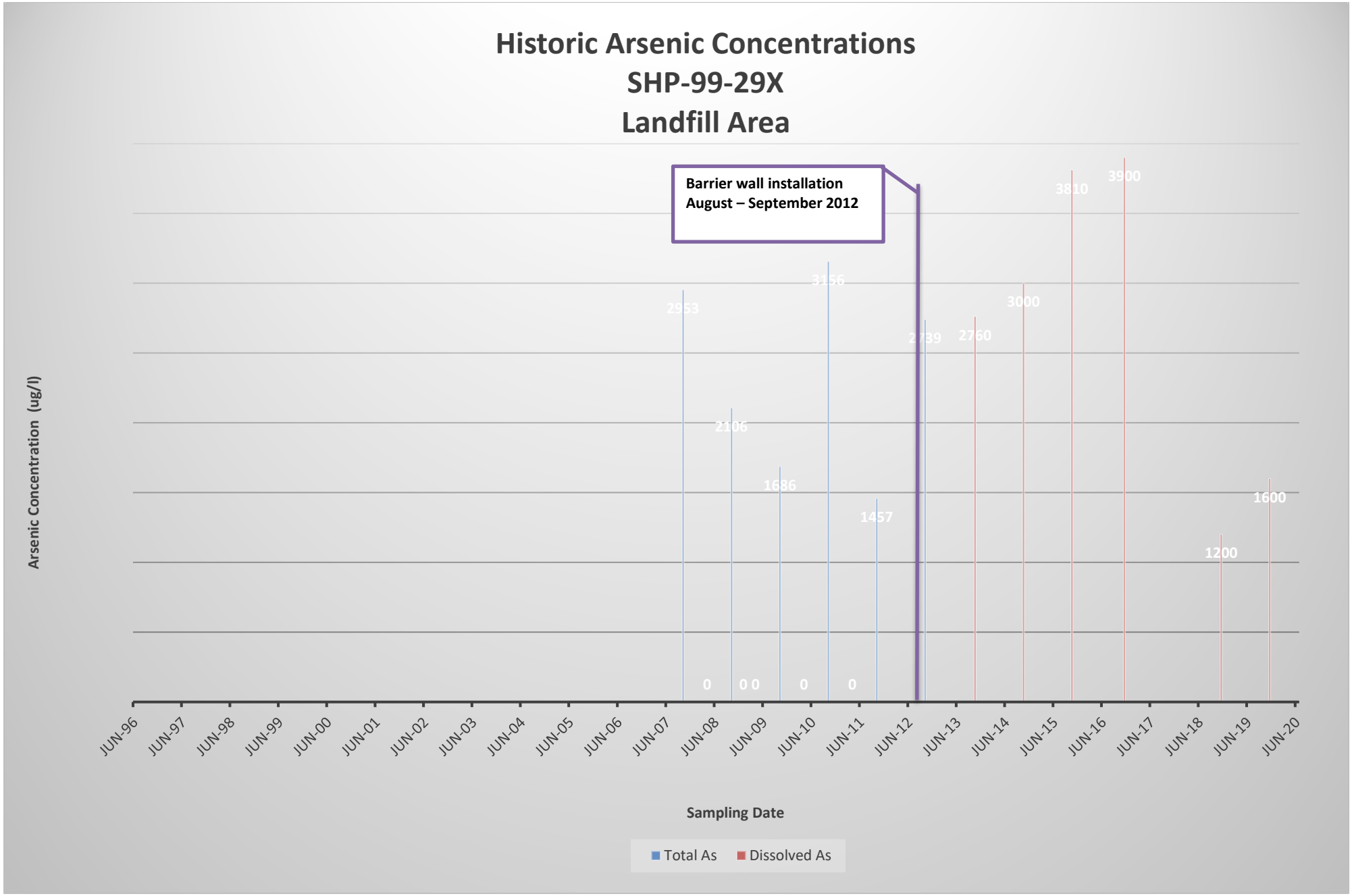


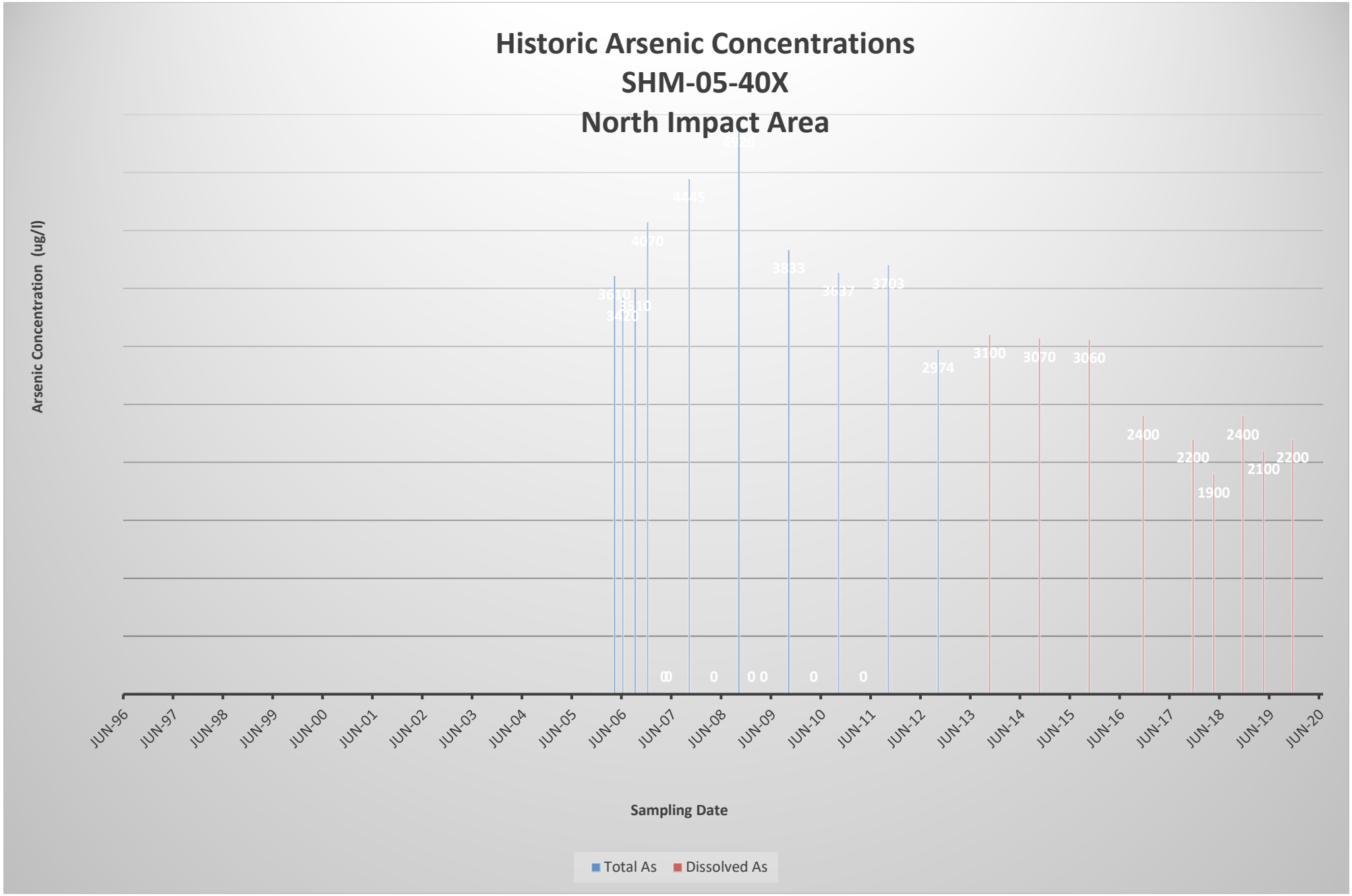
Historic Arsenic Concentrations
SHP-01-38A
Barrier Wall Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
550.0
496.0
681.0
623.0
781.4
602.4
663.7
651.8
557.9
247
263
314
320
190
190
140
130
79
130

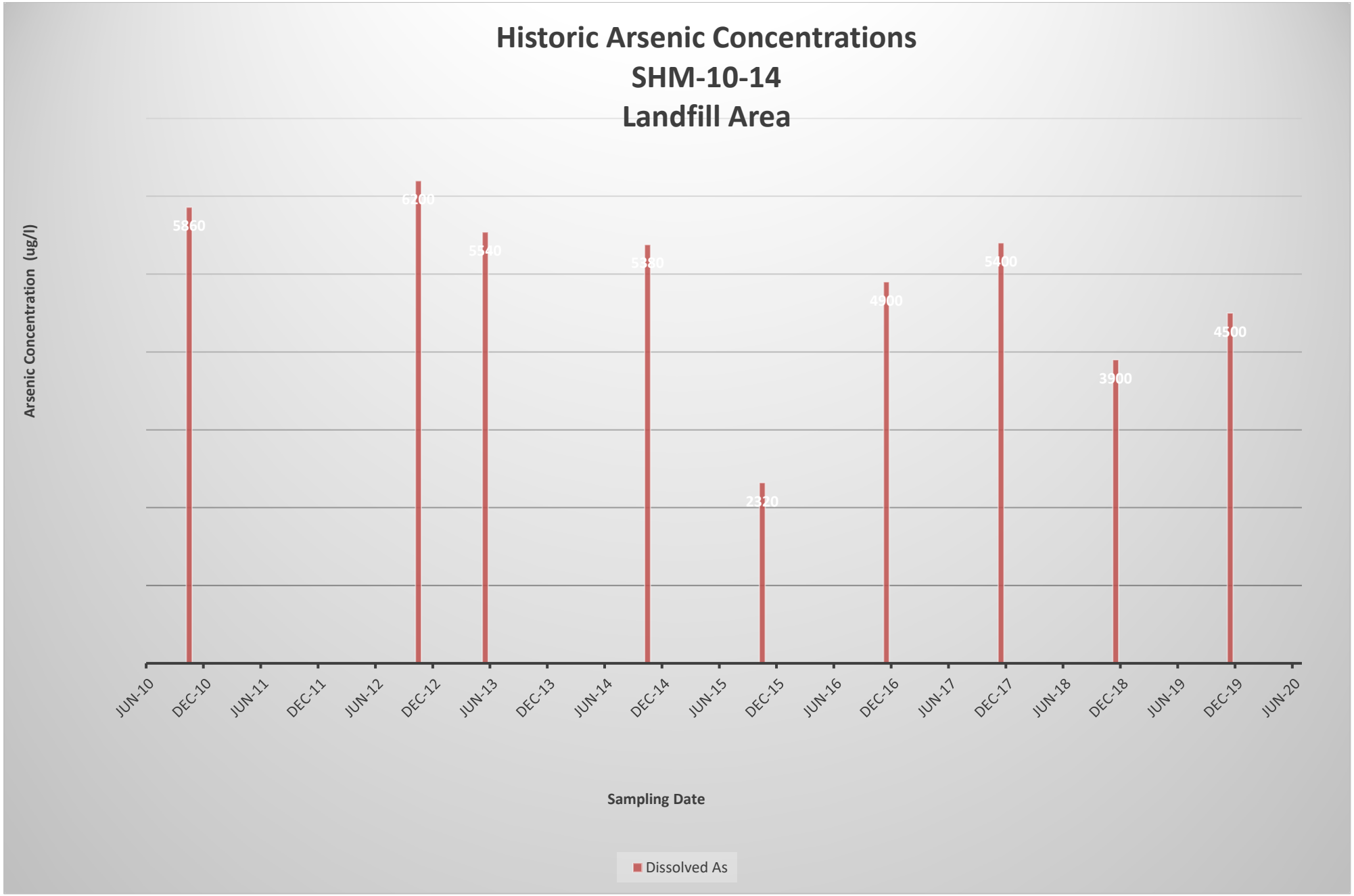

Historic Arsenic Concentrations
SHM-13-06
Northern Impact Area
Arsenic Concentration (ug/l)
3180
2540
2850
2360
2460
2160
2500
2700
2800
2700
2700
2400
3100
1900
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
Sampling Date
Dissolved As

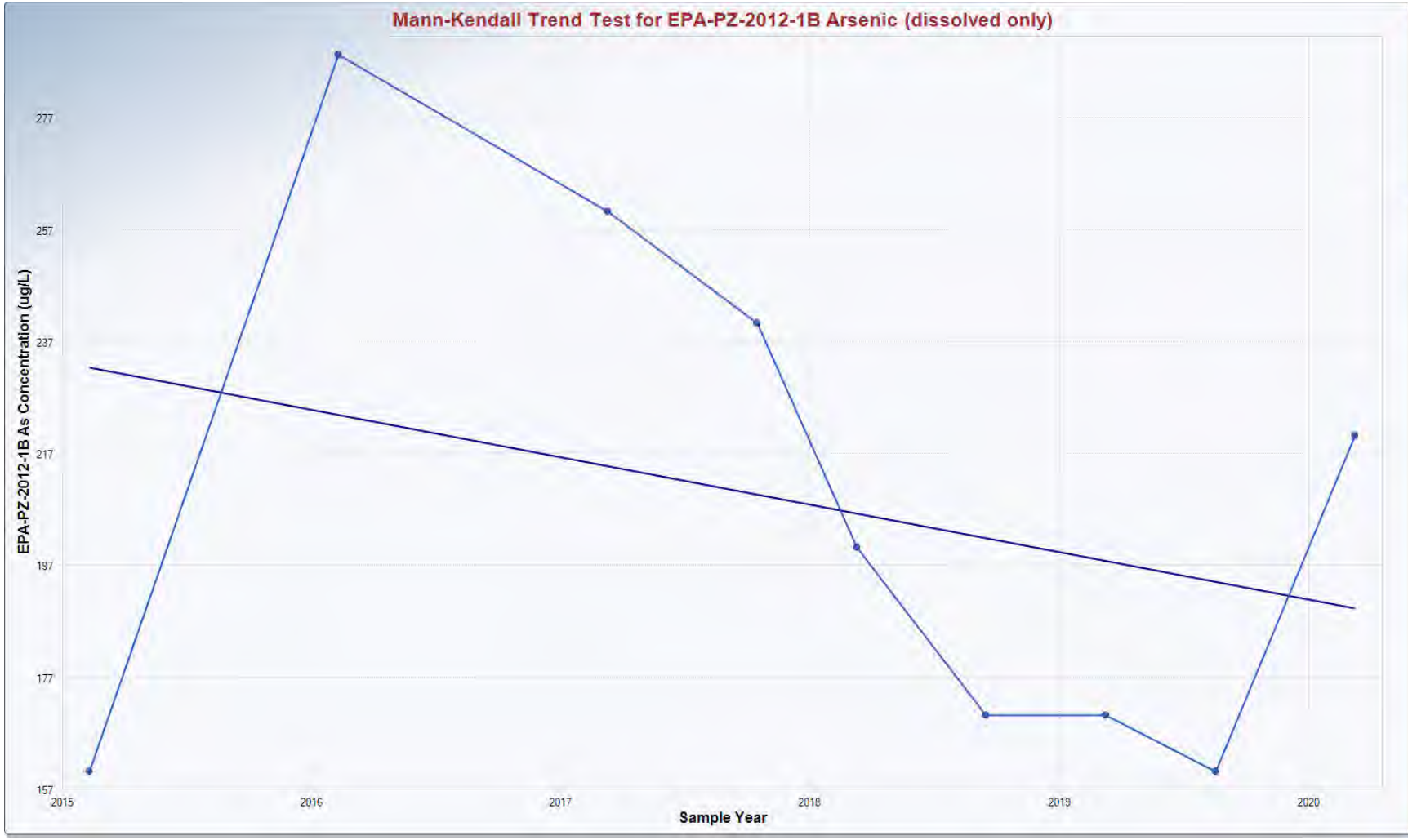

Historic Arsenic Concentrations
SHM-13-03
Northern Impact Area
Arsenic Concentration (ug/l)
318
137
120
80.8
75.5
68.7
53.0
55.0
46
46
26
44
110
140
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
Sampling Date
Dissolved As


Historic Arsenic Concentrations
SHM-13-08
Northern Impact Area
Arsenic Concentration (ug/l)
928
994
1040
978
975
954
770
870
900
810
830
310
800
930
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
Sampling Date
Dissolved As


Historic Arsenic Concentrations
SHP-99-29X
Landfill Area
Barrier wall installation
August – September 2012
Arsenic Concentration (ug/l)
2953
2106
1636
3156
1457
2739
2760
3000
3810
3900
1200
1600
0
0 0
0
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-05-40X
North Impact Area
Arsenic Concentration (ug/l)
3610
3510
3420
4070
4445
4950
3833
3637
3703
2974
3100
3070
3060
2400
2200
1900
2400
2100
2200
0
0
0
0
0
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
Sampling Date
Total As
Dissolved As


Historic Arsenic Concentrations
SHM-10-14
Landfill Area
Arsenic Concentration (ug/l)
5360
6200
5540
5380
2320
4900
5400
3900
4500
JUN-10
DEC-10
JUN-11
DEC-11
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
Sampling Date
Dissolved As



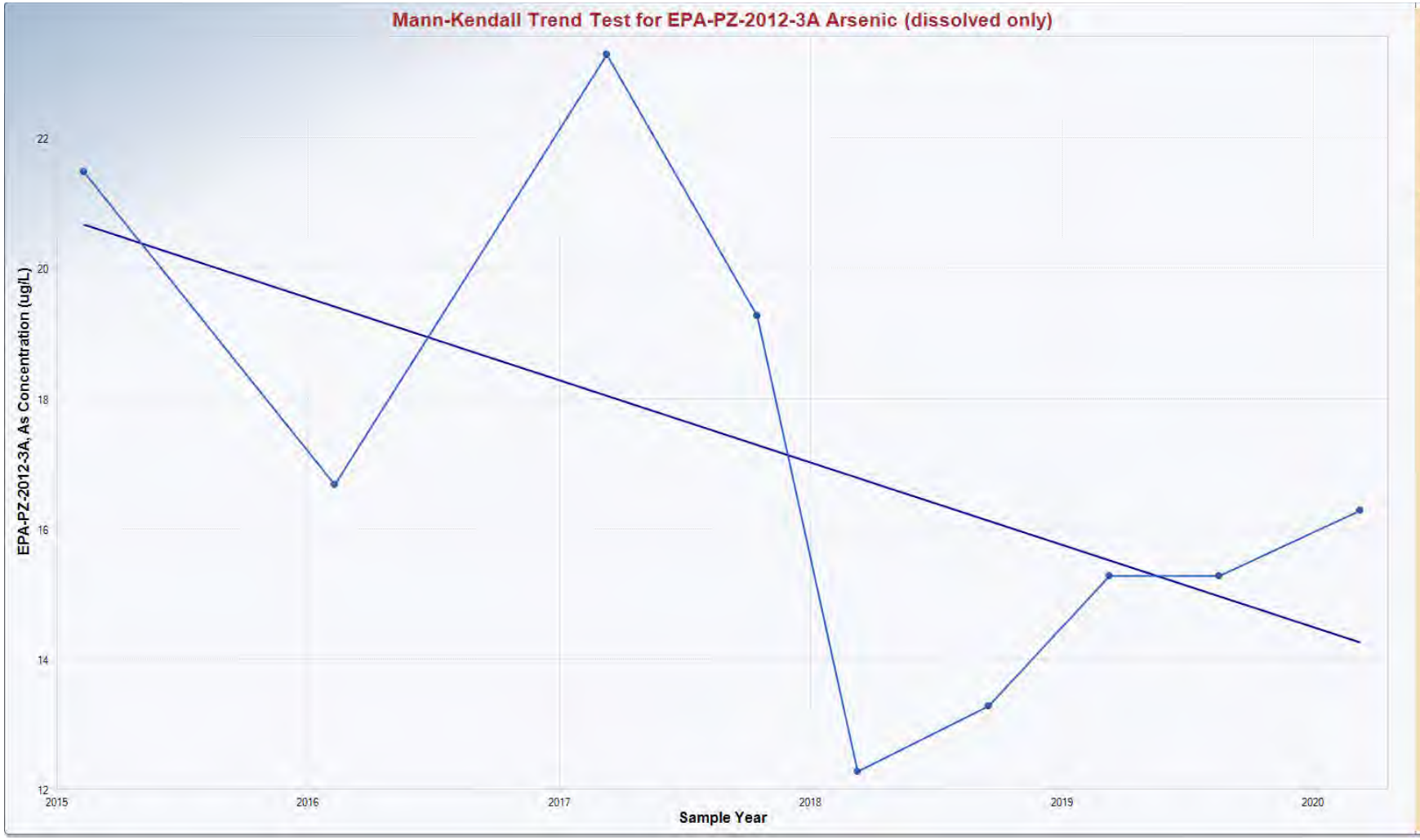
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	-1.1595
M-K Test Value (S)	-12
Tabulated p-value	0.1300
Approximate p-value	0.1231

OLS Regression Line (Blue)

OLS Regression Slope	-8.4853
OLS Regression Intercept	17,328.3610

Insufficient statistical evidence of a significant trend at the specified level of significance.



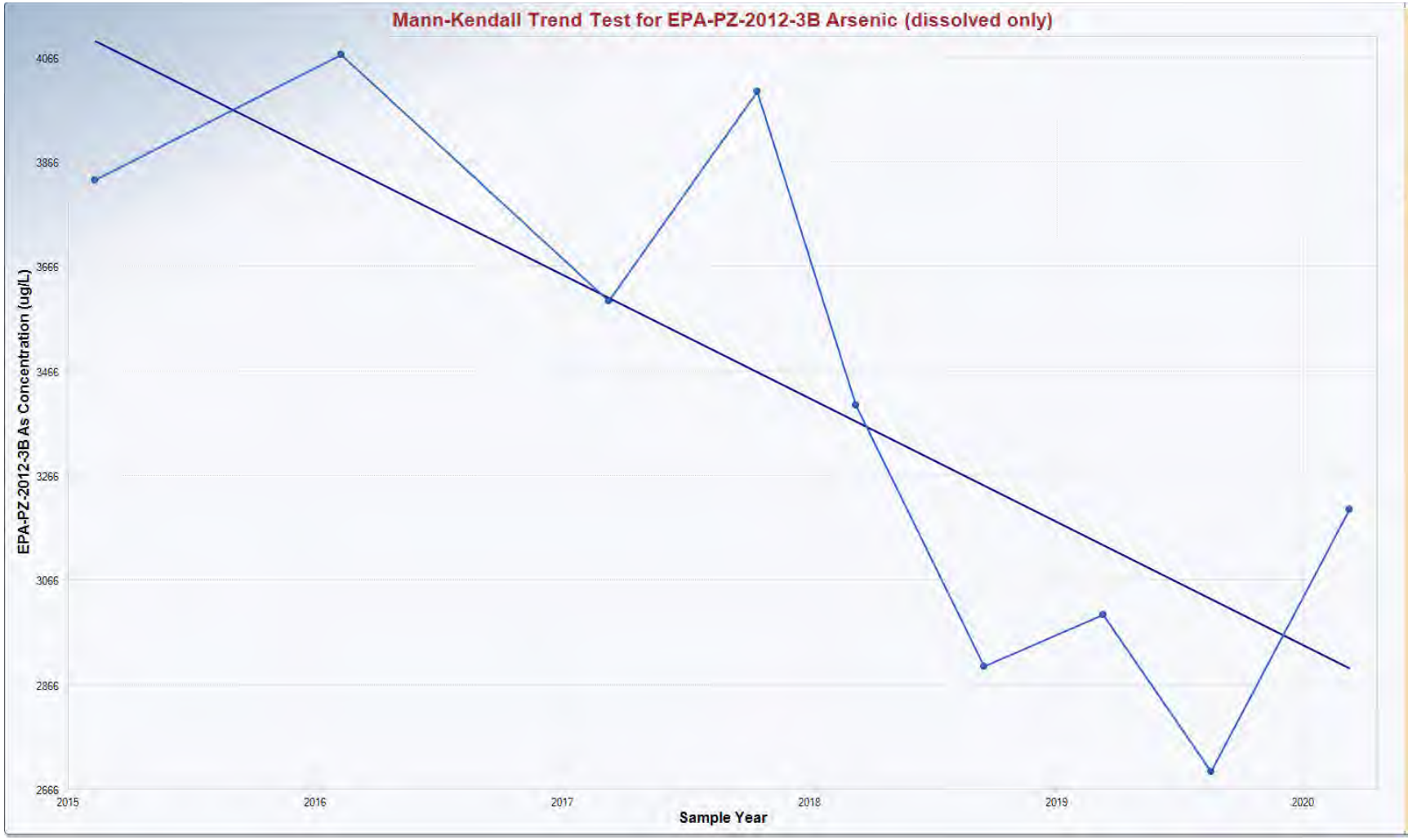
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-1.0483
M-K Test Value (S)	-11
Tabulated p-value	0.1790
Approximate p-value	0.1473

OLS Regression Line (Blue)

OLS Regression Slope	-1.2652
OLS Regression Intercept	2,569.4689

Insufficient statistical evidence of a significant trend at the specified level of significance.



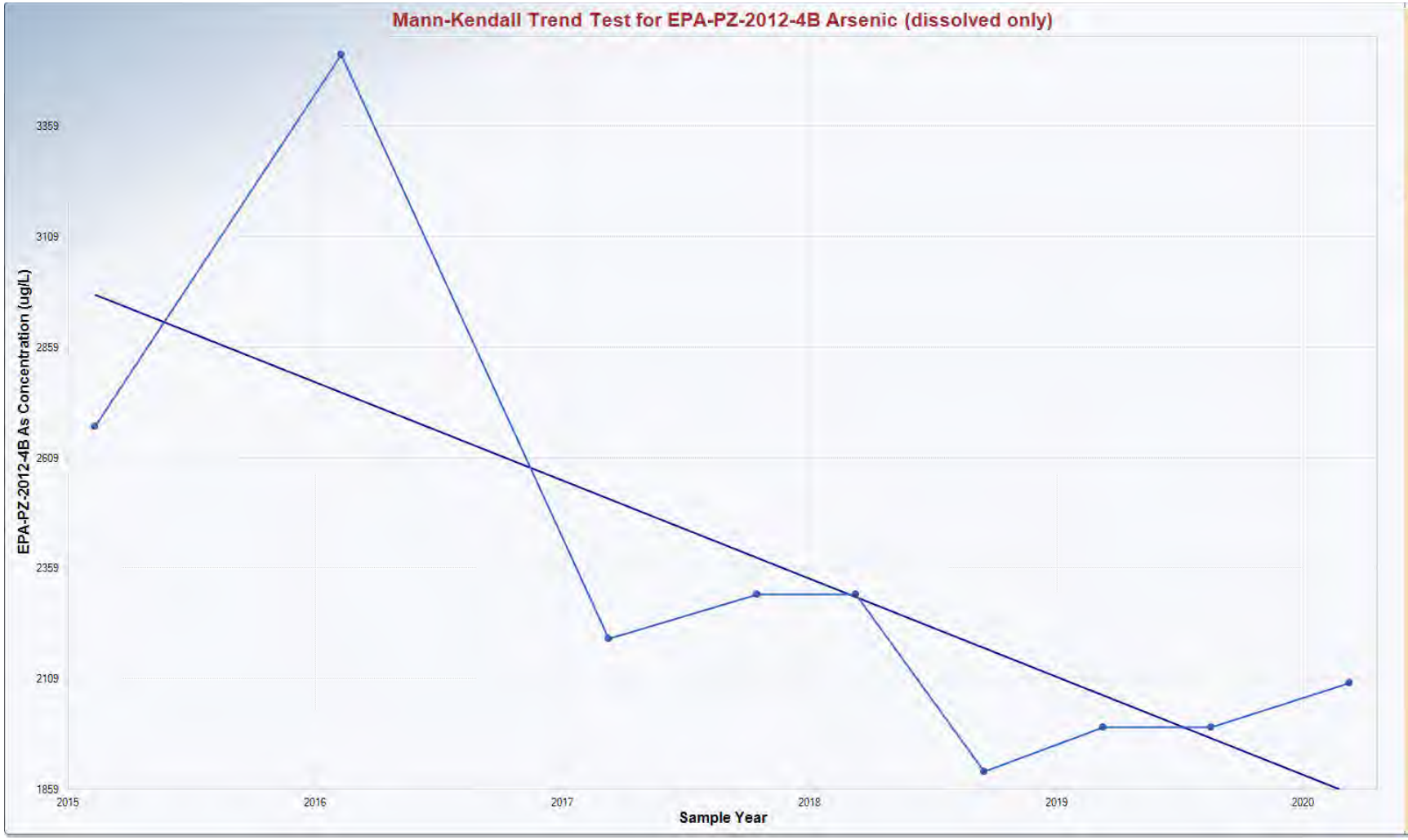
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-2.1894
M-K Test Value (S)	-22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)

OLS Regression Slope	-236.3897
OLS Regression Intercept	480,375.1618

Statistically significant evidence of a decreasing trend at the specified level of significance.



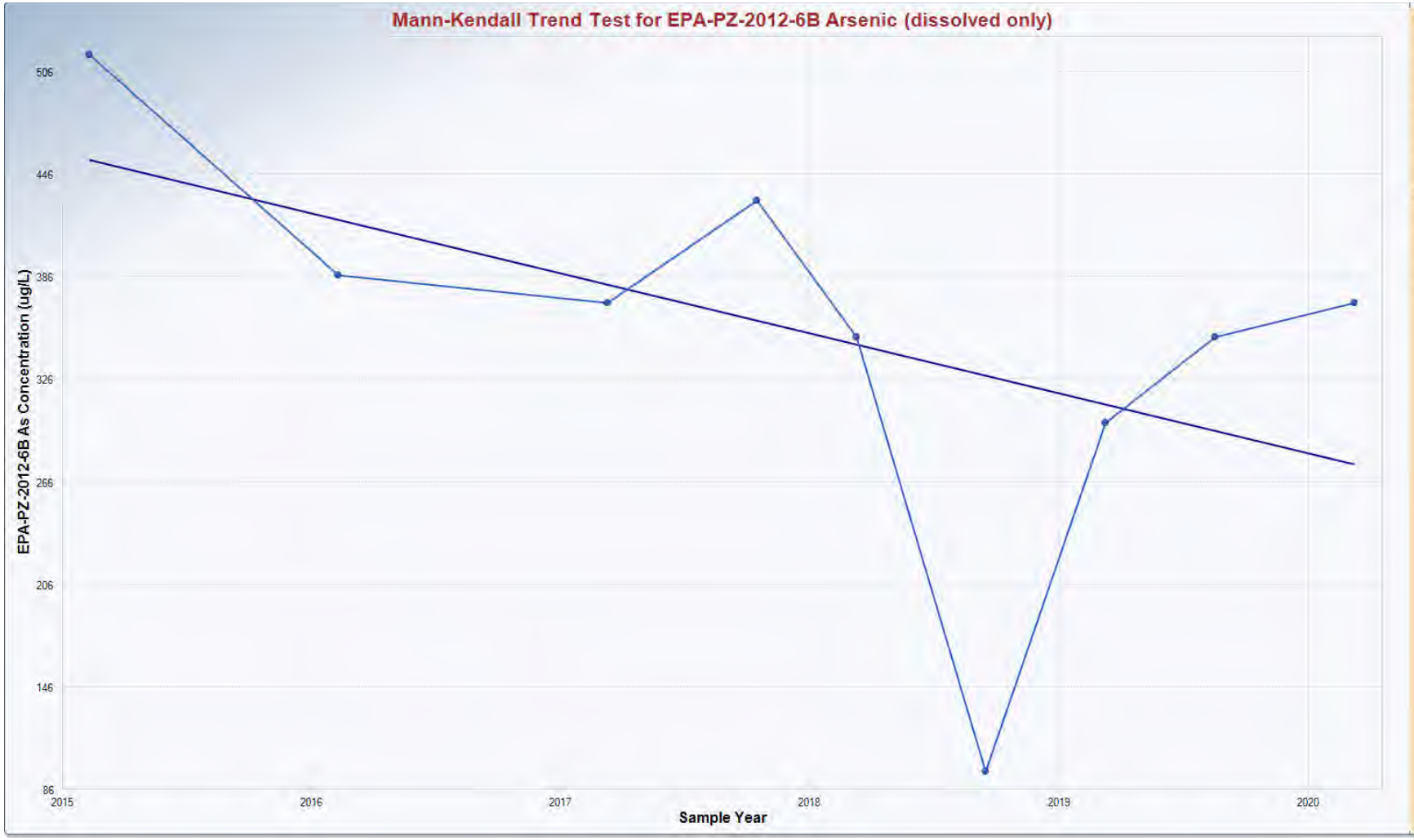
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	-1.7920
M-K Test Value (S)	-18
Tabulated p-value	0.0380
Approximate p-value	0.0366

OLS Regression Line (Blue)

OLS Regression Slope	-222.1581
OLS Regression Intercept	450,582.2637

Statistically significant evidence of a decreasing trend at the specified level of significance.



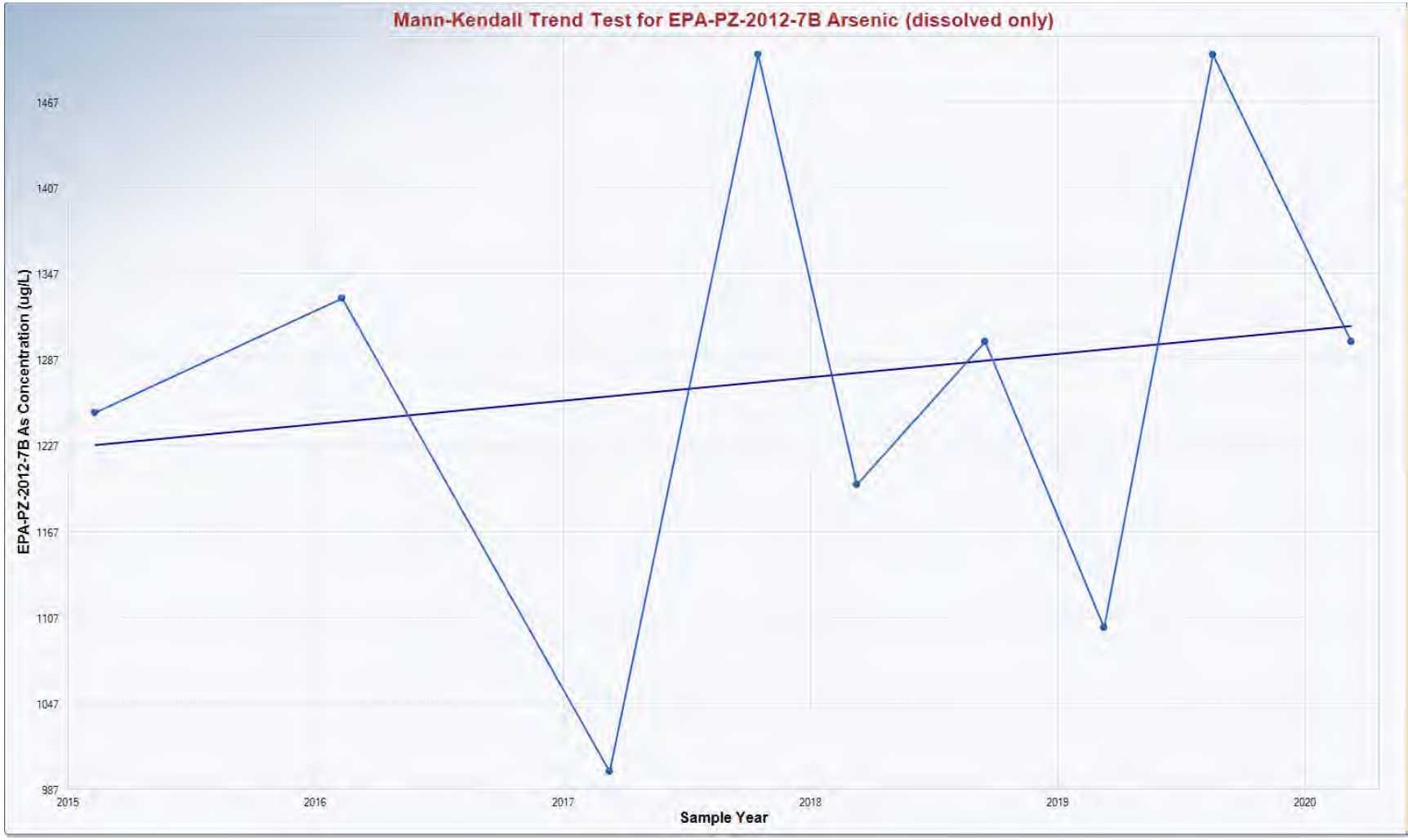
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	-1.5811
M-K Test Value (S)	-16
Tabulated p-value	0.0600
Approximate p-value	0.0569

OLS Regression Line (Blue)

OLS Regression Slope	-35.1364
OLS Regression Intercept	71,246.6922

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	0.3162
M-K Test Value (S)	4
Tabulated p-value	0.3810
Approximate p-value	0.3759

OLS Regression Line (Blue)

OLS Regression Slope	16.3618
OLS Regression Intercept	-31,737.6749

Insufficient statistical evidence of a significant trend at the specified level of significance.

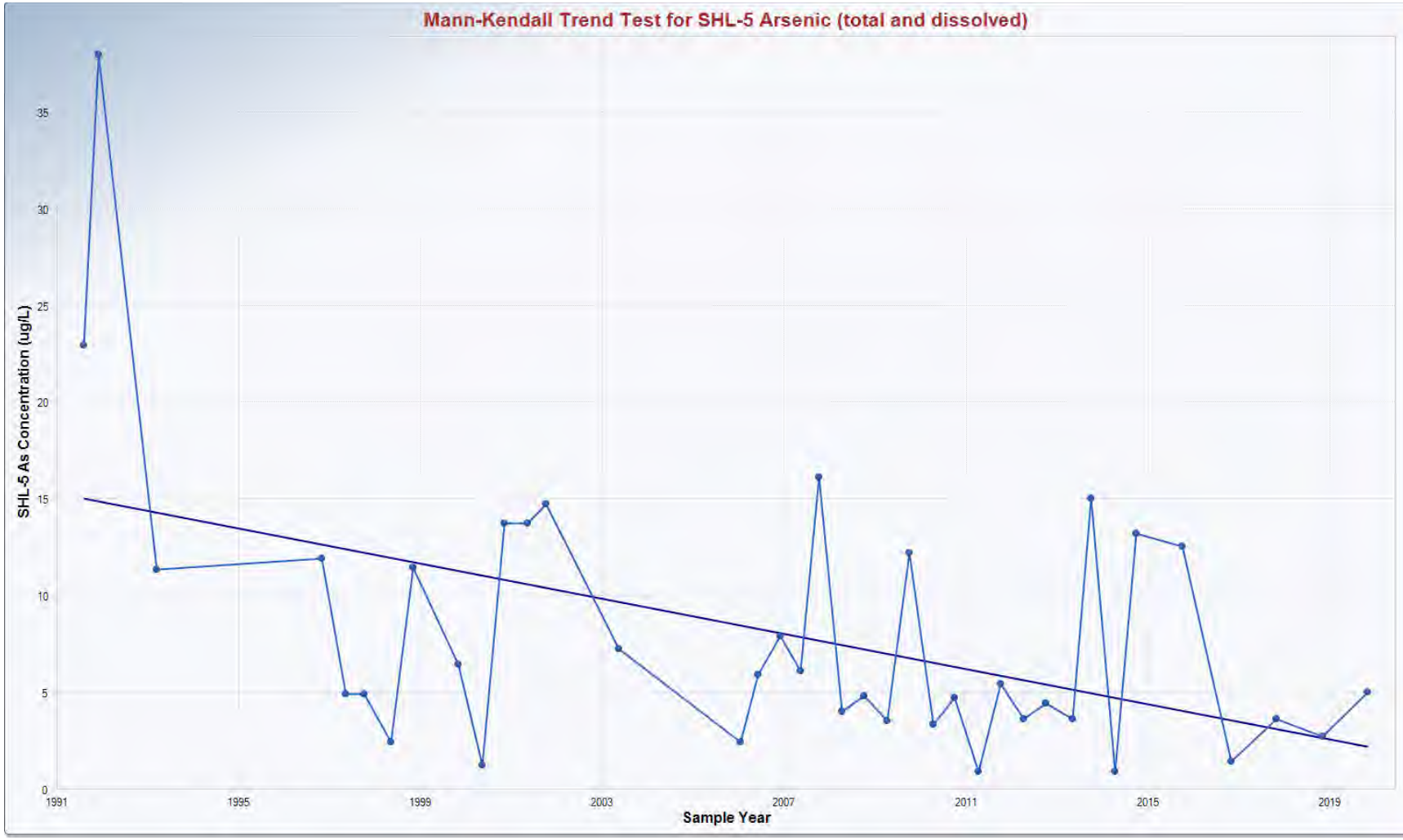
Mann-Kendall Trend Analysis

n	20
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	30.7896
Standardized Value of S	-2.1111
M-K Test Value (S)	-66
Tabulated p-value	0.0170
Approximate p-value	0.0174

OLS Regression Line (Blue)

OLS Regression Slope	-135.2037
OLS Regression Intercept	275,645.7127

Statistically significant evidence of a decreasing trend at the specified level of significance.



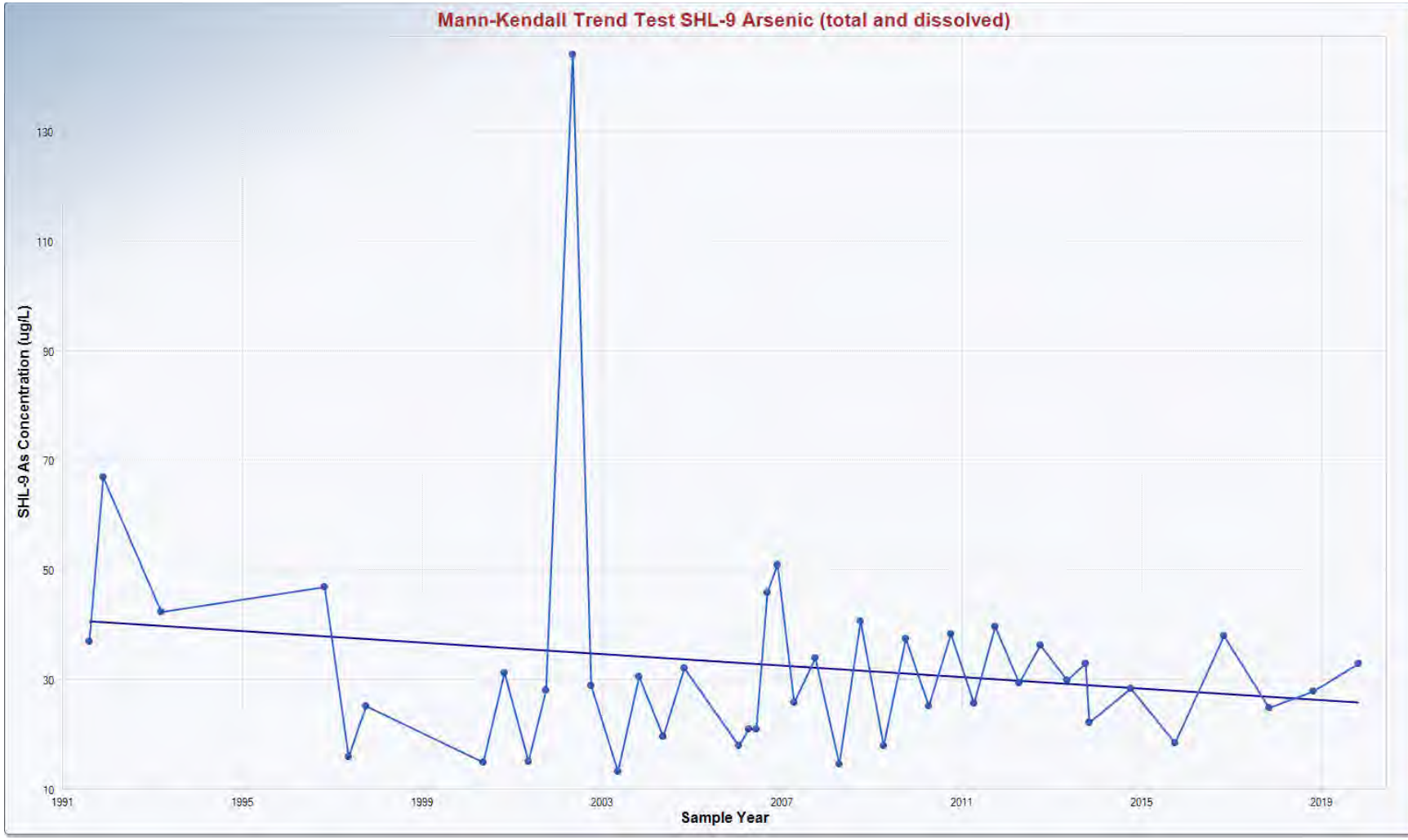
Mann-Kendall Trend Analysis

n	38
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	79.4942
Standardized Value of S	-2.3524
M-K Test Value (S)	-188
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0093

OLS Regression Line (Blue)

OLS Regression Slope	-0.4528
OLS Regression Intercept	916.7945

Statistically significant evidence of a decreasing trend at the specified level of significance.



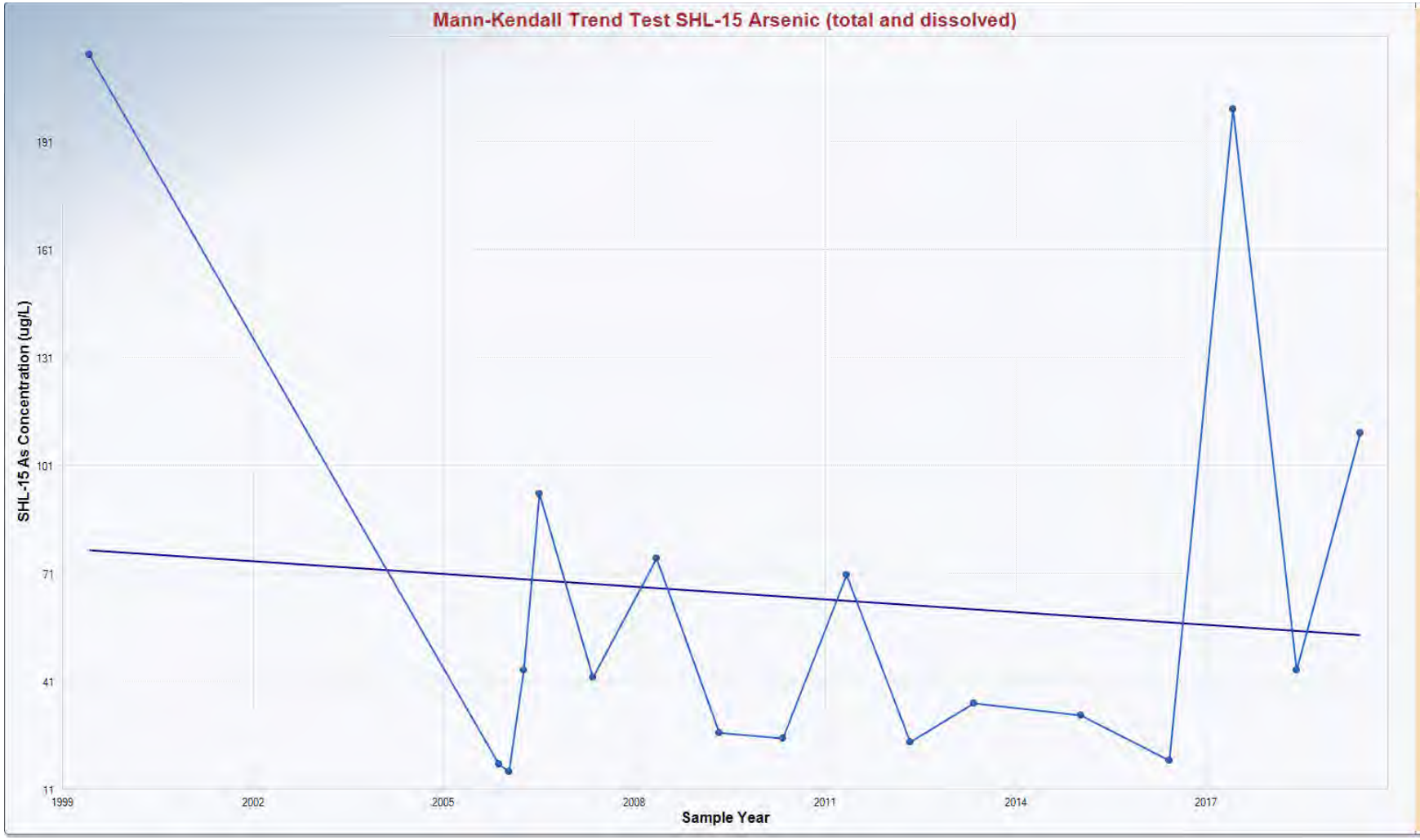
Mann-Kendall Trend Analysis

n	42
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	92.2623
Standardized Value of S	-0.0867
M-K Test Value (S)	-9
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.4655

OLS Regression Line (Blue)

OLS Regression Slope	-0.5266
OLS Regression Intercept	1,089.5408

Insufficient statistical evidence of a significant trend at the specified level of significance.



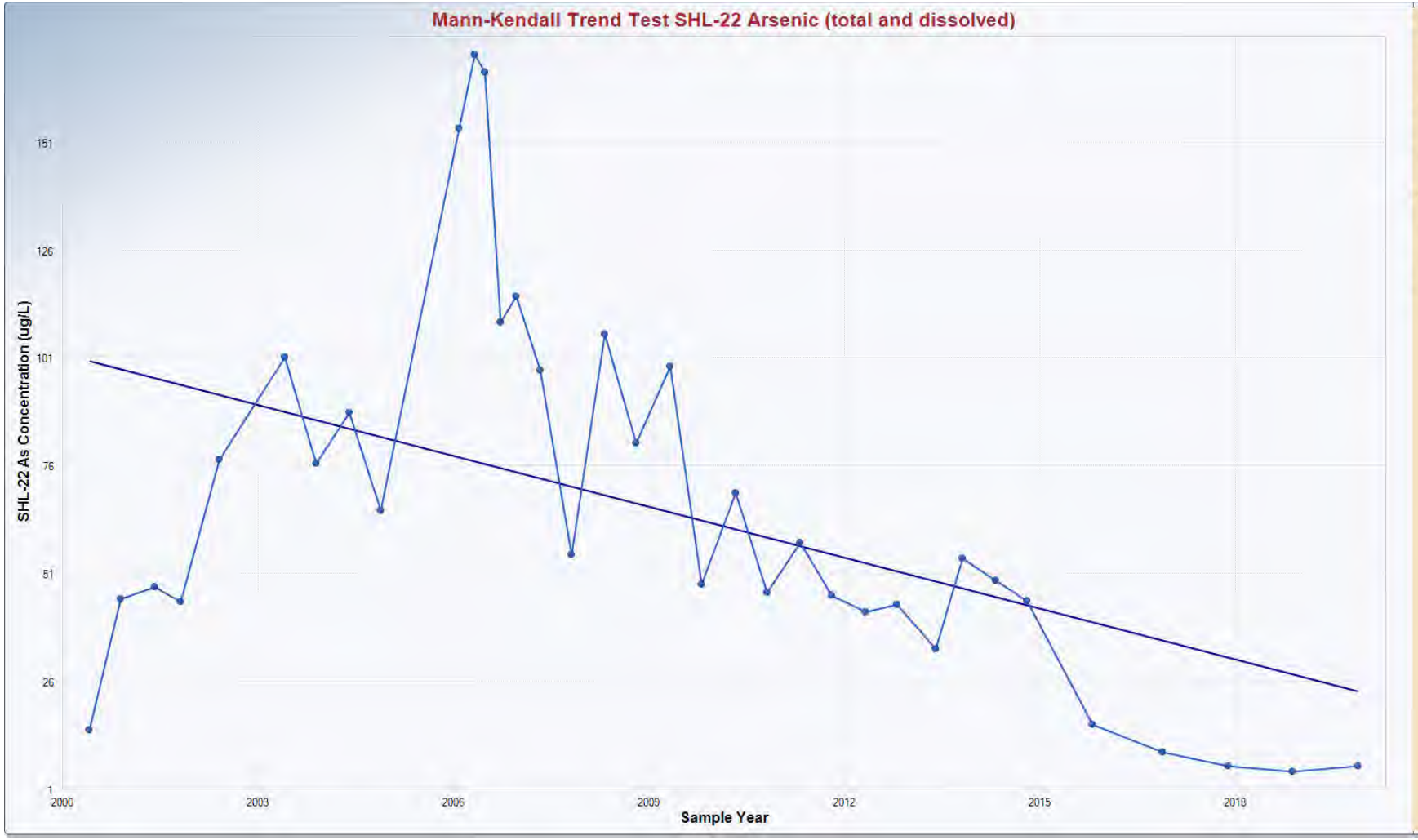
Mann-Kendall Trend Analysis

n	17
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	24.2556
Standardized Value of S	0.2474
M-K Test Value (S)	7
Tabulated p-value	0.4200
Approximate p-value	0.4023

OLS Regression Line (Blue)

OLS Regression Slope	-1.1702
OLS Regression Intercept	2,417.5758

Insufficient statistical evidence of a significant trend at the specified level of significance.



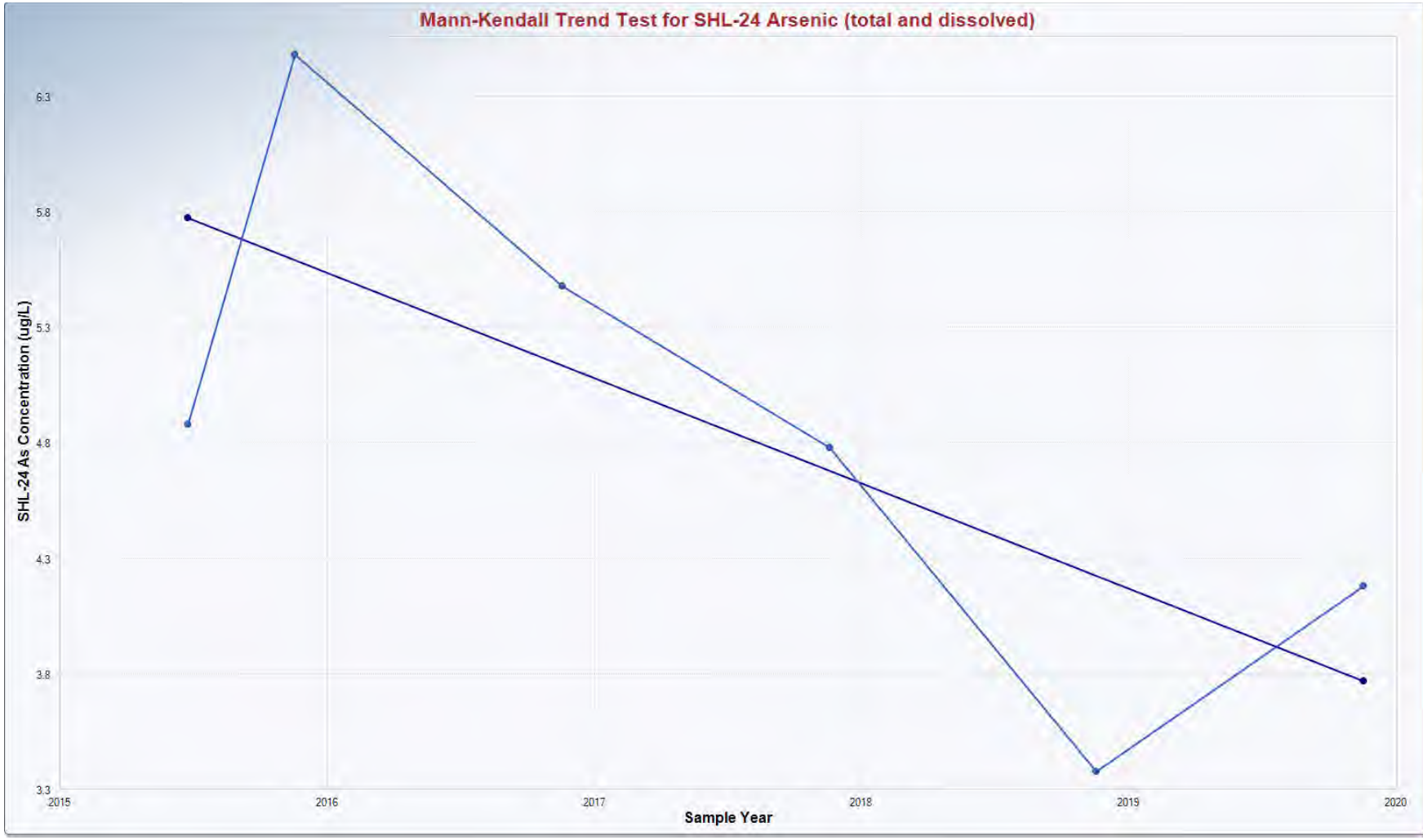
Mann-Kendall Trend Analysis

n	35
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	70.4154
Standardized Value of S	-3.5220
M-K Test Value (S)	-249
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0002

OLS Regression Line (Blue)

OLS Regression Slope	-3.9281
OLS Regression Intercept	7,957.9466

Statistically significant evidence of a decreasing trend at the specified level of significance.



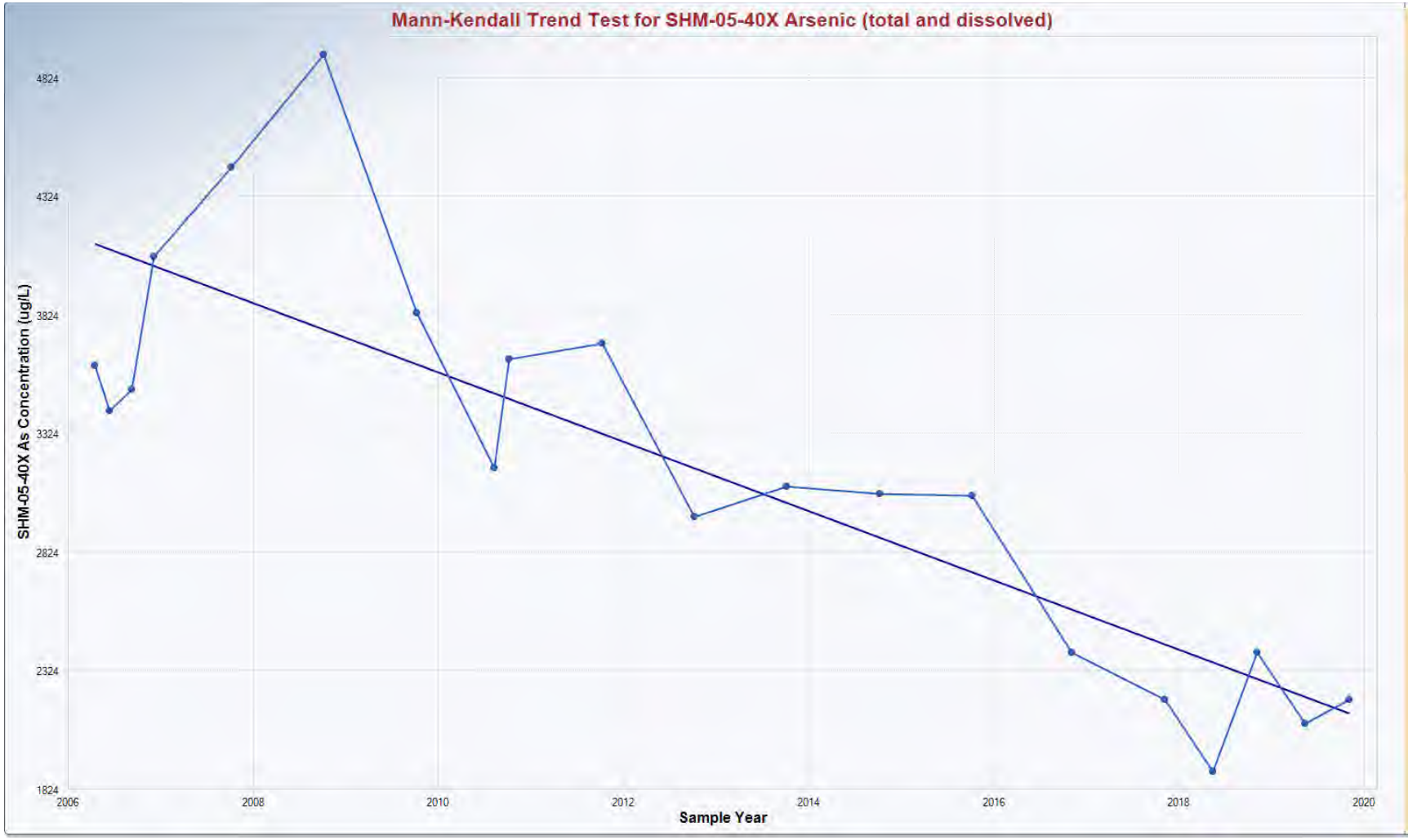
Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	-1.5029
M-K Test Value (S)	-9
Tabulated p-value	0.0680
Approximate p-value	0.0664

OLS Regression Line (Blue)

OLS Regression Slope	-0.4554
OLS Regression Intercept	923.6546

Insufficient statistical evidence of a significant trend at the specified level of significance.



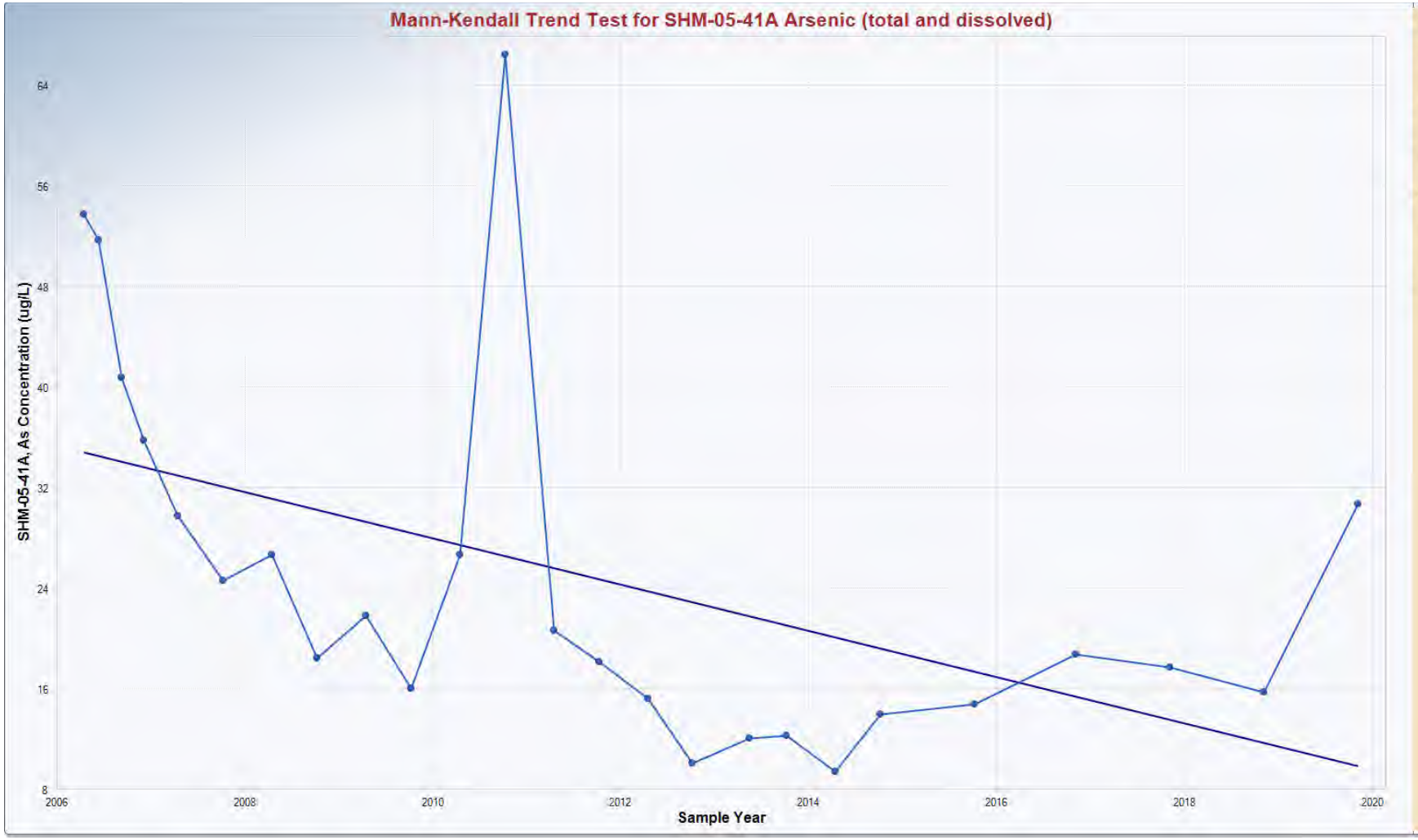
Mann-Kendall Trend Analysis

n	20
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	30.7896
Standardized Value of S	-3.9299
M-K Test Value (S)	-122
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-146.1032
OLS Regression Intercept	297,253.1224

Statistically significant evidence of a decreasing trend at the specified level of significance.



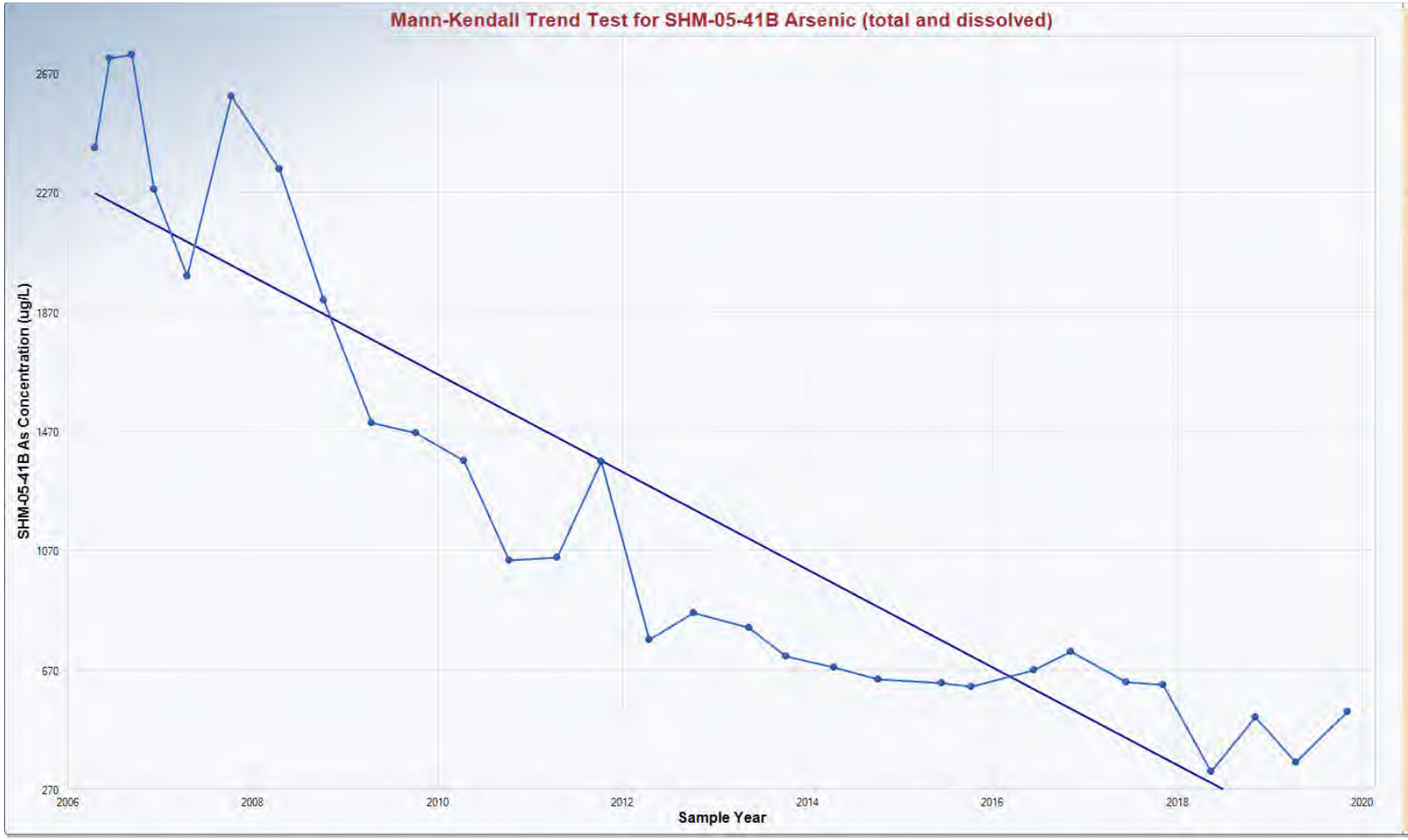
Mann-Kendall Trend Analysis

n	25
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	42.8058
Standardized Value of S	-3.4108
M-K Test Value (S)	-147
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0003

OLS Regression Line (Blue)

OLS Regression Slope	-1.8424
OLS Regression Intercept	3,731.4724

Statistically significant evidence of a decreasing trend at the specified level of significance.



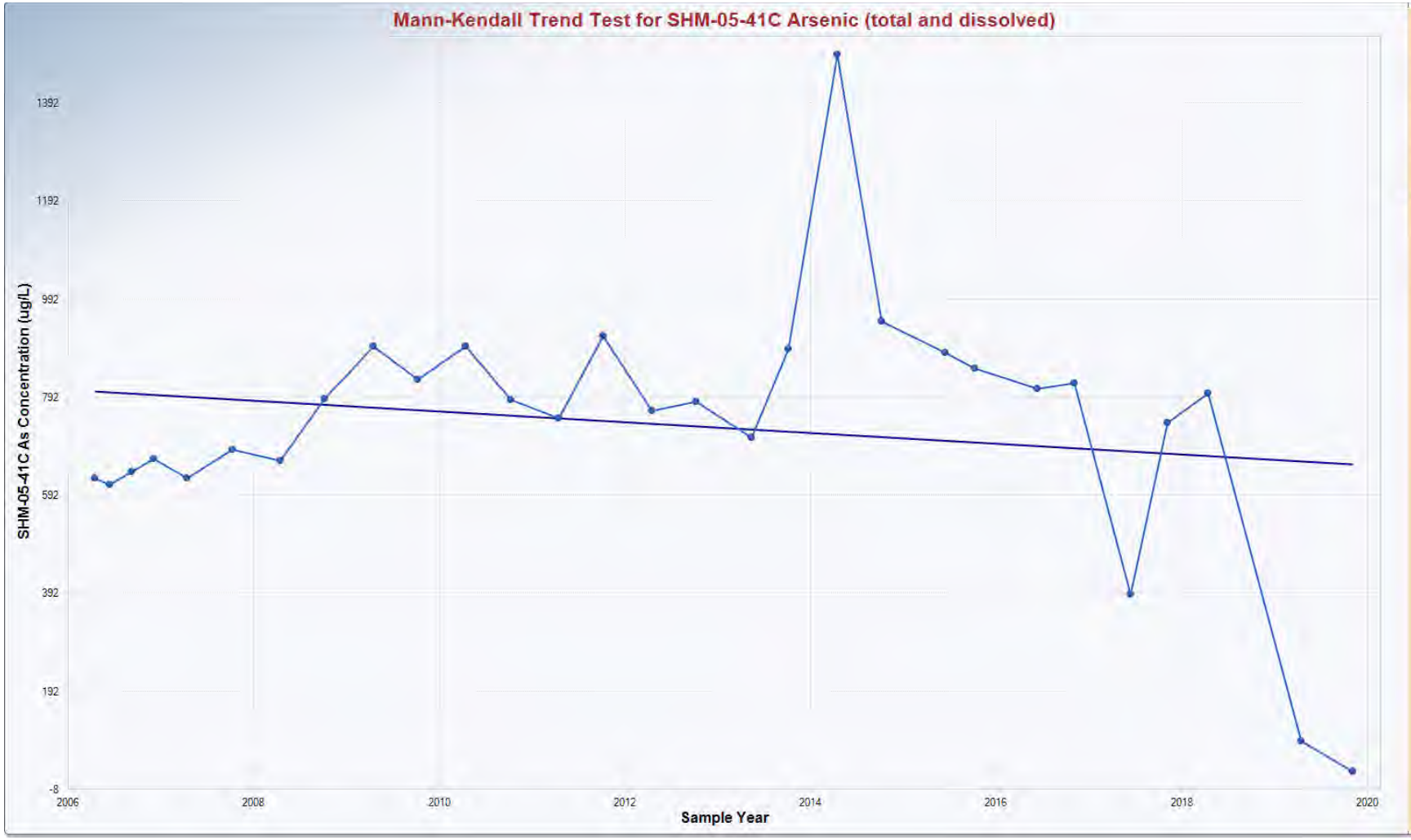
Mann-Kendall Trend Analysis

n	30
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	56.0506
Standardized Value of S	-6.6725
M-K Test Value (S)	-375
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-163.8463
OLS Regression Intercept	330,996.9938

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	29
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	53.3104
Standardized Value of S	0.9567
M-K Test Value (S)	52
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.1694

OLS Regression Line (Blue)

OLS Regression Slope	-10.9672
OLS Regression Intercept	22,808.0595

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	25
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	42.8058
Standardized Value of S	-4.0649
M-K Test Value (S)	-175
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-7.3893
OLS Regression Intercept	15,088.2339

Statistically significant evidence of a decreasing trend at the specified level of significance.

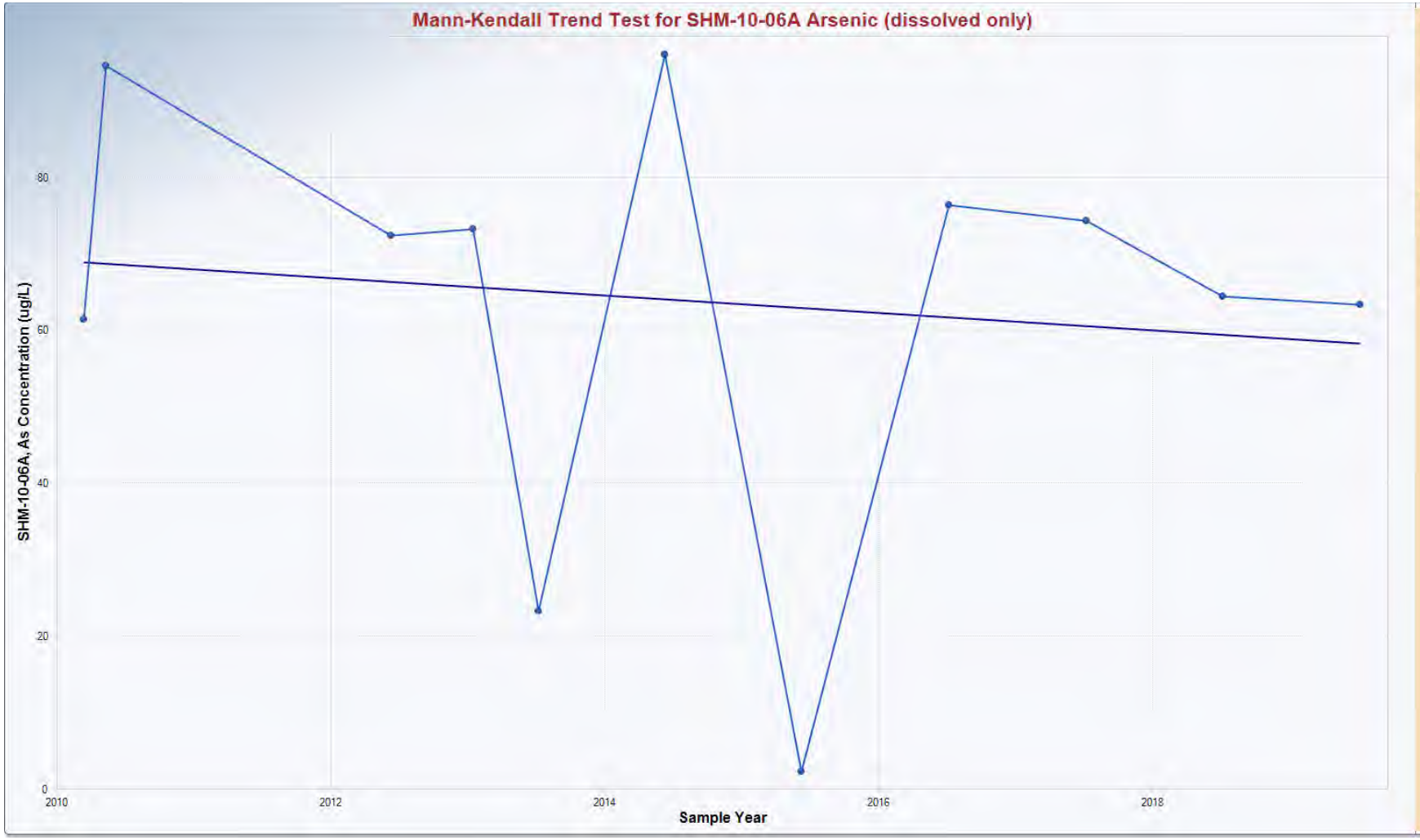
Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-2.3255
M-K Test Value (S)	-27
Tabulated p-value	0.0080
Approximate p-value	0.0100

OLS Regression Line (Blue)

OLS Regression Slope	-104.6590
OLS Regression Intercept	212,756.5632

Statistically significant evidence of a decreasing trend at the specified level of significance.



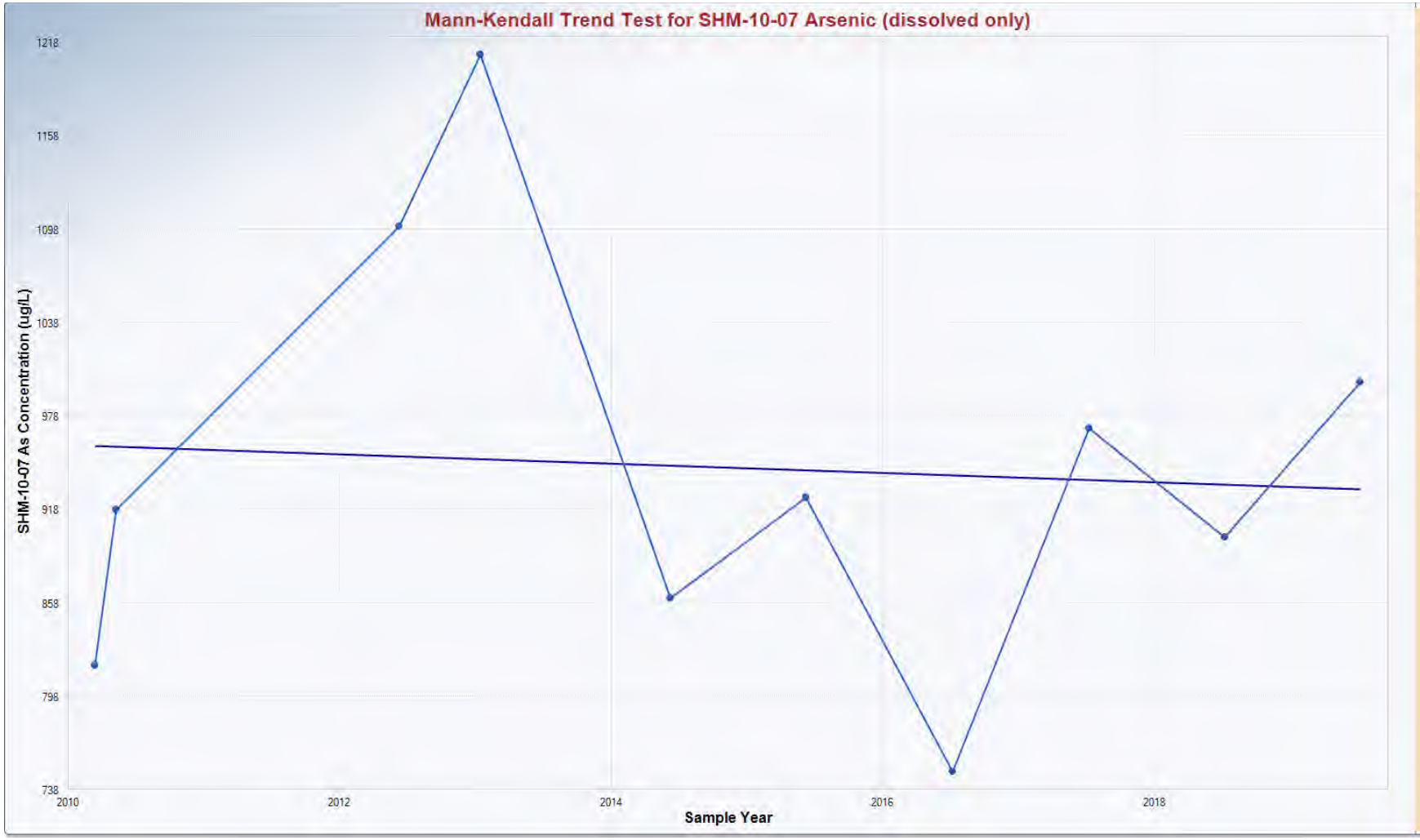
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-0.3114
M-K Test Value (S)	-5
Tabulated p-value	0.3810
Approximate p-value	0.3777

OLS Regression Line (Blue)

OLS Regression Slope	-1.1295
OLS Regression Intercept	2,339.4160

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	0.3578
M-K Test Value (S)	5
Tabulated p-value	0.3640
Approximate p-value	0.3603

OLS Regression Line (Blue)

OLS Regression Slope	-2.9542
OLS Regression Intercept	6,898.5139

Insufficient statistical evidence of a significant trend at the specified level of significance.

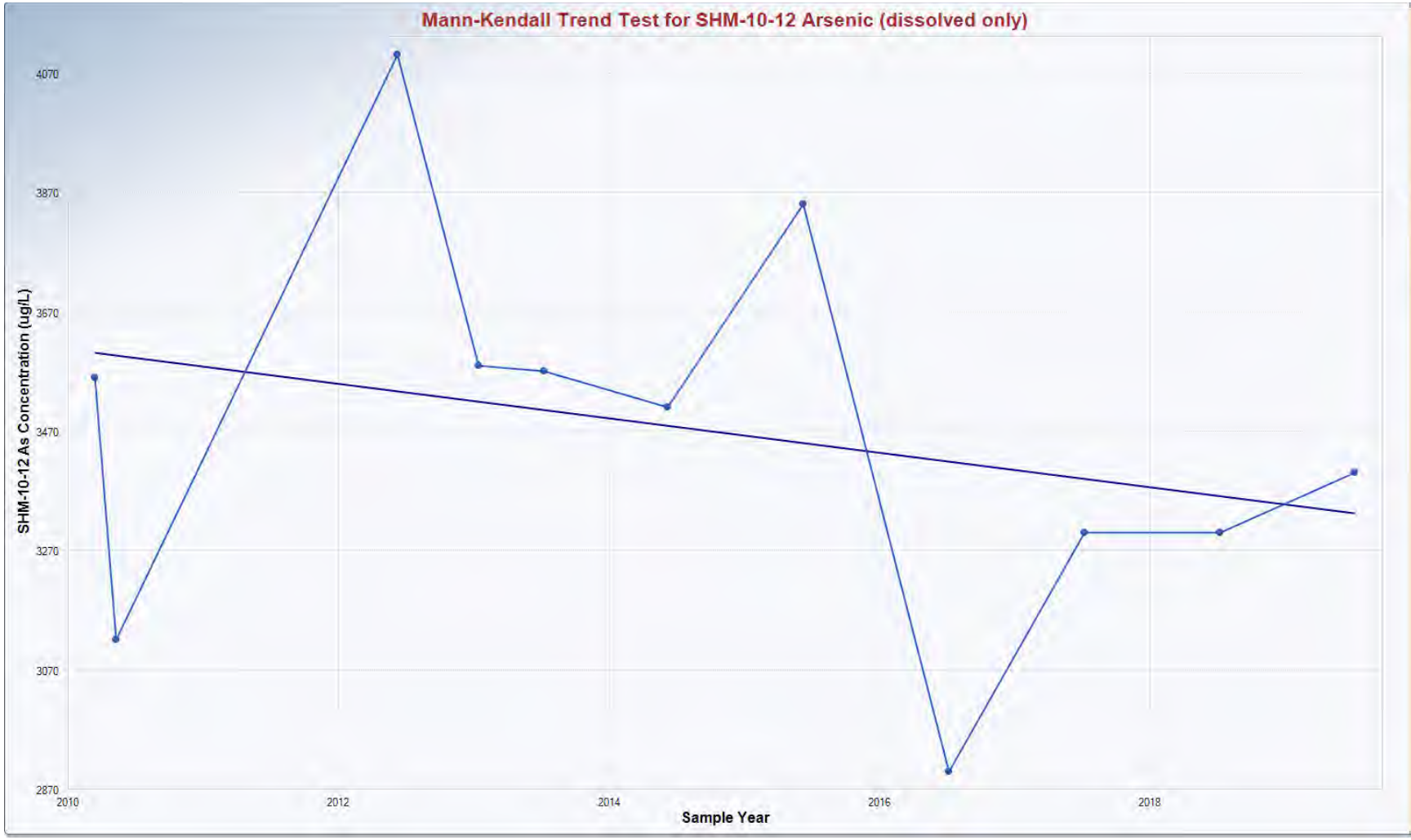
Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	2.8622
M-K Test Value (S)	33
Tabulated p-value	0.0010
Approximate p-value	0.0021

OLS Regression Line (Blue)

OLS Regression Slope	20.9619
OLS Regression Intercept	-41,751.6538

Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	-1.0151
M-K Test Value (S)	-14
Tabulated p-value	0.1410
Approximate p-value	0.1550

OLS Regression Line (Blue)

OLS Regression Slope	-28.9962
OLS Regression Intercept	61,900.3588

Insufficient statistical evidence of a significant trend at the specified level of significance.

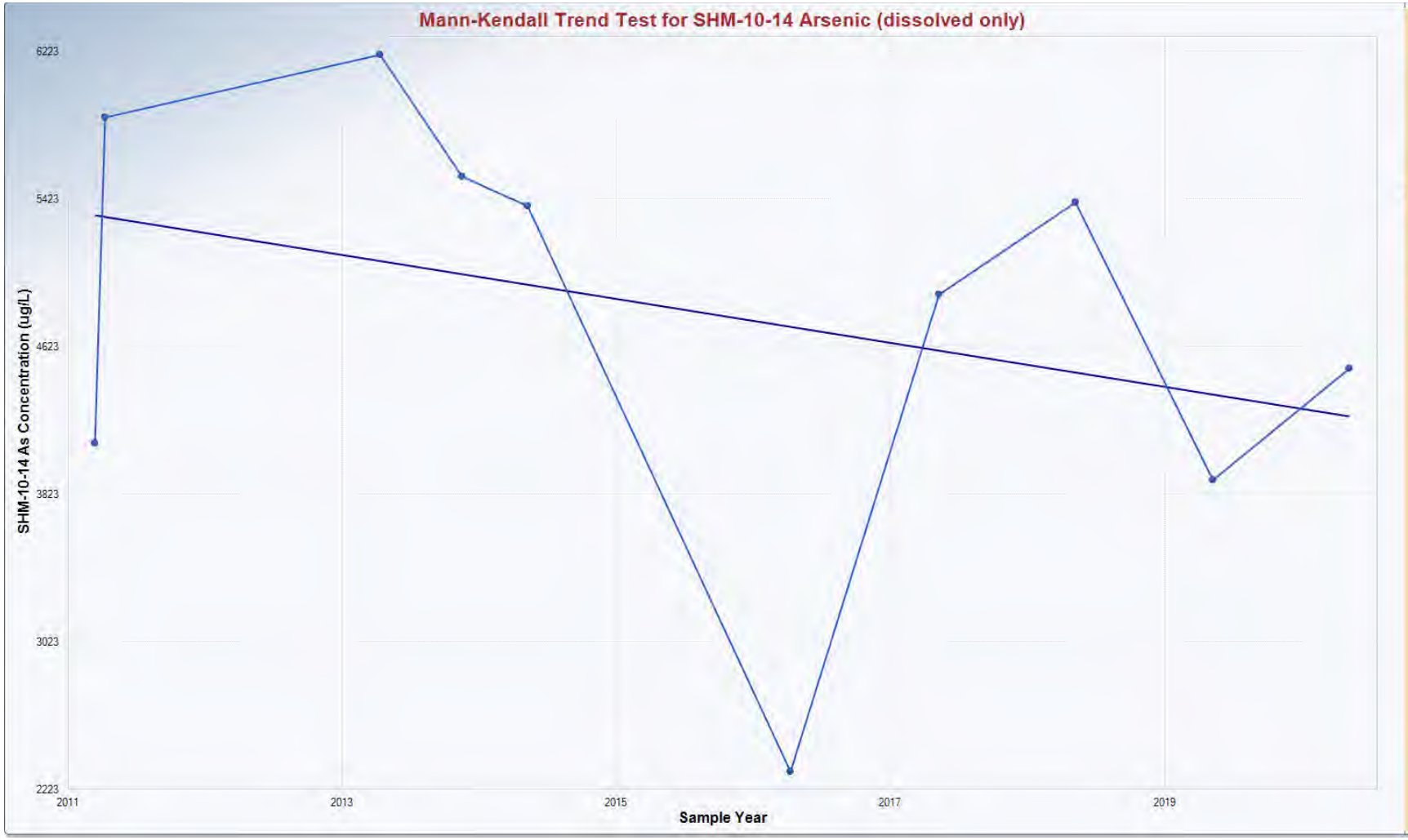
Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-1.9677
M-K Test Value (S)	-23
Tabulated p-value	0.0230
Approximate p-value	0.0245

OLS Regression Line (Blue)

OLS Regression Slope	-20.5231
OLS Regression Intercept	41,858.7725

Statistically significant evidence of a decreasing trend at the specified level of significance.



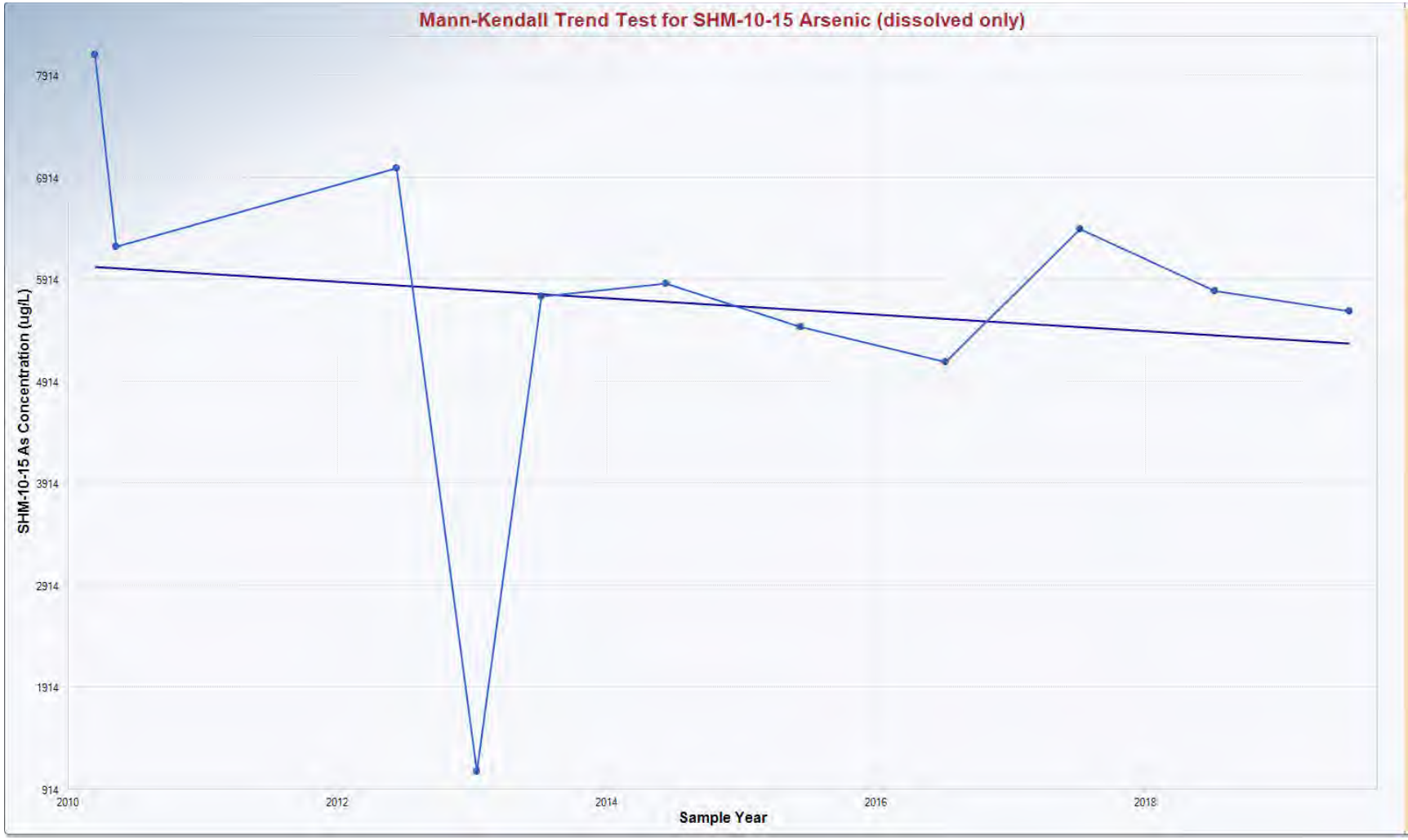
Mann-Kendall Trend Analysis

n	10
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	11.1803
Standardized Value of S	-1.2522
M-K Test Value (S)	-15
Tabulated p-value	0.1080
Approximate p-value	0.1052

OLS Regression Line (Blue)

OLS Regression Slope	-118.9455
OLS Regression Intercept	244,496.1096

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-1.2456
M-K Test Value (S)	-17
Tabulated p-value	0.1090
Approximate p-value	0.1065

OLS Regression Line (Blue)

OLS Regression Slope	-80.8836
OLS Regression Intercept	168,655.7507

Insufficient statistical evidence of a significant trend at the specified level of significance.

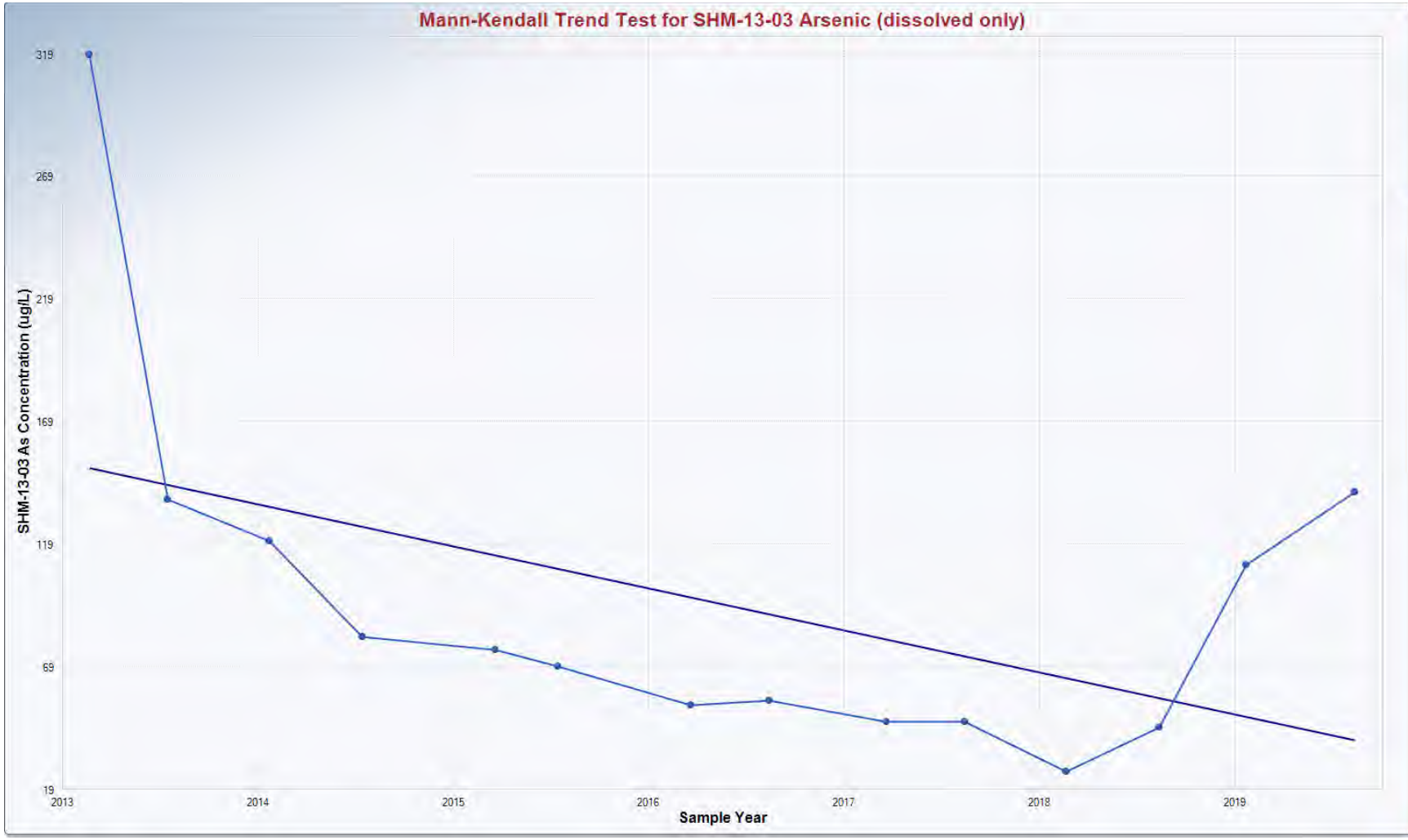
Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5144
Standardized Value of S	0.6201
M-K Test Value (S)	10
Tabulated p-value	0.2730
Approximate p-value	0.2676

OLS Regression Line (Blue)

OLS Regression Slope	43.8657
OLS Regression Intercept	-87,020.9529

Insufficient statistical evidence of a significant trend at the specified level of significance.



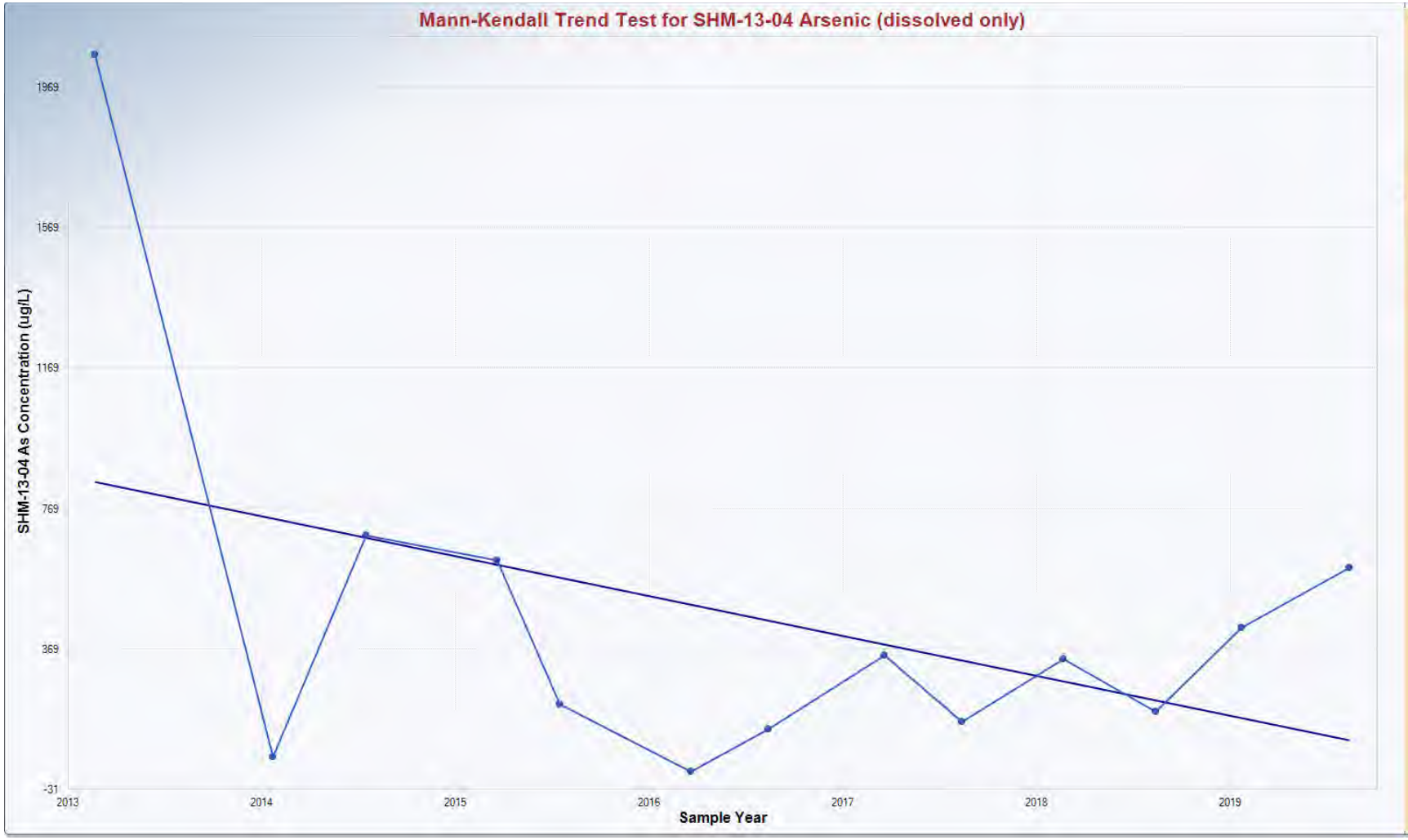
Mann-Kendall Trend Analysis

n	14
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	18.2392
Standardized Value of S	-2.3576
M-K Test Value (S)	-44
Tabulated p-value	0.0070
Approximate p-value	0.0092

OLS Regression Line (Blue)

OLS Regression Slope	-17.1046
OLS Regression Intercept	34,588.0035

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.3911
Standardized Value of S	-0.0610
M-K Test Value (S)	-2
Tabulated p-value	0.4760
Approximate p-value	0.4757

OLS Regression Line (Blue)

OLS Regression Slope	-113.6674
OLS Regression Intercept	229,701.6081

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	8
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	8.0208
Standardized Value of S	1.4961
M-K Test Value (S)	13
Tabulated p-value	0.0890
Approximate p-value	0.0673

OLS Regression Line (Blue)

OLS Regression Slope	0.8256
OLS Regression Intercept	-1,653.9804

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	14
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	18.1659
Standardized Value of S	-0.4954
M-K Test Value (S)	-10
Tabulated p-value	0.2950
Approximate p-value	0.3101

OLS Regression Line (Blue)

OLS Regression Slope	-37.9772
OLS Regression Intercept	79,182.3339

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	13
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	16.3605
Standardized Value of S	-1.8337
M-K Test Value (S)	-31
Tabulated p-value	0.0380
Approximate p-value	0.0334

OLS Regression Line (Blue)

OLS Regression Slope	-120.0461
OLS Regression Intercept	242,775.8590

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	14
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	18.2665
Standardized Value of S	-2.5183
M-K Test Value (S)	-47
Tabulated p-value	0.0050
Approximate p-value	0.0059

OLS Regression Line (Blue)

OLS Regression Slope	-46.5687
OLS Regression Intercept	94,775.2229

Statistically significant evidence of a decreasing trend at the specified level of significance.

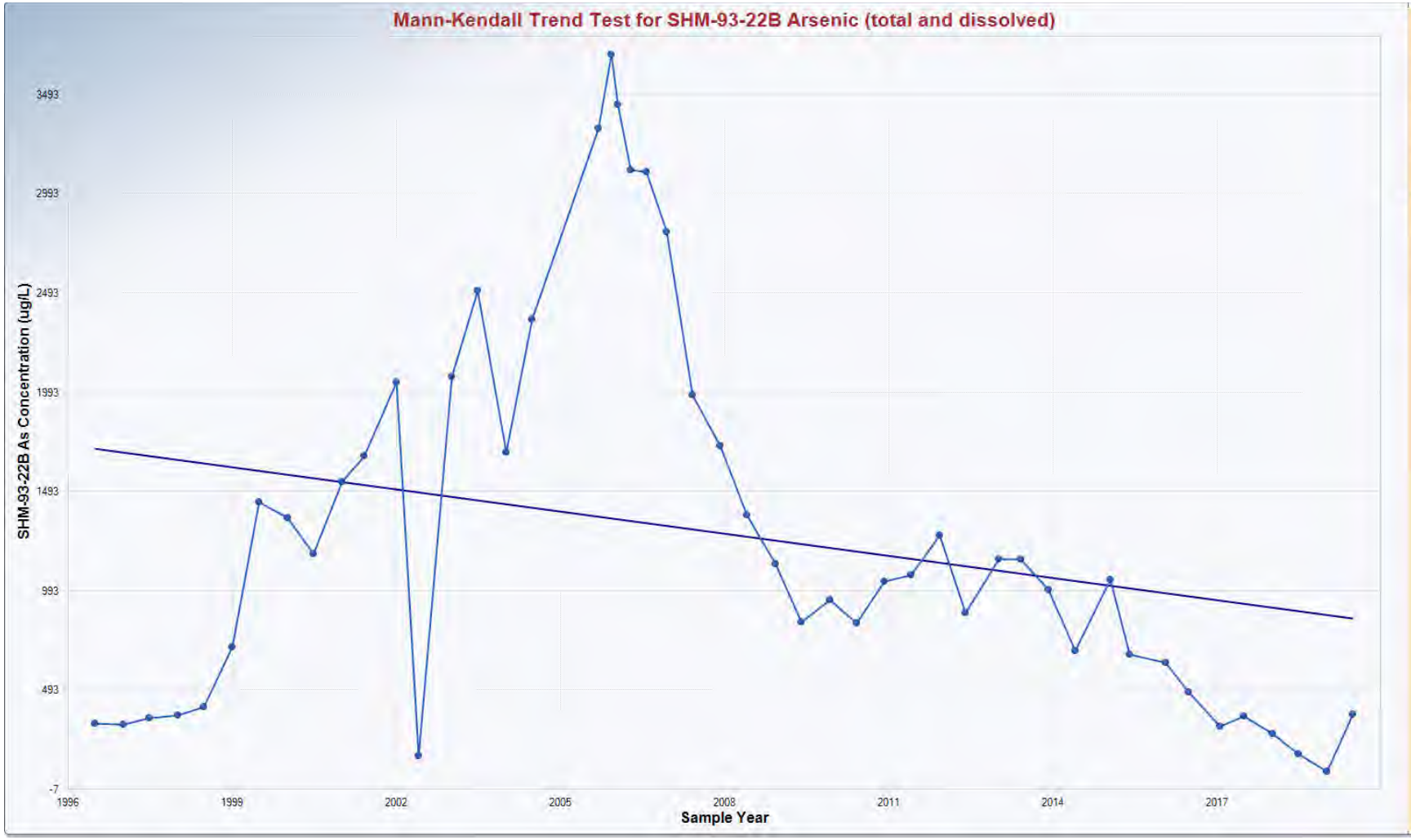
Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	0.7515
M-K Test Value (S)	5
Tabulated p-value	0.2350
Approximate p-value	0.2262

OLS Regression Line (Blue)

OLS Regression Slope	0.2591
OLS Regression Intercept	-513.4124

Insufficient statistical evidence of a significant trend at the specified level of significance.



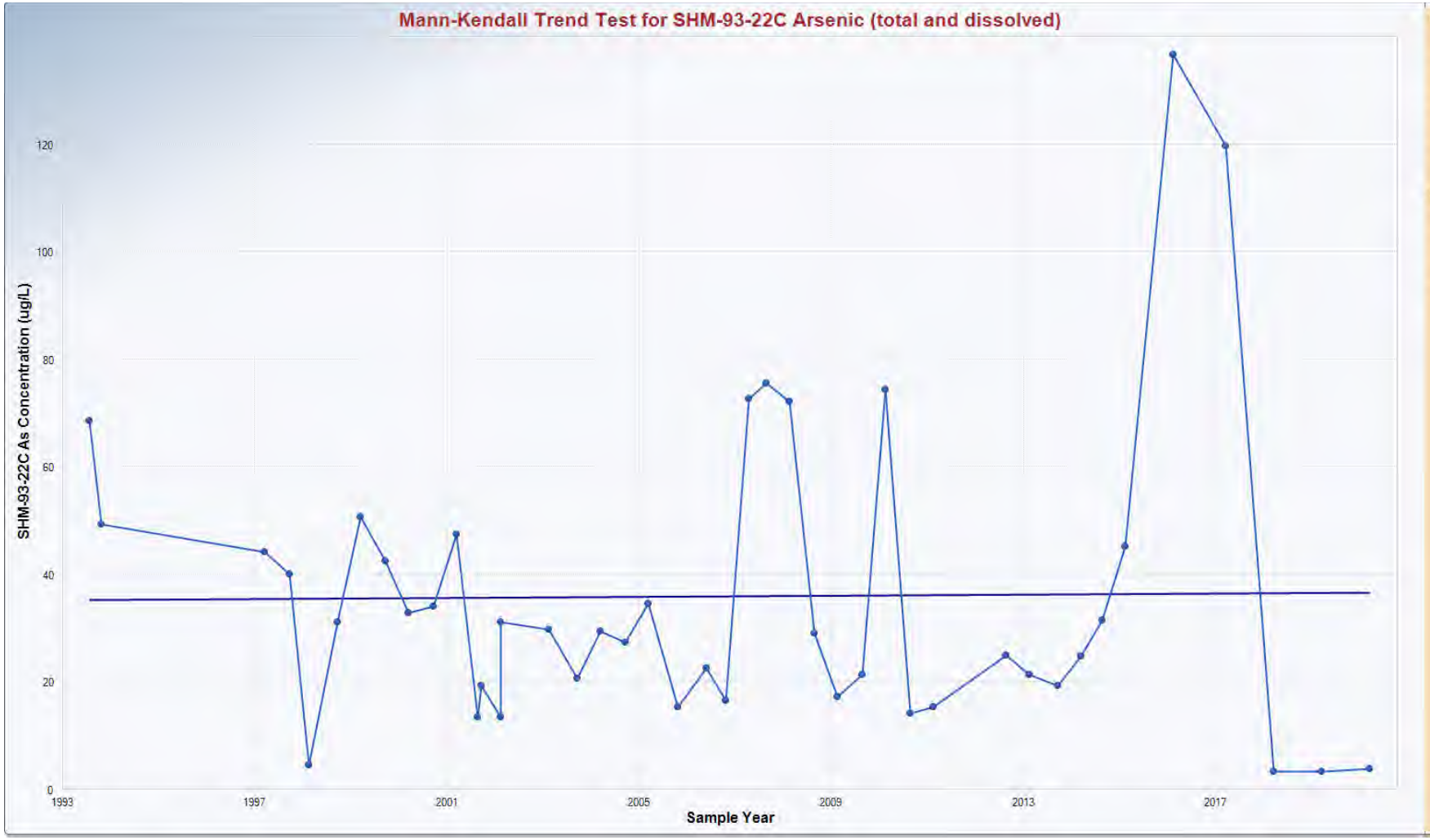
Mann-Kendall Trend Analysis

n	48
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	112.5063
Standardized Value of S	-2.4887
M-K Test Value (S)	-281
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0064

OLS Regression Line (Blue)

OLS Regression Slope	-37.1595
OLS Regression Intercept	75,908.3682

Statistically significant evidence of a decreasing trend at the specified level of significance.



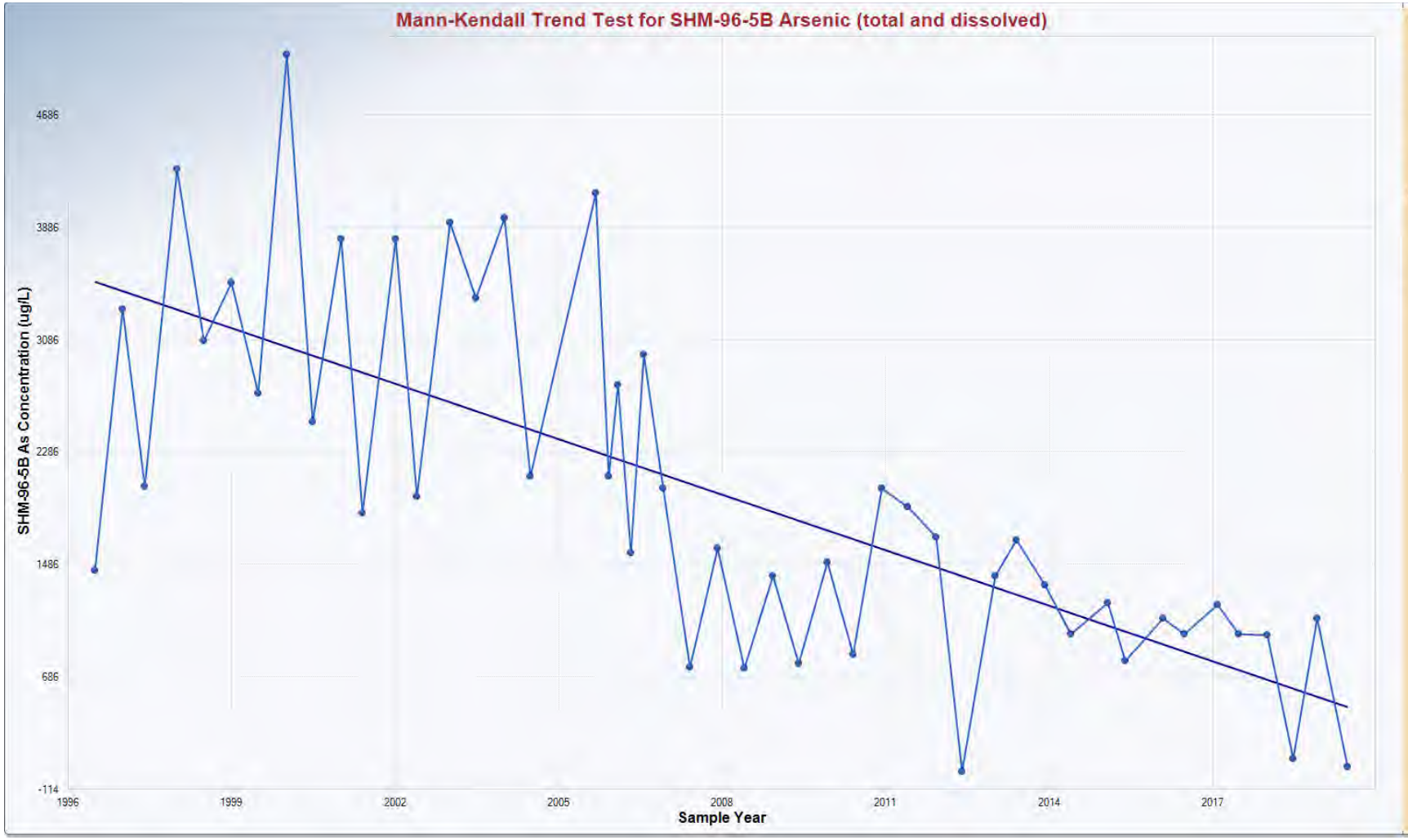
Mann-Kendall Trend Analysis

n	43
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	95.5214
Standardized Value of S	-1.5913
M-K Test Value (S)	-153
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0558

OLS Regression Line (Blue)

OLS Regression Slope	0.0525
OLS Regression Intercept	-68.9975

Insufficient statistical evidence of a significant trend at the specified level of significance.



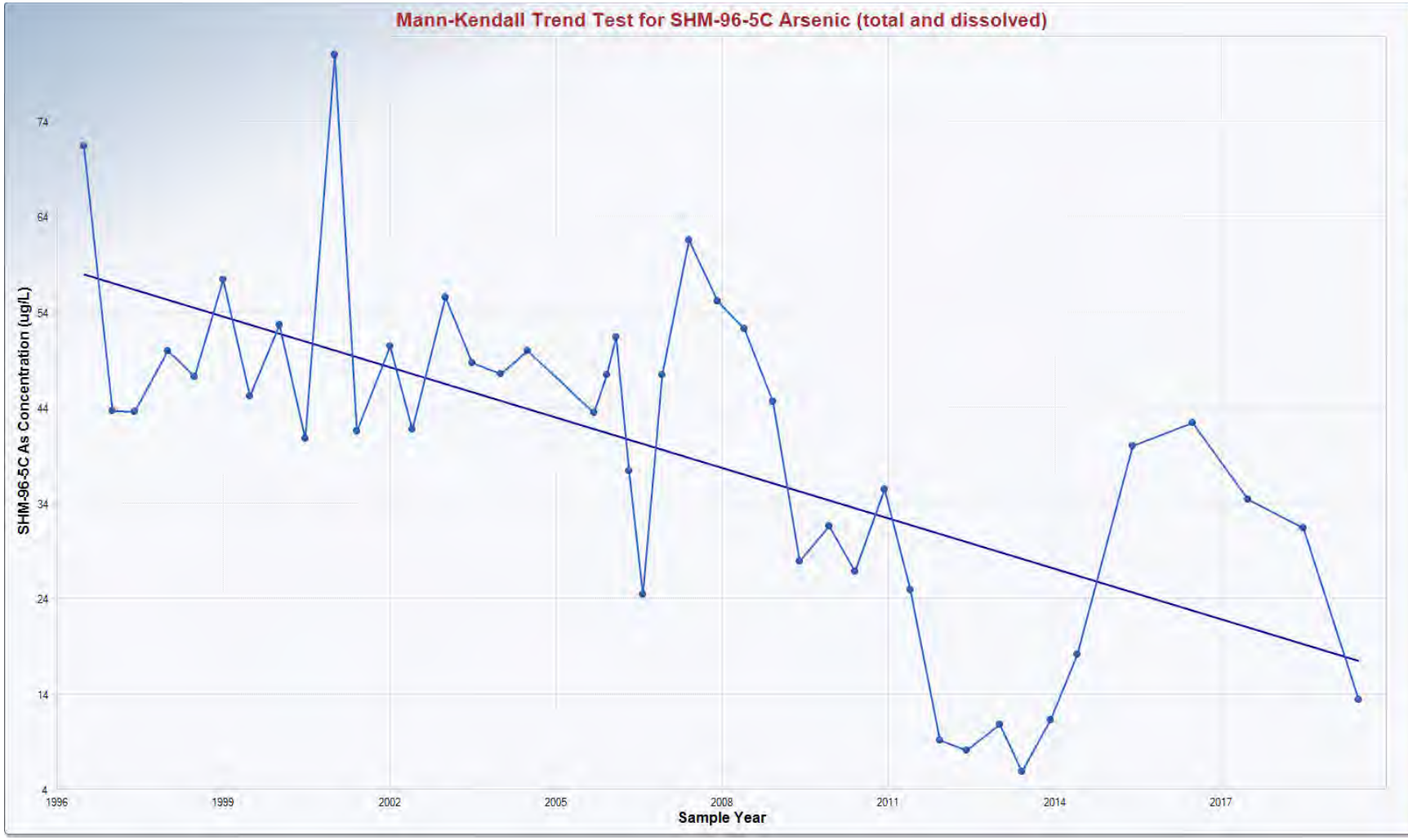
Mann-Kendall Trend Analysis

n	48
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	112.4885
Standardized Value of S	-5.6006
M-K Test Value (S)	-631
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-131.6487
OLS Regression Intercept	266,385.8567

Statistically significant evidence of a decreasing trend at the specified level of significance.



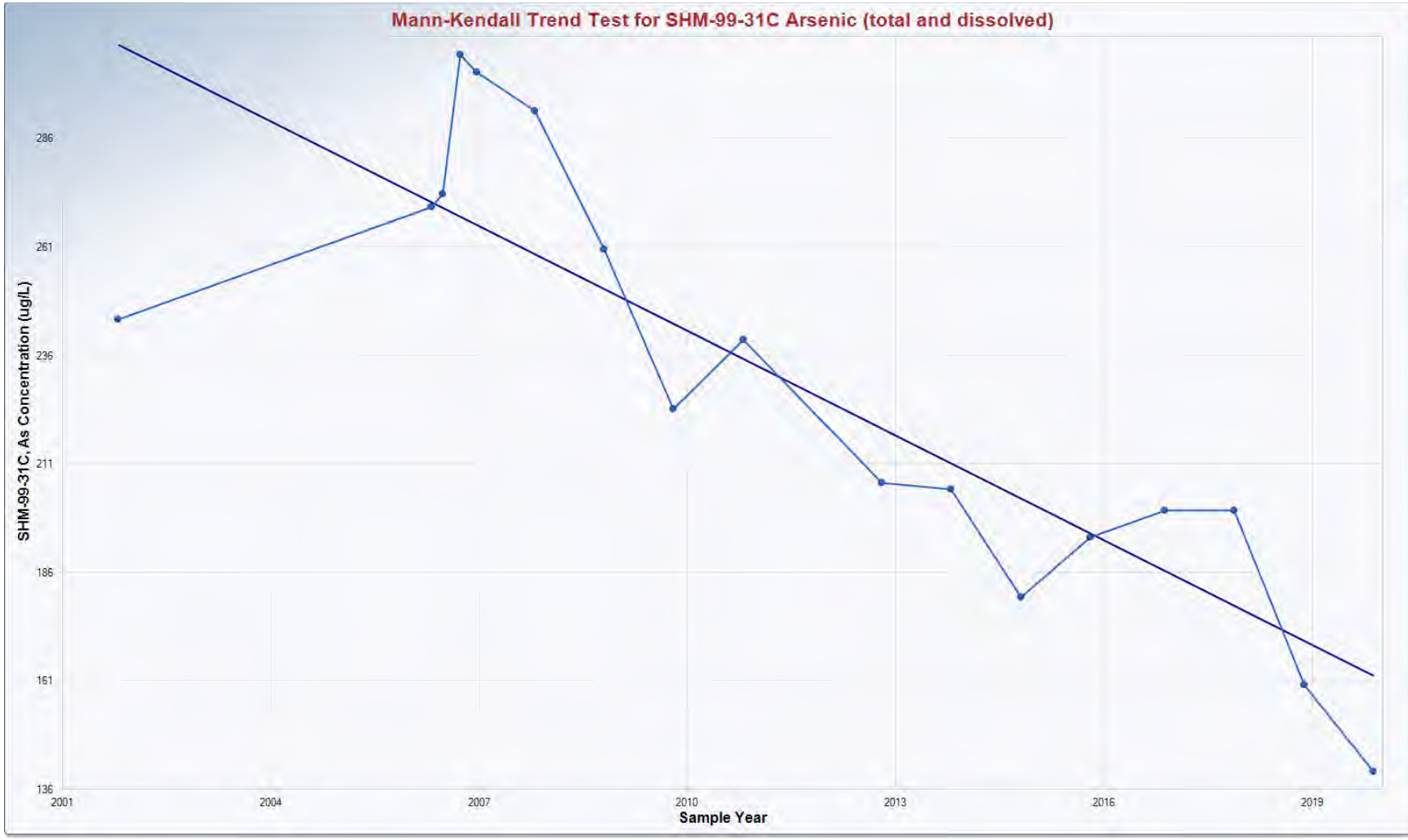
Mann-Kendall Trend Analysis

n	43
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	95.5423
Standardized Value of S	-4.3122
M-K Test Value (S)	-413
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-1.7605
OLS Regression Intercept	3,573.1140

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	17
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	24.2556
Standardized Value of S	-3.9579
M-K Test Value (S)	-97
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-8.0468
OLS Regression Intercept	16,415.5939

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.2111
Standardized Value of S	-3.6468
M-K Test Value (S)	-82
Tabulated p-value	0.0000
Approximate p-value	0.0001

OLS Regression Line (Blue)

OLS Regression Slope	-13.0360
OLS Regression Intercept	26,363.8214

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	15
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	20.2073
Standardized Value of S	-1.2867
M-K Test Value (S)	-27
Tabulated p-value	0.1010
Approximate p-value	0.0991

OLS Regression Line (Blue)

OLS Regression Slope	-84.2177
OLS Regression Intercept	172,164.1035

Insufficient statistical evidence of a significant trend at the specified level of significance.

C.3 Shepley's Hill

Tables

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
SHL-3	SHL-3 FAL17	11/27/2017	NA	3 U	NA	75 U	NA	2.6 J	99	1.9	21	1.7	12.32	5.53	261	7.01	126.3	5.07	
	SHL-3 FAL18	11/5/2018	NA	3 U	NA	22 J	NA	3 U	150	1.8	22	1.9	12.7	6.06	342	6.57	37.9	6.78	
	SHL-3_FAL19	10/29/2019		3.0 U		50 U		**1.3 J**	**99**	**1.3**	**7.3**	**1.4**	12	6	220	5.1	160	3.6	
SHL-4	SHL-4-101607	10/16/2007	7.5	NA	1800	NA	631	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-4-101410	10/14/2010	3.1	NA	180	NA	255	NA	110	25	7.2	NA	12.20	6.01	334	0.46	47.0	0.03	
	SHL-4-101111	10/7/2011	1.4	NA	30 J	NA	31	NA	32	1.6	2.3	NA	12.55	5.65	82	1.44	274.0	0.0	
	SHL-4-101612	10/16/2012	3.8	NA	880	NA	125	NA	55	13	0.65 J	NA	13.55	5.69	162	0.34	47.0	0.84 B	
	SHL-4-052413	5/24/2013	NA	2.6	NA	57.8 J	NA	481	123	12.8	14.6	2.4	10.39	6.10	278	0.27	107.1	0.36	
	SHL-4-111913	11/19/2013	NA	6.2	NA	637	NA	1,830	112	18	69.3	3.3	11.52	6.13	427	0.33	35.2	0.06	
	SHL-4-100814	10/8/2014	NA	37	NA	8030 J	NA	2480 J	114	6.0	14.8	2.7	17.71	6.20	239	0.30	4.2	11.7	
	SHL-4_FA115	10/27/2015	NA	37.4	NA	3,470	NA	2,320	71.1	15	15.9	3.0	12.96	6.15	189	0.82	6.2	3.7	
	SHL-4 FAL16	11/21/2016	NA	110	NA	22,000	NA	3,300	84	1.4	22	1.4	11.68	6.43	219	0.81	-20.0	18	
	SHL-4 SPR17	6/7/2017	NA	74	NA	15,000	NA	2,000	65	1.6	24	1.5	10.31	5.99	149	0.42	-8.2	12.1	
	SHL-4 FAL17	11/7/2017	NA	130	NA	15,000	NA	2,500	76	1.5	18	1.4	12.27	6.62	163	0.17	-38.2	4.14	
	SHL-4 SPR18	4/19/2018	NA	110	NA	15,000	NA	2,600	64 J	1.7	24	1.4	8.78	6.28	212	1.05	-1.6	4.31	
	SHL-4 FAL18	11/14/2018	NA	150	NA	17,000	NA	3,200	68	1.2	22	1.5	11.3	6.32	313	0.21	-15.2	22.4	
	SHL-4_SPR19	04/16/2019		**98**		**14,000**		**2,900**	**55**	**0.93**	**18**	**1.6**	11	6.3	190	0.59	-28	7.7	
	SHL-4_FAL19	10/29/2019		**69**		**11,000**		**3,900**	**90**	**1.5**	**17**	**1.5**	12	6.1	210	0.29	-4.1	18	
SHL-5	SHL-5-101807	10/18/2007	16	NA	6300	NA	362	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-5-042210	4/22/2010	3.4	NA	1200	NA	237	NA	25	3.6	<1.0	NA	7.21	5.86	90	0.09	-254.0	0.56	
	SHL-5-101110	10/11/2010	4.8	NA	610	NA	425	NA	20	2.9	2.1	NA	13.90	5.39	123	0.34	108.0	0.44	
	SHL-5-040511	4/5/2011	1.0	NA	170	NA	157	NA	12	3.7	2.2	NA	4.28	5.78	60	0.34	85.2	0.2	
	SHL-5-101111	10/11/2011	5.5	NA	700	NA	193	NA	33	0.6	1.1	NA	15.15	5.28	78	0.14	130.0	1.0	
	SHL-5041012	4/10/2012	3.7	NA	1500	NA	233 J	NA	24	3.3	<1.7	NA	7.73	5.54	84	0.54	111.8	2100	
	SHL-5-101512	10/15/2012	4.5	NA	1000	NA	310	NA	37	2.9	4.7	NA	13.98	5.42	99	0.49	82.4	4.1	
	SHL-5-052113	5/21/2013	NA	3.7	NA	999	NA	286	23.2	16.2	4.5 U	4.1	10.81	5.59	100	0.36	82.9	3.36	
	SHL-5-102213	10/22/2013	NA	15.1	NA	2,380	NA	429	43.8	4.3	0.87 J	NA	13.75	5.73	88	0.86	-89.4	0.90	
	SHL-5-042214	4/22/2014	NA	2 U	NA	282	NA	159	27.4	62.7	4.5 J	5.1	6.33	5.87	235	0.43	141.4	1.63	
	SHL-5-101314	10/13/2014	NA	13.3	NA	8,390	NA	320	41.4	35	5.6 J	10.3	13.05	5.98	205	0.18	4.7	1.27	
	SHL-5_FA115	10/21/2015	NA	12.6	NA	700	NA	293	38.1	31	2.4	10.7	12.73	6.24	170	0.93	38.7	0.44	
	SHL-5 FAL16	11/17/2016	NA	3 U	NA	190	NA	130	26	15	17	6.7	10.81	5.74	132	0.23	130.1	0.66	
	SHL-5 FAL17	11/10/2017	NA	3.7	NA	640	NA	190	42	6.2	4.4	6.9	12.40	6.38	100	0.19	63.7	3.34	
	SHL-5 FAL18	11/14/2018	NA	2.8 J	NA	610	NA	140	32	3.8	0.54 J	6.4	8.38	5.37	132	0.43	3.4	2.11	
	SHL-5_FAL19	11/08/2019		**5.1**		**390**		**170**	**41**	**12**	**11**	**8**	12	5.5	140	-0.81	63	3.6	
SHL-7	SHL-7 FAL17	11/15/2017	NA	3	NA	180	NA	110	48	13	5.3	0.50 U	11.79	6.70	162	0.39	87.9	6.18	
	SHL-7 FAL18	11/12/2018	NA	3 U	NA	22 J	NA	34	59	4.6	3.5	1.1 U	14.5	6.27	137	0.27	128	4.95	
	SHL-7_FAL19	11/13/2019		3.0 U		**160**		**13**	**61**	**26**	**12**	**1**	9.4	7.7	190	3.3	-4.5	4.2	
SHL-8S	SHL-8S-101807	10/18/2007	23	NA	80	NA	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-8S-0422210	4/22/2010	0.6	NA	<50	NA	<10	NA	20	6.7	6.6	NA	9.85	6.28	101	2.39	-91.0	0.01	
	SHL-8S-101110	10/11/2010	<0.5	NA	<50	NA	3.8 J	NA	20	7.5	5.0	NA	10.20	6.15	78	1.72	145.0	0.47	
	SHL-8S-040511	4/5/2011	<0.5	NA	50	NA	16	NA	21	6.4	6.1	NA	10.24	6.15	77	4.37	138.0	0.0	
	SHL-8S-100611	10/6/2011	<0.5	NA	60	NA	14	NA	21	7.1	5.4	NA	10.38	6.06	82	2.24	175.0	0.0	
	SHL-8S-041012	4/10/2012	0.6	NA	30 J	NA	32 J	NA	20	5200	<4.0	NA	9.98	6.21	97	6.90	139.8	<580	
	SHL-8S-101512	10/15/2012	<0.5	NA	30 J	NA	35	NA	19	7.4	4.3	NA	12.55	6.37	51	4.56	110.1	1.1 B	
	SHL-8S-052813	5/28/2013	NA	0.93 J	NA	<100	NA	<15	22.1	6.0	6.2	16.2	10.32	6.40	74	5.94	146.2	1.33	
	SHL-8S-102213	10/22/2013	NA	2 U	NA	30 U	NA	2.5 U	17.5	6.8	6.4 J	NA	10.77	6.20	75	2.49	230.0	0.7	
	SHL-8S-042214	4/22/2014	NA	2 U	NA	79.4 J	NA	6.1 J	26.3	6.3	6.0 J	0.55 J	10.07	6.54	77	5.53	160.8	0.62	
	SHL-8S-100914	10/9/2014	NA	2 U	NA	50 U	NA	83	25.1	5.0	7.8 J	0.59 J	10.82	6.06	84	0.53	127.8	1.5	
	SHL-8S_FA115	10/27/2015	NA	4 U	NA	100 U	NA	15 U	21.6	6.0	7.3	0.49 J	9.36	5.47	65	2.36	101.1	0.29	
	SHL-8S FAL16	11/17/2016	NA	3 U	NA	50 U	NA	3 U	24	5.0	6.8	0.36 J	10.36	6.42	76	4.11	170.2	1.01	
	SHL-8S FAL17	11/8/2017	NA	3 U	NA	75 U	NA	5 U	23	5.6	5.7	0.43 J	10.01	6.28	85	4.03	68.7	5.91	
	SHL-8S FAL18	11/13/2018	NA	3 U	NA	50 U	NA	1.3 J	23	5.9	6.3	1 U	10.90	5.78	145	3.48	29.8	5.66	
	SHL-8S_FAL19	10/24/2019		3.0 U		50 U		**1.7 J**	**26**	**5.9**	**6.7**	**0.37 J**	9.6	6	82	4.7	170	1.1	
SHL-8D	SHL-8D-101807	10/18/2007	12	NA	22 J	NA	80	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-8D-042210	4/22/2010	0.6	NA	17 J	NA	<10	NA	36	12	7.5	NA	10.25	6.28	167	1.50	-121.0	0.03	
	SHL-8D-101110	10/11/2010	<0.5	NA	<50	NA	13	NA	23	9.6	8.0	NA	11.31	6.02	102	3.65	14.3	0.98	
	SHL-8D-040511	4/5/2011	<0.5	NA	<50	NA	<10	NA	20	19	7.0	NA	10.18	6.13	124	3.47	88.0	0	
	SHL-8D-100611	10/6/2011	<0.5	NA	60	NA	<10	NA	22	7.9	7.6	NA	10.55	6.13	91	5.39	43.0	0	
	SHL-8D-041112	4/11/2012	<0.5	NA	<50	NA	<10	NA	5.0	12	<5.8	NA	9.45	5.89	164	0.83	89.6	<130	
	SHL-8D-101512	10/15/2012	<0.5	NA	<50	NA	4 J	NA	18	24	6.4	NA	12.99	6.17	92	2.19	60.5	1.2 B	
	SHL-8D-052113	5/21/2013	NA	0.72 J	NA	30 U	NA	2.5 U	27.6	30.2	6.2	0.64 U	13.65	6.12	138	1.67	48.7	0.32	
	SHL-8D-102213	10/22/2013	NA	2.0 U	NA	30 U	NA	2.5 U	13.1	11.8	7.5 J	NA	11.08	6.21	90	3.25	83.9	0.00	
	SHL-8D-042214	4/22/2014	NA	2.0 U	NA	30 U	NA	2.5 U	11.0	28.2	6.3 J	0.73 J	10.88	5.92	147	2.08	146.6	0.15	
	SHL-8D-100914	10/9/2014	NA	2.0 U	NA	50 U	NA	7.5 U	16.4	42.5	7.2 J	0.41 J	10.89	5.88	204	0.77	101.8	0.6	
	SHL-8D_FA115	10/27/2015	NA	4.0 U	NA	69.5 J	NA	39	28.8	6.3	3.6 J	1.0	9.94	5.42	69	0.35	49.2	0.32	
	SHL-8D FAL16	11/17/2016	NA	3.0 U	NA	50 U	NA	9.9 J	27	13	7.1	0.73 J	10.59	6.34	101	0.16	36.9	1.06	
	SHL-8D FAL17	11/8/2017	NA	3.0 U	NA	34 J	NA	9	23	21	7.1	0.54 J	10.11	6.44	137	0.25	38.3	4.66	
	SHL-8D FAL18	11/13/2018	NA	3 U	NA	50 U	NA	6.6 J	24	25	7.5	1 U	10.8	5.84	227	0.19	-47	6.59	
	SHL-8D_FAL19	10/24/2019		3.0 U		**22 J**		**11**	**24**	**38**	**7.4**	**0.68 J**	10	6	190	0.19	120	0.72	
SHL-9	SHL-9-042110	4/21/2010	25	NA	6300	NA	447	NA	580	6.3	6.6	NA	8.38	6.58	204	0.12	-74.0	4.1	
	SHL-9-101210	10/12/2010	38	NA	11000	NA	442	NA	770	7.3	4.3	NA	10.20	6.35	204	0.21	-70.0	0.89	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHL-9-040611	4/6/2011	26	NA	7500	NA	467	NA	580	3.4	<6.8	NA	7.65	6.48	160	0.27	-38.7	24	
	SHL-9-100711	10/7/2011	40	NA	9500	NA	409	NA	670	14	7.8	NA	11.78	6.26	223	0.27	-55.1	-55	
	SHL-9-041012	4/10/2012	30	NA	9500	NA	354 J	NA	860	5.0	4.4	NA	8.47	6.20	268	0.34	-19.3	4600	
	SHL-9-101712	10/17/2012	36	NA	8300	NA	357	NA	85	4.4	6.8	NA	9.12	6.94	210	0.36	-80.3	0.72 B	
	SHL-9-052813	5/28/2013	NA	30	NA	9590 J	NA	497	88.4	5.5	4.5 U	4.6	9.04	6.51	199	0.27	-54.1	1.71	
	SHL-9-102313	10/23/2013	NA	33.1	NA	8,890	NA	439	63.5	22.7	2.1 J	NA	10.87	6.52	160	0.22	-76.4	0.58	
	SHL-9-042314	4/23/2014	NA	22.2	NA	9,530	NA	533	62.4	24.2	6.7 J	4.8	7.41	6.28	211	0.71	5.3	20.0	
	SHL-9-100914	10/9/2014	NA	28.5	NA	9,820	NA	469	55.6	36.5	8.5 J	4.5	9.67	6.45	183	0.11	-42.1	7.51	
	SHL-9_FA115	10/28/2015	NA	18.5	NA	15,900	NA	451	82.4	13.5	1.6 J	11.1	9.41	5.96	299	0.28	-7.8	1.51	
	SHL-9 FAL16	11/17/2016	NA	38	NA	6,800	NA	350	52	78	10	5.8	10.53	6.34	431	0.81	-13.0	42	
	SHL-9 FAL17	11/15/2017	NA	25	NA	6,400	NA	360	55	21	11	5.3	10.17	7.89	418	2.06	4.9	4.77	
	SHL-9 FAL18	11/12/2018	NA	28	NA	3,700	NA	220	76	26	8.9	8.1	11.2	6.25	339	0.28	-131	4.55	
	SHL-9_FAL19	10/30/2019		**33**		**3,800**		**190**	**100**	**20**	**3.8**	**8.7**	11	6.3	270	0.36	5	21	
	SHL-DUP07_FAL19	10/30/2019		**30**		**3,800**		**190**	**100**	**20**	**4.1**	**8.8**	11	6.3	270	0.36	5	21	
SHL-10	SHL-10-101607	10/16/2007	0.59 J	NA	45 J	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-10-101410	10/14/2010	0.9	NA	<50	NA	<10	NA	31	1.3	6.0	NA	12.8	6.51	89	9.16	136.9	1.0	
	SHL-10-101612	10/16/2012	0.7	NA	<50	NA	<10	NA	26	1.1	4.2	NA	9.75	6.89	73	0.87	59.1	0.36 B	
	SHL-10-052213	5/22/2013	NA	1.2	NA	30.0 J	NA	2.5 U	24.3	5.8	4.6 J	1.6	11.46	6.62	55	10.05	149.8	1.22	
	SHL-10-100814	10/8/2014	NA	2.0 U	NA	50 U	NA	7.5 U	33.8	2.8	9.8 J	0.57 J	10.9	6.54	76	8.68	173.6	8.11	
	SHL-10_FALL15	10/23/2015	NA	4.0 U	NA	100 U	NA	15 U	36.1	3.0	10.1	1.0 U	11.28	6.59	84	7.74	86.6	1.53	
	SHL-10 FAL16	12/1/2016	NA	3.0 U	NA	18 J	NA	2.6 J	11	1.4	2.7	0.96 J	10.45	6.59	81	7.29	43.6	16.2	
	SHL-10 SPR17	6/1/2017	NA	3.0 U	NA	50	NA	3.0 U	5.4	1.1	1.5	9.14	9.52	6.53	22	9.14	184.2	8.67	
	SHL-10 FAL17	11/29/2017	NA	3.0 U	NA	75 U	NA	5 U	7.5 U	0.95	2.1	0.5 U	10.81	6.25	30	9.24	104.9	1.42	
	SHL-10 SPR18	4/19/2018	NA	3.0 U	NA	85	NA	1.2 J	12	1.1	2.0	1.0 U	10.27	6.57	32	9.74	46.8	2.18	
	SHL-10 FAL18	11/6/2018	NA	3.0 U	NA	50 U	NA	3.0 U	9.3 J	0.78 J	1.1 J	1.0 U	10.6	5.46	32	0.94	103	4.71	
	SHL-10_SPR19	04/12/2019		3.0 U		50 U		3.0 U	**14**	**0.97 J**	**2.5**	0.50 U	10	6.3	41	5.7	170	3.9	
	SHL-10_FAL19	10/29/2019		3.0 U		50 U		3.0 U	**28**	**1.4**	**6.8**	**0.58 J**	11	6.8	75	8.8	150	9.8	
SHL-11	SHL-11-101607	10/16/2007	687	NA	48000	NA	2,320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-11-101310	10/13/2010	694	NA	60000	NA	2,620	NA	230	19	6.1	NA	12.66	6.38	580	0.24	-70.0	0.72	
	SHL-11-100611	10/6/2011	655	NA	50000	NA	2,250	NA	240	15	1.6	NA	13.13	6.20	597	0.30	-41.2	4.0	
	SHL-11-101512	10/15/2012	647	NA	34000	NA	1,540	NA	200	20	19	NA	14.82	6.71	365	0.35	-108.2	79	
	SHL-11-052313	5/23/2013	NA	496	NA	19,800	NA	2,430	160	41.2	19.5	2.1	12.24	6.75	462	0.18	-96.0	8.5	
	SHL-11-102213	10/22/2013	NA	752	NA	27,600	NA	3,610	164	42.7	20.2	NA	12.75	6.54	530	0.42	-97.6	0.43	
	SHL-11-042314	4/23/2014	NA	587	NA	25,100	NA	3,950	157	47.7	20.0	1.9	10.27	6.45	390	0.26	-54.9	4.94	
	SHL-11-100814	10/8/2014	NA	793	NA	44,700	NA	4,320	242	42.5	69.5	2.8	12.39	6.61	623	0.44	-90.3	5.51	
	SHL-11-06052015	6/4/2015	NA	925	NA	53,400	NA	3,310	187	64.0	0.95 J	1.6	11.64	7.01	676	0.31	-134.2	11.30	
	SHL-11_FA115	10/23/2015	NA	642	NA	45,800	NA	3560 J	173	41.2	527	3.0	11.52	6.32	630	1.12	-78.4	8.17	
	SHL-11 SPR16	6/27/2016	NA	970	NA	57,000	NA	3,500	200	63	0.8 U	2.5	0.21	6.28	696	13.26	-73.0	10.22	
	SHL-11 FAL16	11/16/2016	NA	520	NA	32,000	NA	1,900	160	45	3.3	1.9	11.7	6.34	492	1.10	-49.1	11.49	
	SHL-11 SPR17	5/31/2017	NA	880	NA	47,000	NA	3,000	170	51	2.8	2.1	10.25	6.23	404	0.38	70.9	12.80	
	SHL-11 FAL17	11/3/2017	NA	870	NA	57,000	NA	2,500	150	57	2.2	2.0	13.19	6.61	590	0.17	-79.0	14.20	
	SHL-11 SPR18	4/12/2018	NA	820	NA	53,000	NA	2,300	160	54	3.6	2.1	11.46	7.32	504	0.65	55.0	9.62	
	SHL-11 FAL18	11/7/2018	NA	910	NA	51,000	NA	1,600	130	61	0.96 J	1.9	12.1	7.33	585	0.42	-91.4	20.6	
	SHL-11_SPR19	04/22/2019		**960**		**58,000**		**1,700**	**140**	**65**	**4.7**	**2**	11	6.7	640	0.84	-82	32	
	SHL-DUP02_SPR19	04/22/2019		**950**		**60,000**		**1,700**	**140**	**65**	**4.3**	**2.1**	11	6.7	640	0.84	-82	32	
	SHL-11_FAL19	10/30/2019		**920**		**50,000**		**1,900**	**140**	**64**	**14**	**1.7**	12	6.6	550	0.23	-110	3.8	
SHL-12	SHL-12-060815	6/8/2015	NA	2.0 J	NA	50 U	NA	14.7 J	63	24	92.1	1.8	--	--	--	--	--	--	
	SHL-12 FAL16	11/21/2016	NA	1.6 J	NA	20 J	NA	2,000	92	62	100	2.6	11.16	6.17	457	1.07	81	2.04	
	SHL-12 FAL17	11/29/2017	NA	2.4 J	NA	120	NA	2,100	78	61	92	2.1	12.73	6.86	640	0.69	144.4	2.96	
	SHL-12 FAL18	11/26/2018	NA	1.9 J	NA	50 U	NA	150	76	19	61	2.3	11.6	6.00	340	3.88	105	3.23	
	SHL-12_FAL19	11/07/2019		**7.4**		**660**		**890**	**69**	**40**	**98**	**3.2**	10.4	5.9	439	3.14	105	12.2	
SHL-13	SHL-13-101807	10/18/2007	1.6	NA	110	NA	503	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-13-101110	10/11/2010	<0.5	NA	<50	NA	11	NA	19	82	6.5	NA	15.52	5.62	317	2.54	169.0	3.08	
	SHL-13-100611	10/6/2011	2.8	NA	520	NA	179	NA	18	66	4.7	NA	14.61	5.72	273	0.25	42.0	0	
	SHL-13-101512	10/15/2012	1.0	NA	400	NA	484	NA	23	61	5.5	NA	16.26	5.91	254	0.67	61.5	0.23 B	
	SHL-13-102213	10/22/2013	NA	2.0 U	NA	43.3 J	NA	30	23	61	8.0 J	NA	13.87	6.08	269	0.35	127.0	0.2	
	SHL-13_FA115	10/22/2015	NA	2.9 J	NA	1210	NA	549	22.7	89.7	5.3 J	2.0	17.82	5.32	338	0.41	28.8	0.26	
SHL-15	SHL-15-101607	10/16/2007	42	NA	3400	NA	570	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-15-101410	10/14/2010	25	NA	2800	NA	342	NA	70	11	20	NA	11.49	5.73	241	0.21	-0.3	1.0	
	SHL-15-100611	10/6/2011	70	NA	8200	NA	512	NA	140	22	14	NA	12.36	6.17	403	0.27	66.1	0.9	
	SHL-15-101612	10/16/2012	24	NA	3200	NA	271	NA	84	26	14	NA	13.11	5.98	348	3.27	-18.7	1.3	
	SHL-15-102213	10/22/2013	NA	35	NA	6,610	NA	437	90.9	16.7	10.1	NA	13.48	5.91	266	0.31	-23.6	2.08	
	SHL-15-060815	6/9/2015	NA	32	NA	3,570	NA	198	74.9	120	13.8	8.5	10.22	5.82	392	0.24	-151.5	23.80	
	SHL-15 FAL16	1/21/2016	NA	19	NA	4,100	NA	230	93	100	22	3.3	11.30	6.16	565	1.89	-10.7	2.25	
	SHL-15 FAL17	11/15/2017	NA	200	NA	11,000	NA	820	130	4.6	1.0	8.8	13.25	6.36	271	0.34	13.2	4.79	
	SHL-15 FAL18	11/12/2018	NA	44	NA	15,000	NA	670	100	2.5	2.4	6.2	12.5	5.84	268	0.72	12.9	4.35	
	SHL-15_FAL19	11/01/2019		**110**		**1,500**		**540**	**100**	**7**	**29**	**2.6**	12	5.8	290	0.21	71	2.9	
	SHL-DUP11_FAL19	11/01/2019		**110**		**1,700**		**530**	**100**	**7.3**	**29**	**2.6**	12	5.8	290	0.21	71	2.9	
SHL-19	SHL-19-101607	10/16/2007	8.9	NA	50000	NA	2,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-19-101410	10/14/2010	235	NA	23000	NA	3,260	NA	80	2.2	22	NA	11.03	5.86	240	0.57	22.0	40	
	SHL-19-100711	10/7/2011	63	NA	7700	NA	1,460	NA	38	1.2	13	NA	13.12	4.97	107	3.66	128.0	13	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHL-19-101612	10/16/2012	138	NA	10000	NA	1,060	NA	66	2.3	22	NA	10.52	5.67	194	0.27	22.0	79	
	SHL-19-052413	5/24/2013	NA	3.8	NA	1,460	NA	580	55.3	1.0	12.6	1.8	10.83	5.86	137	1.01	98.9	17.0	
	SHL-19-102413	10/24/2013	NA	34	NA	8,380	NA	1,630	64.6	2.8	16.6	NA	11.54	6.76	110	0.50	-85.9	123	
	SHL-19-100814	10/8/2014	NA	3.1 J	NA	5,640	NA	2210 J	62.1	2.5	18.4	2.4	12.78	6.09	180	0.52	29.6	30.7	
	SHL-19_FA115	10/27/2015	NA	3.1 J	NA	8,850	NA	2,770	334.0	75.0	17.4	1.0	11.08	6.13	167	0.59	-50.2	50.7	
	SHL-19 FAL16	11/21/2016	NA	3.0 U	NA	50 U	NA	9.8 J	45	2.3	17	0.69 J	10.53	6.56	147	9.39	161.0	28.4	
	SHL-19 SPR17	6/2/2017	NA	1.6 J	NA	50 U	NA	3.0 U	14.0	0.7	2.9	1.0	10.16	5.72	300	9.83	117.9	11.03	
	SHL-19 FAL17	11/7/2017	NA	3.0 U	NA	75 U	NA	2.2 J	47	2.6	33	1.0	12.63	6.51	156	7.25	90.9	2.74	
	SHL-19 SPR17	4/19/2018	NA	3.0 U	NA	21 J	NA	3.0 U	39 J	1.1	15	1.0 U	15.29	6.57	112	8.38	53.7	1.19	
	SHL-19 FAL18	11/7/2018	NA	20 J	NA	1,400	NA	18 J	39	1.1	11	1.0 U	13.1	6.71	107	8.26	58.2	49.4	
	SHL-19_SPR19	04/12/2019		3.0 U		**23 J**		3.0 U	**71**	**1.3**	**26**	0.50 U	8.2	6.4	210	5.6	170	26	
	SHL-19_FAL19	10/29/2019		**4.4**		**100**		**56**	**90**	**1.1**	**23**	**0.74 J**	11	6.2	210	9	110	15	
SHL-20	SHL-20-101607	10/16/2007	3.4	NA	7200	NA	6,540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-20-101310	10/13/2010	4.4	NA	250	NA	544	NA	140	20	8.8	NA	12.04	6.43	395	0.20	88.0	1.71	
	SHL-20-100611	10/6/2011	7.3	NA	350	NA	820	NA	140	22	14	NA	12.36	6.17	403	0.27	66.1	1.6	
	SHL-20-101512	10/15/2012	139	NA	1800	NA	3,000	NA	120	22	22	NA	12.74	6.36	277	2.43	50.1	16	
	SHL-20-052213	5/22/2013	NA	621	NA	17,700	NA	2,150	111	35.7	30.5	1.4	12.18	6.75	414	0.19	-85.6	0.54	
	SHL-20-102213	10/22/2013	NA	641	NA	38,500	NA	1,590	81	49.7	23.0	NA	12.80	6.51	443	1.87	-93.6	4.10	
	SHL-20-042314	4/23/2014	NA	701	NA	40700 J	NA	1,760	120	50.2	26.0	1.6	10.96	6.21	499	0.85	-58.7	6.31	
	SHL-20-100814	10/8/2014	NA	763	NA	52,500	NA	1,700	153	61	4.0 J	2.0	12.94	6.40	620	0.43	-87.8	2.43	
	SHL-20-06052015	6/5/2015	NA	794	NA	53,400	NA	3,310	118	59	14.7	1.5	12.69	6.61	530	0.47	-86.4	9.24	
	SHL-20_FA115	10/23/2015	NA	855	NA	59,300	NA	2,060	139	62	3.5 J	2.2	10.78	6.46	606	0.57	-119.0	7.31	
	SHL-20 SPR16	6/27/2016	NA	880	NA	63,000	NA	2,400	210	63	0.8 U	2.6	0.25	6.46	719	16.36	-67.6	9.08	
	SHL-20 FAL16	11/16/2016	NA	830	NA	45,000	NA	1,500	140	50	2.0	2.0	11.56	6.58	505	0.91	-89.0	3.24	
	SHL-20 SPR17	5/31/2017	NA	860	NA	54,000	NA	2,300	150	61	3.8	2.1	11.39	6.43	449	0.32	-84.9	11.90	
	SHL-20 FAL 17	11/7/2017	NA	860	NA	71,000	NA	2,300	170	59	1.0 U	2.3	11.73	6.52	474	0.32	-62.3	9.82	
	SHL-20 SPR18	4/12/2018	NA	830	NA	56,000	NA	2,100	160	61	1.0 U	2.2	12.31	7.34	610	0.64	11	1.33	
	SHL-20 FAL18	11/7/2018	NA	970	NA	43,000	NA	1,800	72 J	58	37	1.8	11.8	7.32	500	3.47	-70.6	3.02	
	SHL-20_SPR19	04/22/2019		**770**		**41,000**		**2,200**	**80**	**61**	**40**	**1.7**	9.2	6.2	520	0.42	-68	3.9	
	SHL-20_FAL19	11/01/2019		**830**		**45,000**		**1,900**	**99**	**62**	**29**	**1.3**	11	6.6	550	0.17	-91	3	
	SHL-DUP02_FAL19	11/01/2019		**810**		**46,000**		**1,900**	**98**	**61**	**29**	**1.4**	11	6.6	550	0.17	-91	3	
SHL-21	SHL-21-101607	10/16/2007	0.81 J	NA	40 J	NA	4.6 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-21-101310	10/13/2012	0.9	NA	<50	NA	<10	NA	12	1.4	6.0	NA	11.85	5.59	46	9.01	178.3	1	
	SHL-21-101512	10/15/2012	1.1	NA	<50	NA	6 J	NA	18	1.3	5.1	NA	11.32	6.26	39	4.97	185.9	1.8	
	SHL-21_FA115	10/21/2015	NA	4.0 U	NA	100 U	NA	15 U	25.8	4.5	5.0	1.2	10.31	6.41	74	2.31	114.3	3.45	
SHL-22	SHL-22-101607	10/16/2007	55	NA	370	NA	4,320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-22-042110	4/21/2010	70	NA	580	NA	6,670	NA	340	21	5.9	NA	9.19	6.77	933	0.10	-40.0	0.05	
	SHL-22-101210	10/12/2010	47	NA	430	NA	7,510	NA	380	23	5.9	NA	9.75	6.47	783	0.31	-14.1	0.03	
	SHL-22-040611	4/6/2011	58	NA	650	NA	8,020	NA	370	22	<5.3	NA	8.16	6.67	750	0.22	-43.6	0	
	SHL-22-100711	10/7/2011	46	NA	580	NA	8,280	NA	380	22	5.3	NA	11.06	6.54	776	0.27	15.3	0	
	SHL-22-041012	4/10/2012	42	NA	610	NA	8180 J	NA	380	22	<2.2	NA	8.80	6.42	981	2.13	-20.6	2000 J	
	SHL-22-101712	10/17/2012	17	NA	340	NA	8,570	NA	360	21	6.0	NA	9.76	6.72	705	0.45	-20.2	0.85 B	
	SHL-22-052813	5/28/2013	NA	34.1	NA	453	NA	9,200	400	19.5	5.8	2.2	9.22	6.68	492	1.28	18.7	0.91	
	SHL-22-102313	10/23/2013	NA	53.1	NA	615	NA	9,700	388	20.2	6.6 J	NA	10.60	6.70	511	0.39	-6.9	0.00	
	SHL-22-042414	4/24/2014	NA	49.2	NA	564	NA	9,430	393	19.7	5.9 J	2.2	8.19	6.71	757	0.16	7.1	0.18	
	SHL-22-100914	10/9/2014	NA	44.5	NA	436	NA	8,820	378	19.5	7.2 J	1.8	10.21	6.67	526	0.31	5.8	1.99	
	SHL-22_FA115	10/26/2015	NA	15.9	NA	123	NA	10,200	362	195	5.8	2.2	9.78	6.03	557	0.44	0.3	0.19	
	SHL-22 SPR16	11/17/2016	NA	9.4	NA	110	NA	8,900	230	20	5.2	1.8	10.40	6.62	700	1.54	60.0	1.01	
	SHL-22 FAL17	11/13/2017	NA	6.1	NA	110	NA	9,400	330	20	4.7	1.9	10.36	6.74	497	0.26	37.9	5.96	
	SHL-22 FAL18	11/12/2018	NA	5.0	NA	47 J	NA	8,500	330	23	5.3	2.7	10.4	6.5	763	0.31	-140	1.17	
	SHL-22_FAL19	11/04/2019		**6.2**		**74**		**8,900**	**320**	**26**	**10**	**1.5**	9.8	66	680	0.55	47	4	
SHL-23	SHL-22-101707	10/17/2007	0.73 J	NA	210	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHL-23	8/12/2010	NA	0.14 J	NA	16.9 J	NA	7	4.3	1.3	4.9	<1.0	10.42	6.45	25	10.06	209.8	NA	Test Kit (Filtered) < 5
	SHL-23-101310	10/13/2010	<0.5	NA	28 J	NA	8.5 J	NA	4.3	1.9	5.5	NA	11.53	4.98	31	10.43	264.1	1	
	SHL-23-101512	10/15/2012	<0.5	NA	20 J	NA	0	NA	4.8	2.1	4.8	NA	11.31	5.32	24	11.55	290.1	1.1 B	
	SHL-23-060915	6/10/2015	NA	2.0 U	NA	50 U	NA	22	3.9 U	2.5	26.3	0.36 UJ	9.59	5.22	26	8.59	134.6	3.25	
	SHL-23_FA115	10/26/2015	NA	4.0 U	NA	100 U	NA	9.3 J	4.1 J	3.0	5.4	1.6	10.56	4.78	24	10.09	165.1	1.06	
	SHL-23 FAL16	11/22/2016	NA	3.0 U	NA	50 U	NA	8.3 J	4.2 J	3.4	4.2	0.67 J	9.22	5.50	36	10.20	210.2	1.38	
	SHL-23 FAL17	11/27/2017	NA	3.0 U	NA	75 U	NA	24	5.0 U	7.1	5.3	0.5 U	9.25	4.96	45	8.90	102.9	0.84	
	SHL-23 FAL18	11/8/2018	NA	3.0 U	NA	50 U	NA	25	5.0 U	8.8	5.6	1.0 U	9.87	4.46	59	5.52	105	1.18	
	SHL-23_FAL19	11/13/2019		3.0 U		50 U		**14**	**4.5**	**4.8**	**6.7**	1.0 U	8.6	4.5	44	7.5	250	4.6	
SHL-24	SHL-24-060915	6/9/2015	NA	4.9	NA	50 U	NA	7.5 U	45.8	33	26.3	0.36 U	--	--	--	--	--	--	
	SHL-24 FAL15	10/27/2015	NA	6.5	NA	50 U	NA	7.5 U	51.5	24	20.4	0.37 J	--	--	--	--	--	--	
	SHL-24 FAL16	11/21/2016	NA	5.5	NA	50 U	NA	3.0 U	45	24	20	0.50 J	4.87	7.34	145	7.68	9.8	5.13	
	SHL-24 FAL17	11/29/2017	NA	4.8	NA	75 U	NA	5.0 U	45	37	24	0.5 U	12.13	7.16	589	2.01	117.2	1.27	
	SHL-24 FAL18	11/28/2018	NA	3.4	NA	50 U	NA	3.0 U	48	37	22	1.0 U	10.2	7.17	291	6.42	45.4	1.88	
	SHL-24_FAL19	11/07/2019		**4.2**		50 U		3.0 U	**49**	**38**	**26**	**1.6**	11	7.2	270	1.9	95	11	
N5-P1	N-5,P-1-101210	10/12/2010	3,488	NA	20000	NA	7,010	NA	300	20	<11	NA	12.27	6.06	1353	0.31	-61.8	1.0	
	N-5,P-1-101011	10/10/2011	4,942	NA	40000	NA	6,440	NA	280	16	9.5	NA	12.71	6.60	548	0.18	-60.0	2.0	
	N-5,P-1-101812	10/18/2012	2,286	NA	6500	NA	671	NA	270	20	11	NA	11.67	6.79	386	0.55	-100.0	18	
	N-5,P-1-101812	10/22/2013	NA	2,500	NA	7,520	NA	8,570	313	17.7	11	NA	13.56	6.73	620	0.57	-69.5	0.46	

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Table C-1A
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Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	N5-P1-100814	10/8/2014	NA	327	NA	563	NA	2,010	230	19.5	16.8	2.4	13.75	7.20	303	0.25	-108.3	0.61	
	N5-P1_FA115	10/23/2015	NA	2,170	NA	3,440	NA	7,250	250	15.8	13.5	2.7	11.50	6.25	560	0.51	-25.0	1.52	
	N5-P1 FAL16	12/22/2016	NA	4,200	NA	35,000	NA	9,000	110 J	18	14	2.3	10.71	6.26	887	1.35	-41.0	3.57	
	N5-P1 SPR17	6/15/2017	NA	4,700	NA	20,000	NA	9,400	220	220	220	2.4	13.97	7.12	269	0.48	-82.1	6.97	
	N5-P1 FAL17	11/9/2017	NA	4,700	NA	44,000	NA	6,800	230	16	9.0	2.7	11.10	6.81	381	0.85	-23.0	4.18	
	N5-P1 FAL18	11/14/2018	NA	540	NA	570	NA	2,000	140	19	16	1.2 U	8.39	7.66	337	2.25	-50.4	21.5	
	N5-P1_FAL19	11/06/2019		**4,400**		**43,000**		**6,200**	**240**	**21**	**12**	**2.6**	11	6.6	590	0.55	-43	9.9	
N5-P2	N-5,P-2-101210	10/12/2010	25	NA	70000	NA	422	NA	700	14	1.0	NA	12.08	6.43	519	0.35	-60.7	1.0	
	N-5,P-2-101011	10/10/2011	27	NA	72000	NA	476	NA	690	14	1.0	NA	12.83	6.20	1080	0.17	-32.0	2.0	
	N-5,P-2-101712	10/17/2012	26	NA	66000	NA	421	NA	640	13	<2.0	NA	14.87	6.25	850	1.21	-132.4	82	
	N-5,P-2-102213	10/22/2013	NA	21	NA	75400	NA	459	652	15.3	0.67 J	NA	14.15	6.34	1271	0.72	-71.6	3.36	
	N5-P2_FA115	10/23/2015	NA	26	NA	38200	NA	426	574	14.8	4.2	13.1	12.20	5.64	1340	0.39	-57.2	1.29	
	N5-P2 FAL16	11/22/2016	NA	35	NA	72,000	NA	490	610	13	1.0 U	12	10.71	6.26	887	1.35	-41.0	3.57	
SHM-93-10C	SHM-93-10C-101607	10/16/2007	10	NA	140	NA	67	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-93-10C-101410	10/14/2010	8.7	NA	26 J	NA	38	NA	170	23	1.9	NA	12.1	7.31	469	0.30	-30.7	1.0	
	SHL-93-10C-101612	10/16/2012	8.1	NA	30 J	NA	6 J	NA	180	23	18	NA	9.45	7.28	434	1.23	16.3	1.0 B	
	SHM-93-10C_FA115	10/22/2015	NA	12	NA	100 U	NA	15 U	162	23.2	19.9	1.0 U	12.21	7.69	342	2.38	43.3	0.48	
SHM-93-22B	SHM-93-22B-042110	4/21/2010	948	NA	48000	NA	6,210	NA	380	22	4.4	NA	8.10	6.71	953	0.11	-125.0	5.2	
	SHM-93-22B-101110	10/11/2010	828	NA	37000	NA	8,280	NA	350	24	3.7	NA	9.52	6.52	745	0.29	-83.2	1.18	
	SHM-93-22B-040611	4/6/2011	1,039	NA	45000	NA	8,620	NA	330	26	<3.5	NA	6.96	6.57	749	0.23	-78.8	8.6	
	SHM-93-22B-101111	10/11/2011	1,072	NA	38000	NA	8,540	NA	330	23	3.6	NA	11.13	6.36	704	0.16	-63.0	5.0	
	SHM-93-22B-041012	4/10/2012	1,271	NA	35000	NA	8100 J	NA	340 J	19	<1.9	NA	8.73	6.25	908	0.37	-59.8	95000	
	SHM-93-22B-101712	10/17/2012	879	NA	23000	NA	9,020	NA	340	22	4.4	NA	10.83	6.54	415	0.55	-141.4	39	
	SHM-93-22B-052813	5/28/2013	NA	1,150	NA	30,000	NA	9,680	337	21.5	4.5 U	2.9	8.92	6.57	471	0.22	80.4	71.0	
	SHM-93-22B-102313	10/23/2013	NA	1,150	NA	31,300	NA	9,450	334	20.7	4.4 J	NA	10.17	6.59	485	0.39	1.8	1.2	
	SHM-93-22B-042414	4/24/2014	NA	997	NA	28300 J	NA	10600 J	329	22.2	2.9 J	2.8	7.63	6.48	734	0.14	-66.3	0.5	
	SHM-93-22B-100814	10/8/2014	NA	690	NA	19,300	NA	11,700	338	20.5	4.9 J	2.7	10.27	6.51	503	0.29	-43.8	3.4	
	SHM-93-22B-60815	6/8/2015	NA	1,050	NA	19,500	NA	12,100	309	19	3.3 J	2.2	9.54	6.39	628	0.65	-49.3	9.60	
	SHM-93_22B_FA115	10/23/2015	NA	670	NA	12,500	NA	11,500	283	17.5	5.2 J	4.0	9.13	5.27	475	0.41	2.7	10.60	
	SHM-93-22B SPR16	6/27/2016	NA	630	NA	17,000	NA	9,800	290	18	1.5	2.2	1.66	6.37	570	11.31	-64.8	10.89	
	SHM-93-22B FAL16	11/17/2016	NA	480	NA	12,000	NA	9,100	260	19	2.1	1.8	10.42	6.47	590	1.40	-45.9	23.2	
	SHM-93-22B SPR17	5/23/2017	NA	310	NA	18,000	NA	9,700	230	21	1.9	2.1	8.73	6.30	626	0.48	1.0	34.69	
	SHM-93-22B FAL17	11/13/2017	NA	360	NA	16,000	NA	10,000	240	25	1.9 J	1.8	9.77	6.48	418	0.41	-41.7	7.68	
	SHM-93-22B SPR18	4/24/2018	NA	270	NA	17,000	NA	9,500	240	33	4.2	1.4	11.13	6.75	601	0.70	-34.5	4.84	
	SHM-93-22B FAL18	11/14/2018	NA	170	NA	8,600	NA	8,400	230	33	4.4	1.7 U	11.5	6.62	658	0.48	-65.8	3.99	
	SHM-93-22B_SPR19	04/12/2019		**83**		**3,000**		**9,500**	**260**	**31**	**5.6**	**1.8**	6.8	6.7	600	0.45	13	6.1	
	SHM-93-22B_FAL19	11/04/2019		**370**		**11,000**		**10,000**	**250**	**35**	**10**	**1.6**	9.1	6.3	620	0.62	1.5	12	
SHM-93-22C	SHM-93-22C-101607	10/16/2007	73	NA	1700	NA	494	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-93-22C-042110	4/21/2010	15	NA	280	NA	105	NA	110	10	6.1	NA	11.33	8.23	321	1.10	-38.0	2.2	
	SHM-93-22C-101210	10/12/2010	16	NA	290	NA	58	NA	110	12	5.8	NA	10.86	7.82	286	0.58	-103.1	1.05	
	SHM-93-22C-040611	4/6/2011	14	NA	350	NA	36	NA	120	10	<6.0	NA	9.93	8.84	284	0.78	-1.0	0	
	SHM-99-22C-100511	10/5/2011	14	NA	380	NA	84	NA	120	8.4	6.1	NA	12.07	7.50	282	0.14	-42.0	1.0	
	SHM-93-22C-041112	4/11/2012	25	NA	980	NA	136	NA	120	9.9	<6.6	NA	8.17	7.46	361	1.26	-105.3	1600	
	SHM-93-22C-101712	10/17/2012	22	NA	590	NA	140	NA	120	10	6.9	NA	8.4	8.04	140	0.41	-163.1	0.30 B	
	SHM-99-22C-052813	5/28/2013	NA	19.7	NA	568	NA	140	133	10.0	7.5	3.6	10.73	7.83	196	0.45	-145.7	3.37	
	SHM-99-22C-102313	10/23/2013	NA	25.1	NA	555	NA	154	137	11.3	7.0 J	NA	10.87	7.79	198	0.40	-164.8	0.31	
	SHM-99-22C-042414	4/24/2014	NA	31.9	NA	397	NA	145	140	11.3	6.3 J	3.5	8.94	7.77	294	0.17	-89.5	0.82	
	SHM-03-22C-100814	10/8/2014	NA	45.6	NA	519	NA	8,800	375	19.5	7.9 J	2.4	10.92	6.65	743	0.25	18.2	0.73	
	SHM-93-22C_FA115	10/23/2015	NA	137	NA	1,410	NA	271	201	24.5	3.9 J	3.5	10.57	6.78	384	0.30	-127.1	0.30	
	SHM-93-22C FAL16	11/29/2016	NA	120	NA	850	NA	260	200	23.0	1.3	2.7	9.02	7.74	451	0.82	-122.6	3.27	
	SHM-93-22C FAL17	11/13/2017	NA	3.8	NA	63 J	NA	8	110	26.0	6.5	2.9	10.09	7.29	286	3.01	32.9	5.12	
	SHM-93-22C FAL18	11/14/2018	NA	3.8	NA	50 U	NA	3.0 U	120	25	6.5	3.3	9.15	7.26	404	2.29	-62.7	1.18	
	SHM-93-22C_FAL19	11/04/2019		**4.3**		50 U		3.0 U	**120**	**22**	**7.6**	**3.2**	9	7.6	320	2.3	31	4.3	
SHM-96-5B	SHM-96-5B-101707	10/17/2007	750	NA	5000	NA	11,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-96-5B-010808	1/8/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-96-5B-042210	4/22/2010	1504 J	NA	21000 J	NA	9840 J	NA	330 J	19	4.4	NA	10.22	6.51	883	0.16	-278.0	0.18	
	SHM-96-5B-101110	10/11/2010	846	NA	9300	NA	11,500	NA	320	21	4.5	NA	11.16	6.34	685	0.13	-35.0	0.24	
	SHM-96-5B-040511	4/5/2011	2,030	NA	30000	NA	9,510	NA	340	17	3.8	NA	10.15	6.54	681	0.19	-60.0	1.0	
	SHM-96-5B-100611	10/6/2011	1,895	NA	17000	NA	11,000	NA	310	20	4.1	NA	12.86	6.15	702	0.38	-19.8	4.4	
	SHM-96-5B-041012	4/10/2012	1,681	NA	19000	NA	10300 J	NA	330	18	<1.6	NA	9.83	6.35	869	0.25	-43.0	42000	
	SHM-96-5B-101512	10/15/2012	1,376	NA	13000	NA	9,160	NA	320	18	5.4	NA	14.74	6.56	475	0.69	-71.6	52	
	SHM-96-5B-052113	5/21/2013	NA	1,400	NA	20,000	NA	9,670	315	18.7	5.4	2.7	10.75	6.42	652	0.36	-43.7	9.01	
	SHM-96-5B-102213	10/22/2013	NA	1,660	NA	24,700	NA	9,980	315	17.7	5.0 J	NA	11.55	6.55	560	1.31	-69.0	0.58	
	SHM-96-5B-042214	4/22/2014	NA	1,340	NA	17,100	NA	9,810	345	18.2	4.5 J	2.4	10.14	6.21	642	0.73	-29.4	4.61	
	SHM-96-5B-100914	10/9/2014	NA	991	NA	13,100	NA	10,500	318	17	5.7 J	2.7	12.11	6.53	484	0.12	-54.8	0.41	
	SHM-96-5B-6052015	6/5/2015	NA	1,210	NA	16,200	NA	9,810	296	28	6.9 J	2.0	14.27	6.54	618	1.36	-56.8	4.03	
	SHM-96-5B_FA115	10/21/2015	NA	799	NA	11,000	NA	11,600	256	19	7.2	2.2	13.18	7.42	541	0.60	-18.3	0.17	
	SHM-96-5B SPR16	6/27/2016	NA	1,100	NA	15,000	NA	10,000	280	20	5.1	1.8	0.24	6.30	593	13.74	-19.1	11.18	
	SHM-96-5B FAL16	11/17/2016	NA	990	NA	13,000	NA	11,000	250	23	6.2	1.7	13.01	6.59	573	0.67	-6.9	0.97	
	SHM-96-5B SPR17	5/31/2017	NA	1,200	NA	16,000	NA	9,400	230	27	8.0	1.7	7.67	7.21	588	0.98	-12.6	3.05	
	SHM-96-5B FAL17	11/10/2017	NA	990	NA	15,000	NA	9,200	230	29	8.9	1.7	10.20	6.79	403	0.66	-26.1	25.3	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-96-5B SPR18	4/23/2018	NA	980	NA	15,000	NA	8,500	220	32	13	1.7	11.58	6.6	594	0.78	-60.3	37	
	SHM-96-5B FAL18	11/26/2018	NA	100	NA	50 U	NA	28	240	19	4.4	1.7	9.82	6.67	500	4.02	36.4	2.41	
	SHM-96-5B_SPR19	04/23/2019		**1,100**		**14,000**		**8,300**	**220**	**33**	**14**	**1.8**	8.6	6.5	550	0.87	-41	19	
	SHM-96-5B_FAL19	11/07/2019		**41**		50 U		**23**	**230**	**23**	**9.6**	**2.5**	10	6.8	490	3.4	150	4.4	
SHM-96-5C	SHM-96-5C-101707	10/17/2007	61	NA	60000	NA	3,980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-96-5C-042210	4/22/2010	31	NA	15000	NA	6,860	NA	30	34	<1.0	NA	9.84	6.31	1008	0.14	-267.0	0.19	
	SHM-96-5C-101110	10/11/2010	26	NA	15000	NA	7,160	NA	310	31	2.0	NA	10.55	6.19	712	0.12	-51.0	0.49	
	SHM-96-5C-040511	4/5/2011	35	NA	22000	NA	8,890	NA	340	28	1.6	NA	9.38	6.33	744	0.20	-32.2	15	
	SHM-96-5C-100611	10/6/2011	25	NA	13000	NA	8,140	NA	310	28	1.7	NA	12.15	6.16	721	0.22	-3.1	4.6	
	SHM-96-5C-041012	4/10/2012	8.7	NA	4400	NA	13600 J	NA	310	27	<2.0	NA	9.48	6.00	885	0.11	32.7	6600	
	SHM-96-5C-101712	10/17/2012	7.7	NA	1100	NA	15,000	NA	300	27	2.6	NA	11.96	6.30	396	0.84	-71.0	0.62 B	
	SHM-96-5C-052813	5/28/2013	NA	10.4	NA	2,200	NA	12,600	318	24.0	4.5 U	3.8	9.98	6.29	482	0.18	-64.9	4.82	
	SHM-96-5C-102213	10/22/2013	NA	5.5	NA	609	NA	12,900	315	19.2	3.4 J	NA	11.63	6.21	529	1.41	-20.1	0.10	
	SHM-96-5C-042214	4/22/2014	NA	10.9	NA	3,980	MA	10,400	326	20.2	2.6 J	3.8	9.79	6.18	618	0.16	7.8	3.66	
	SHM-96-5C-100914	10/9/2014	NA	17.7	NA	7,300	NA	8,310	302	18.0	3.5 J	2.8	11.75	6.39	466	0.07	-28.1	0.35	
	SHM-96-5C_FA115	10/21/2015	NA	39.6	NA	22,000	NA	7,820	265	20.5	5.0	5.2	12.13	7.02	637	0.91	-33.7	18.0	
	SHM-96-5C FAL16	11/17/2016	NA	42	NA	16,000	NA	6,200	250	19	2.1	4.4	11.40	6.57	588	0.18	-48.7	2.57	
	SHM-96-5C FAL17	11/10/2017	NA	34	NA	13,000	NA	6,900	240	21	1.8	3.1	9.60	6.66	365	0.47	-12.9	4.92	
	SHM-96-5C FAL18	11/20/2018	NA	31	NA	22,000	NA	2,100	130	28	1.2	1.5	8.93	6.07	360	0.25	15.5	24.2	
	SHM-96-5C_FAL19	11/07/2019		**13**		**1,900**		**14,000**	**240**	**28**	**8.1**	**3.3**	9.8	6.4	540	0.31	-37	3.8	
SHP-99-29X	SHP-99-29X-101807	10/18/2007	2,953	NA	44000	NA	10,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-29X-102907	10/29/2007	2,800	NA	42000	41,000	10,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-29X-101210	10/12/2010	3,156	NA	44000	NA	9,310	NA	130	2.5	4.9	NA	11.90	5.67	270	0.13	-8.8	1	
	SHP-99-29X-101112	10/11/2012	1,457	NA	50000	NA	4,210	NA	110	4.1	3.0 J	NA	12.07	5.54	287	0.27	-1.0	6	
	SHP-99-29X-101712	10/17/2012	2,739	NA	32000	NA	5,510	NA	92	1.6	4.8	NA	11.32	5.82	191	0.29	-75.7	3.6	
	SHP-99-29X-102213	10/22/2013	NA	2,760	NA	43,300	NA	6,430	101	2.3	5.6 J	NA	13.10	6.02	230	0.90	-48.3	4.29	
	SHP-99-29X-100714	10/7/2014	NA	3,000	NA	49,100	NA	8,510	120	3.0	7.8 J	1.5	11.60	5.92	180	0.13	-17.8	13.2	
	SHP-99-29X_FA115	10/22/2015	NA	3,810	NA	48,500	NA	8,340	108	2.8	6.2	1.5	12.31	5.73	243	0.35	27.3	3.35	
	SHP-99-29X FAL16	11/22/2016	NA	3,900	NA	57,000	NA	9,600	140	2.3	6.1	1.5	11.41	5.97	229	1.03	-4.1	7.89	
	SHP-99-29X FAL17	11/9/2017	NA	2,100	NA	47,000	NA	2,500	98	3.5	2.0	2.4	10.70	6.47	207	0.40	4.0	8.70	
	SHP-99-29X FAL18	11/8/2018	NA	1,200	NA	50,000	NA	2,700	81	4.6	1.9	3.1	12.1	7.24	265	0.56	22.7	49.5	
	SHP-99-29X_FAL19	11/06/2019		**1,600**		**42,000**		**3,900**	**110**	**5.5**	**5.1**	**2.8**	11	5.6	240	0.51	14	4.1	
SHP-99-31A	SHP-99-31A-101707	10/17/2007	23	NA	12,000.00	NA	798	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-31A-011008	1/10/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-31A-101310	10/13/2010	17	NA	13000	NA	675	NA	32	46	5.6	NA	13.63	5.83	241	0.11	6.4	0.24	
	SHP-99-31A-100511	10/5/2011	18	NA	8100	NA	427	NA	38	3.0	6.6	NA	15.55	5.55	151	0.28	3.2	1.8	
	SHP-99-31A-101812	10/18/2012	18	NA	11000	NA	519	NA	22	46	15	NA	13.71	5.78	169	0.42	-6.0	2.2	
	SHP-99-31A-102313	10/23/2013	NA	14.2	NA	4,210	NA	311	15.3	25.7	9.7 J	NA	12.48	5.83	145	1.02	41.9	3.79	
	SHP-99-31A FAL15	10/29/2015	NA	18.7	NA	7,300	NA	443	16.5	62.5	7.4	2.4	13.07	5.48	271	0.48	20.5	4.44	
SHP-99-31B	SHP-99-31B-101707	10/17/2007	86	NA	28,000.00	NA	1,210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-31B-011008	1/10/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-99-31B	8/12/2010	NA	28.8	NA	14,600	NA	478	86	4.0	3	6.5	10.74	6.03	186	0.19	33.9	NA	Test Kit (Filtered) 5
	SHP-99-31B-101310	10/13/2010	39	NA	11000	NA	481	NA	86	3.4	3.8	NA	10.58	6.27	211	0.15	-71.0	0.19	
	SHP-99-31B-100511	10/5/2011	59	NA	10000	NA	460	NA	83	3.3	4.1	NA	11.8	6.22	201	0.22	-46.0	0.19	
	SHP-99-31B-101812	10/18/2012	60	NA	9400	NA	405	NA	73	2.3	5.3	NA	10.42	6.31	175	0.31	-85.0	1.3	
	SHP-99-31B-102313	10/23/2013	NA	61.6	NA	9,460	NA	448	63.5	4.3	7.6 J	NA	11.15	6.56	176	2.42	-57.7	1.02	
	SHP-99-31B FAL15	10/29/2015	NA	58.7	NA	7,430	NA	340	56.7	5.0	6.2	3.5	11.04	5.81	156	0.28	-23.4	0.84	
SHP-99-31C	SHP-99-31C-101707	10/17/2007	292	NA	44,000	NA	4,050	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-31C-011008	1/10/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-99-31C-101310	10/13/2010	239	NA	22,000	NA	5,250	NA	350	30	3.5	NA	10.61	6.46	811	0.16	-80.0	0.25	
	SHM-99-31C-100511	10/5/2011	244	NA	22,000	NA	6,040	NA	340	27	3.9	NA	11.61	6.50	809	0.27	-59.2	1.9	
	SHP-99-31C-101812	10/18/2012	206	NA	17,000	NA	5,450	NA	310	28	5.2	NA	13.81	6.75	641	0.64	-117.1	19	
	SHP-99-31C-102313	10/23/2013	NA	205	NA	16,400	NA	6,160	348	32.2	5.7 J	NA	11.13	6.70	737	0.23	-95.7	3.71	
	SHM-99-31C-101314	10/13/2014	NA	180	NA	15,800	NA	5,060	315	24.5	6.0 J	4.2	10.85	6.71	634	0.17	-78.4	4.22	
	SHP-99-31C FAL15	10/29/2015	NA	194	NA	14,700	NA	5,200	313	22.5	5.0	3.6	13.39	6.62	663	1.31	-73.9	8.32	
	SHP-99-31C SPR16	11/29/2016	NA	200	NA	17,000	NA	5,900	330	25	3.9	3.0	9.35	6.66	534	0.67	-57.7	6.59	
	SHP-99-31C FAL17	11/28/2017	NA	200	NA	17,000	NA	5,600	320	31	4.4	2.5	8.64	6.73	675	3.83	-26.6	1.99	
	SHM-99-31C FAL18	11/29/2018	NA	160	NA	15,000	NA	5,300	270	33	4.6	2.6	8.88	6.87	695	1.34	-46.4	2.39	
	SHM-99-31C_FAL19	11/14/2019		**140**		**11,000**		**4,700**	**250**	**31**	**5.4**	**2**	9.4	6.7	300	0.78	-78	6.4	
SHM-99-32X	SHP-99-32X-101707	10/17/2007	206	NA	60,000.00	NA	3,480	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-99-32X-011008	1/10/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-99-32X-101310	10/13/2010	173	NA	25000	NA	8,600	NA	390	39	3.9	NA	10.49	6.51	879	0.16	-77.0	0.42	
	SHM-99-32X-100411	10/4/2011	173	NA	24000	NA	10,100	NA	380	32	2.4	NA	11.54	6.42	825	0.33	-36.0	5.0	
	SHM-99-32X-101712	10/17/2012	131	NA	23000	NA	10,700	NA	370	36	2.8	NA	10.52	6.54	469	0.63	-136.4	28	
	SHM-99-32X-102313	10/23/2013	NA	107	NA	18,400	NA	10,900	342	32.2	2.9 J	NA	11.17	6.45	704	0.17	-77.9	0.37	
	SHM-99-32X-101314	10/13/2014	NA	93.5	NA	16,800	NA	9,670	280	32.5	4.9 J	2.1	11.19	6.64	462	1.89	-83.0	17.39	
	SHM-99-32X FAL16	11/21/2016	NA	59.0	NA	4,800	NA	3,900	76	55	4.9	1.2	10.37	7.06	354	0.35	-31.2	12.3	
	SHM-99-32X FAL17	11/28/2017	NA	60	NA	4,900	NA	4,000	81	64 J	5.6	1.2	10.15	6.91	362	1.85	-59.1	4.28	
	SHM-99-32X FAL18	11/15/2018	NA	6.3	NA	1,200	NA	1,700	50	56	5.8	1.5	4.09	6.52	289	2.1	170	42.1	
	SHM-99-32X_FAL19	11/12/2019		**47**		**6,700**		**4,100**	**78**	**64**	**17**	**1.4**	9.2	6.4	370	0.16	12	7.8	
SHP-01-36X	SHP-01-36X-101607	10/16/2007	17	NA	6900	NA	309	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHP-01-36X-101410	10/14/2010	14	NA	2300	NA	168	NA	24	40	9.2	NA	15.80	6.50	218	0.12	-78.0	1.0	
	SHP-01-36X-101011	10/10/2011	31	NA	2700	NA	53	NA	28	46	4.3	NA	19.76	5.82	208	0.18	-43.0	1.0	
	SHP-01-36X-101612	10/16/2012	18	NA	2600	NA	83	NA	40	63	5.1	NA	15.00	6.52	379	0.36	-73.4	23	
	SHP-01-36X-111913	11/19/2013	NA	4.8	NA	75.2 J	NA	23	24.2	75.5	23.7	NA	6.79	6.42	351	7.07	118.8	0.63	
	SHP-01-36X-100914	10/9/2014	NA	10.8	NA	535	NA	68	26.2	110	8.1 J	3.1	17.35	6.27	329	0.32	39.2	2.99	
	SHP-01-36X_FA115	10/27/2015	NA	9.0	NA	686	NA	111	23.7	105	7.7	2.7	11.81	6.12	329	1.40	27.2	0.91	
	SHP-01-36X FAL16	11/22/2016	NA	4.5	NA	350	NA	28	24	84	8.4	3.1	8.20	6.82	370	2.50	36.5	0.47	
	SHP-01-36X SPR17	6/2/2017	NA	4.3	NA	490	NA	39	27	84	3.9	3.6	14.45	6.55	382	0.59	32.9	6.69	
	SHP-01-36X FAL17	11/13/2017	NA	17	NA	6,800	NA	220	26	66	2.9	5.0	12.11	6.31	293	1.08	7.5	1.20	
	SHP-01-36X SPR18	4/13/2018	NA	11	NA	3,400	NA	77	18	110	7.7	3.2	8.29	7.00	403	0.94	69.4	1.51	
	SHP-01-36X FAL18	11/8/2018	NA	7.8	NA	550	NA	39	25	53	5.4	3.6	11.8	6.42	239	0.34	36.4	28.2	
	SHP-01-36X_SPR19	04/12/2019		**6.3**		**870**		**33**	**22**	**81**	**7.3**	**2.1**	7.5	7.3	330	1.3	170	1.3	
	SHP-01-36X_FAL19	11/04/2019		**11**		**1,500**		**78**	**27**	**67**	**6**	**3.5**	12	6.4	300	0.3	37	=	
SHP-01-37X	SHP-01-37X-101607	10/16/2007	27	NA	8200	NA	588	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-01-37X-101410	10/14/2010	23	NA	6700	NA	761	NA	44	60	<1.0	NA	16.68	6.21	300	0.42	-43.0	0.29	
	SHP-01-37X-101612	10/16/2012	10	NA	3900	NA	321	NA	37	62	3.0	NA	14.67	6.40	287	0.38	-105.8	1.6	
	SHP-01-37X-111913	11/19/2013	NA	4.7	NA	1,430	NA	569	4.4 J	75.5	78.1	2.0 U	6.85	5.64	433	3.12	123.3	0.43	
	SHP-01-37X-100914	10/9/2014	NA	8.5	NA	3,410	NA	158	12	80	8.0 J	3.1	17.13	6.22	350	1.80	28.0	0.1	
	SHP-01-37X_FA115	10/27/2015	NA	14	NA	1,090	NA	136	25.8	95	6.3	3.8	11.71	6.30	325	3.02	0.7	0.88	
	SHP-01-37X FAL16	11/22/2016	NA	11	NA	1,000	NA	46	22	86	11	4.3	8.70	7.85	367	3.60	-28.5	0.71	
	SHP-01-37X SPR17	6/2/2017	NA	6.5	NA	1,400	NA	72	24	100	8.0	3.5	12.56	6.64	470	1.15	13.6	8.32	
	SHP-01-37X FAL17	11/13/2017	NA	13	NA	1,500	NA	110	26	71	3.8	4.9	11.22	6.42	301	1.91	25.4	2.88	
	SHP-01-37X SPR18	4/13/2018	NA	9.9	NA	1,200	NA	160	28	89	7.0	3.5	8.09	6.87	350	0.90	88	1.77	
	SHP-01-37X FAL18	11/8/2018	NA	17	NA	2,200	NA	120	36	110	4	3.6	13.7	6.3	447	0.15	11.6	22.7	
	SHP-01-37X_SPR19	04/12/2019		**15**		**5,400**		**440**	**65**	**28**	**21**	**2.1**	8.5	7	290	0.62	140	7.4	
	SHP-01-37X_FAL19	11/04/2019		**13**		**4,500**		**210**	**28**	**69**	**7.8**	**3.9**	13	6.6	310	0.39	-4.3	2.6	
SHP-01-38A	SHP-01-38A-101607	10/16/2007	781	NA	37000	NA	848	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHP-01-38A-101410	10/14/2010	652	NA	28000	NA	716	NA	140	28	18	NA	12.81	6.37	433	0.91	-70.0	1.0	
	SHP-01-38A-101211	10/12/2011	558	NA	31000	NA	892	NA	200	24	11	NA	13.44	5.95	500	0.21	-39.0	3.0	
	SHP-01-38A-101512	10/15/2012	661	NA	3000	NA	710	NA	180	44	18	NA	12.84	6.19	499	0.36	-73.1	30	
	SHP-01-38A-052313	5/23/2013	NA	412	NA	10,200	NA	254	64.1	5.3	6.3	2.1	10.79	6.66	156	0.12	-70.1	4.3	
	SHP-01-38A-111913	11/19/2013	NA	247	NA	17,900	NA	2,200	79.2	7.0	115	2.2	12.33	6.14	435	1.25	-20.7	0.31	
	SHP-01-38A-100914	10/9/2014	NA	263	NA	23,500	NA	2,490	93.7	10.5	49.2	19.8	14.12	6.23	256	0.16	-47.0	0.37	
	SHP-01-38A_FA115	10/28/2015	NA	314	NA	38,400	NA	2,950	112	10.5	20.5	1.8	12.66	6.28	388	0.36	-52.8	1.39	
	SHP-01-38A FAL16	11/16/2016	NA	320	NA	20,000	NA	1,900	78	4.3	13	1.4	12.20	6.18	163	0.78	-34.6	5.96	
	SHP-01-38A SPR17	6/12/2017	NA	190	NA	15,000	NA	1,300	55	1.0	16	1.4	13.65	5.34	205	0.70	-4.2	9.84	
	SHP-01-38A FAL17	11/7/2017	NA	190	NA	20,000	NA	1,500	70	2.2	8.6	1.5	13.96	6.30	183	0.30	-24.0	3.16	
	SHP-01-38A SPR18	4/19/2018	NA	140	NA	12,000	NA	1,000	39 J	1.2	11	1.7	7.21	6.46	142	1.51	-33.4	1.45	
	SHP-01-38A FAL18	11/8/2018	NA	130	NA	19,000	NA	1,600	61	1.8	10	1.5 U	12	5.94	181	0.34	9.9	21.1	
	SHP-01-38A_SPR19	04/12/2019		**79**		**15,000**		**1,300**	**41**	**1.3**	**8.6**	**1.3**	7.3	6.8	140	0.59	130	2.4	
	SHL-DUP04_FAL19	11/04/2019		**140**		**25,000**		**2,000**	**95**	**8.6**	**13**	**1.4**	12	6	250	0.37	0.8	2.2	
	SHP-01-38A_FAL19	11/04/2019		**130**		**25,000**		**2,000**	**94**	**8.5**	**13**	**1.3**	12	6	250	0.37	0.8	2.2	
SHP-01-38B	SHP-01-38B-052313	5/23/2013	NA	900	NA	47,100	NA	2,240	190	51.7	4.5 U	3.6	10.78	6.62	583	0.30	-109.1	0.0	
	SHP-01-38B_FA115	10/28/2015	NA	903	NA	43,600	NA	2,320	145	43	7.0	4.4	11.13	6.34	610	0.15	-100.0	0.34	
SHM-05-39A	SHM-05-39A-101707	10/17/2007	2	NA	52000	NA	1,250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-39A-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-39A	8/12/2010	NA	236	NA	24,500	NA	680	100	7.1	6	2.9	11.37	6.45	263	0.35	-52.9	NA	Test Kit (Filtered) 100
	SHM-05-39A-101310	10/13/2012	246	NA	26000	NA	744	NA	110	13	4.3	NA	11.29	6.63	297	0.20	-92.0	0.17	
	SHM-05-39A-100411	10/4/2011	227	NA	17000	NA	541	NA	87	3.6	3.8	NA	12.05	6.62	213	0.16	-66.0	2.0	
	SHL-05-39A-101612	10/16/2012	76	NA	3900	NA	52	NA	50	17	4.8	NA	14.29	6.28	149	0.37	69.6	40	
	SHL-05-39A-102413	10/24/2013	NA	146	NA	14,700	NA	575	51.5	19.2	4.0 J	NA	11.90	6.70	133	0.23	-94.3	0.35	
	SHM-05-39A FAL15	10/29/2015	NA	4.0 U	NA	100 U	NA	417	56.7	17.5	5.4 J	1.8	13.39	6.47	175	3.35	16.5	5.62	
SHM-05-39B	SHM-05-39B-101707	10/17/2007	3.1	NA	10000	NA	5,920	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-39B-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-39B-101310	10/13/2010	162	NA	3200	NA	5,510	NA	300	130 J	4.0 J	NA	12.93	6.75	896	0.19	-68.1	3.54	
	SHM-05-39B-100511	10/5/2011	308	NA	5000	NA	6,130	NA	420	93 J	3.2	NA	13.12	6.85	919	0.11	-66.0	3.0	
	SHM-05-39B-101612	10/16/2012	364	NA	6100	NA	6,320	NA	420	37	1.97 J	NA	15.3	6.91	1365	1.67	-126.7	55	
	SHM-05-39B-102413	10/24/2013	NA	113	NA	9,580	NA	1,230	71.2	88.7	3.8 J	NA	10.76	6.93	278	0.40	-95.3	0.97	
	SHM-05-39B FAL15	10/29/2015	NA	293	NA	37,800	NA	1,500	62.8	525	10.4	3.0	13.75	6.82	1,712	2.81	-160.8	5.44	
SHM-05-40X	SHM-05-40X-101807	10/18/2007	4,445	NA	58000	NA	1,330	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-40X-103107	10/31/2007	4,058	2,620	57900	43,500	1,427	1,244	220	13	1.7	NA	11.02	6.71	565	1.62	-134.1	7.89	
	SHM-05-40X-081210	8/12/2010	NA	3,180	NA	22,500	NA	544	94	8.9	8.1	2	11.43	6.45	256	0.40	-21.5	NA	Test Kit (Filtered) > 500
	SHM-05-40X-100710	10/7/2010	3,637	NA	35000	NA	828	NA	160	12	5.8	NA	10.68	6.47	409	0.22	-106.1	0.34	
	SHM-05-40X100511	10/5/2011	3,703	NA	30000	NA	804	NA	159	11	4.2	NA	10.52	6.48	3.95	0.24	-77.3	4.1	
	SHM-05-40X-101712	10/17/2012	2,974	NA	3000	NA	1	NA	150	9.7	5.9	NA	10.62	6.71	374	0.19	-133.2	40	
	SHM-05-40X-102413	10/24/2013	NA	3,100	NA	28,800	911	NA	165	13.3	4.8 J	NA	10.62	6.87	253	0.32	-136.3	2.21	
	SHM-05-40X-101314	10/13/2014	NA	3,070	NA	40,800	NA	1,080	178	12	5.4 J	5.8	10.50	6.85	334	0.39	-130.2	8.65	
	SHM-05-40X SPR16	10/29/2015	NA	2,060	NA	39,800	NA	955	174	13	4.5 J	4.3	11.72	6.71	445	4.13	-144.8	5.92	
	SHM-05-40X FAL16	11/21/2016	NA	2,400	NA	35,000	NA	800	160	10	2.9	2.0	10.10	6.88	347	1.09	-107.1	4.79	
	SHM-05-40X SPR17	6/6/2017	NA	25 J	NA	9,000	NA	1,700	8.6	8.6	8.6	2.0	11.66	7.10	46	5.09	71.6	40.22	
	SHM-05-40X FAL17	11/17/2017	NA	2,200	NA	43,000	NA	1,100	150	14	2.7	2.1	9.6	6.73	331	0.20	-66.1	3.45	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-05-40X SPR18	4/17/2018	NA	1,900	NA	28,000	NA	740	180	130	4.6	2.1	10.5	6.66	1026	0.98	-60.9	0.80	
	SHM-05-40X FAL18	11/26/2018	NA	2,400	NA	41,000	NA	980	120 J	23 J	3.7 J	2.0	8.98	6.44	532	1.2	0.5	6.49	
	SHM-05-40X_SPR19	04/23/2019		**2,100**		**27,000**		**690**	**74**	**38**	**3.5**	**1.9**	10	6.8	360	0.41	-110	3	
	SHL-DUP10_FAL19	11/08/2019		**2,100**		**32,000**		**770**	**140**	**22**	**5.4**	**2.8**	8.1	6.5	390	0.44	20	13	
	SHM-05-40X_FAL19	11/08/2019		**2,200**		**33,000**		**820**	**140**	**23**	**5.4**	**2.8**	8.1	6.5	390	0.44	20	13	
SHM-05-41A	SHM-05-41A-101707	10/17/2007	25	NA	3400	NA	356	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-41A-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-41A-042110	4/21/2010	27	NA	2900	NA	388	NA	37	1.4	7.9	NA	9.53	6.60	121	0.09	-34.0	0.15	
	SHM-05-41A-100710	10/7/2010	67	NA	4900	NA	395	NA	31	3.0	7.3	NA	10.18	6.09	95	0.26	1.3	0.67	
	SHM-05-41A-040411	4/4/2011	21	NA	2800	NA	539	NA	37	2.5	6.7	NA	8.44	6.46	100	0.32	1.8	2.7	
	SHM-05-41A-100411	10/4/2011	18	NA	3200	NA	636	NA	41	2.2	5.2	NA	10.99	5.76	107	0.48	44.9	3.9	
	SHM-05-41A-04112	4/11/2012	16	NA	2400	NA	424	NA	30	3.0	<6.2	NA	9.56	6.20	111	0.52	18.4	1200	
	SHM-05-41A-101712	10/17/2012	10	NA	2300	NA	592	NA	34	2.0	6.1	NA	12.98	6.25	90	0.35	-33.5	1.4	
	SHM-05-41A-052213	5/22/2013	NA	12.3	NA	5,530	NA	569	33.2	3.3	7.9	1.2	10.43	6.27	101	0.76	17.6	3.79	
	SHM-05-41A-102313	10/23/2013	NA	12.5	NA	4,560	NA	534	40.5	2.8	5.8 J	NA	10.17	6.42	69	0.35	-18.0	0.66	
	SHM-05-41A-042314	4/23/2014	NA	9.7	NA	6,240	NA	576	35.0	21.2	4.9 J	1.9	9.27	6.22	172	0.72	45.3	6.28	
	SHM-05-41A-100914	10/9/2014	NA	14.2	NA	8,040	NA	552	38.2	3.5	6.8 J	1.5	10.94	6.39	81	0.08	-20.0	0.42	
	SHM-05-41A_FA115	10/26/2015	NA	15	NA	6,330	NA	308	31.9	5.5	5.4	1.5	10.13	5.79	88	2.16	54.2	0.28	
	SHM-05-41A FAL16	11/18/2016	NA	19	NA	4,600	NA	160	33	5.7	4.1	1.5	10.71	6.45	103	1.53	81.2	1.03	
	SHM-05-41A FAL17	11/20/2017	NA	18	NA	5,900	NA	210	25	17.0	3.3	1.1	9.42	6.73	142	0.46	43.5	3.79	
	SHM-05-41A FAL18	11/16/2018	NA	16	NA	4,400	NA	160	29	11	5.7	1.2	10.4	5.52	193	0.21	-0.9	2.55	
	SHM-05-41A_FAL19	11/08/2019		**31**		**6,300**		**260**	**36**	**5.8**	**8.5**	1.0 U	8	6.1	120	0.1	9.5	36	
SHM-05-41B	SHM-05-41B-101707	10/17/2007	2,591	NA	100000	NA	1,770	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-41A-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-041B	8/9/2010	1,440	1,130	35,200	28,000	736	656 J	NA	NA	NA	2.6	11.75	6.43	310	0.32	42.6	NA	Test Kit (Filtered) 500
	SHM-05-41B-042110	4/21/2010	1,372	NA	32000	NA	662	NA	120	7.0	5.0	NA	9.6	6.74	392	0.08	-124.0	9.6	
	SHM-05-41B-100710	10/7/2010	1,036	NA	27000	NA	605	NA	100	2.9	5.3	NA	10.29	6.65	259	0.35	-86.8	1.64	
	SHM-05-41B-040411	4/4/2011	1,045	NA	27000	NA	605	NA	120	1.5	5.7	NA	8.44	6.73	266	0.16	-80.4	0.5	
	SHM-05-41B-100411	10/4/2011	1,369	NA	26000	NA	494	NA	83	1.5	3.5	NA	10.92	6.29	209	0.35	-61.2	5.8	
	SHM-05-41B-04112	4/11/2012	771	NA	13000	NA	304	NA	66	3.0	<3.3	NA	10.02	6.44	199	0.14	-57.2	8400	
	SHM-05-41B-101712	10/17/2012	860	NA	26000	NA	629	NA	100	3.1	4.1	NA	12.23	6.58	259	0.22	-150.1	41	
	SHM-05-41B-52213	5/22/2013	NA	812	NA	32,300	NA	780	97.2	5.8	8.7	2.8	9.98	6.55	302	0.26	-94.0	3.03	
	SHM-05-41B-102313	10/23/2013	NA	716	NA	21,400	NA	583	81	4.3	4.7 J	NA	10.05	6.88	155	0.46	-120.4	4.49	
	SHM-05-41B-042314	4/23/2014	NA	678	NA	25,900	NA	766	87.6	3.8	5.2 J	2.3	9.33	6.60	245	0.47	-37.7	15.0	
	SHM-05-41B-100914	10/9/2014	NA	638	NA	24,300	NA	752	97	2.5	5.3 J	1.7	10.49	6.76	195	0.41	-93.0	10.7	
	SHM-05-41B-60815	6/8/2015	NA	626	NA	28,500	NA	947	92.6	18.5	3.8 J	1.6	13.29	6.67	315	0.09	-64.0	6.90	
	SHM-05-41B_FA115	10/26/2015	NA	614	NA	27,300	NA	890	34	17.5	5.8	1.7	11.26	5.32	269	0.27	-23.3	30.9	
	SHM-05-41B SPR16	6/27/2016	NA	670	NA	32,000	NA	1,100	130	7.9	1.7	1.9	0.26	6.43	327	13.23	-59.7	11.70	
	SHM-05-41B FAL16	11/18/2016	NA	730	NA	41,000	NA	1,400	120	10	1.8	1.8	12.14	6.67	373	0.29	-103.7	9.82	
	SHM-05-41B SPR17	6/6/2017	NA	630	NA	53,000	NA	1,800	130	15	2.3	1.8	6.58	7.12	479	1.73	-50.9	9.06	
	SHM-05-41B FAL17	11/20/2017	NA	620	NA	50,000	NA	1,800	110	16	1.8	1.6	10.14	6.86	300	0.31	-69.1	6.48	
	SHM-05-41B SPR18	4/20/2018	NA	330	NA	33,000	NA	1,300	110	810	5.4	1.7	8.53	6.47	3,310	1.85	-33.9	4.91	
	SHM-05-41B FAL18	11/16/2018	NA	510	NA	42,000	NA	1,400	81	17	4	1.4	9.91	6.13	437	0.19	-70	5.01	
	SHM-05-41B_SPR19	04/18/2019		**360**		**23,000**		**840**	**65**	**430**	**11**	**2.2**	6.6	6.4	1,400	0.41	-44	14	
	SHM-05-41B_FAL19	11/08/2019		**530**		**24,000**		**720**	**62**	**2.3**	**6.4**	1.0 U	9.3	6.6	190	0.13	-60	25	
SHM-05-41C	SHM-05-41C-101707	10/17/2007	685	NA	18000	NA	3,260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-41C-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-41C-042110	4/21/2010	896	NA	18000	NA	2,860	NA	350	30	<1.0	NA	10.06	7.17	963	0.11	-167.0	0.8	
	SHM-05-41C-100710	10/7/2010	787	NA	19000	NA	3,100	NA	350	29	<1.0	NA	10.71	7.01	753	0.29	-132.0	0.43	
	SHM-05-41C-040411	4/4/2011	750	NA	16000	NA	3,170	NA	250	130	2.9	NA	8.67	7.03	1132	0.28	-99.0	19	
	SHM-05-41C-100411	10/4/2011	917	NA	19000	NA	3,240	NA	340	28	0.30 J	NA	11.14	6.28	775	0.36	-88.7	4.8	
	SHM-05-41C-041112	4/11/2012	765	NA	18000	NA	3,160	NA	330	30	<2.1	NA	9.20	7.00	929	0.19	-116.8	150000	
	SHM-05-41C-101812	10/18/2012	782	NA	17000	NA	3,190	NA	350	28	0.81 J	NA	9.02	6.93	714	0.70	-164.5	170	
	SHM-05-41C-052113	5/21/2013	NA	709	NA	14,700	NA	2,530	375	153	4.5 U	3.9	11.50	6.98	1081	0.26	-98.5	2.7	
	SHM-05-41C-102313	10/23/2013	NA	890	NA	16,200	NA	2,940	364	28.7	1.4 J	NA	10.08	7.16	511	0.93	-165.9	0.44	
	SHM-05-41C-042314	4/23/2014	NA	1,490	NA	17,600	NA	1,660	378	437	4.2 J	4.5	9.46	7.14	1905	0.57	-121.7	4.91	
	SHM-05-41C-100914	10/9/2014	NA	946	NA	16,000	NA	2,540	368	90	2.6 J	4.1	10.97	7.13	6.99	0.14	-152.2	0.42	
	SHM-05-41C-60815	6/8/2015	NA	883	NA	16,700	NA	2,880	368	41	1.4 J	3.8	12.08	7.02	825	0.49	-131.7	4.59	
	SHM-05-41C_FA115	10/26/2015	NA	851	NA	15,700	NA	2,740	370	33.5	2.1 J	6.4	10.32	6.29	654	0.54	-98.1	0.12	
	SHM-05-41C SPR16	6/27/2016	NA	810	NA	17,000	NA	3,100	370	30	1.9	3.8	0.47	6.83	798	12.83	-93.6	5.66	
	SHM-05-41C FAL16	11/18/2016	NA	820	NA	17,000	NA	3,100	360	27	2.6	3.7	10.07	7.21	732	0.70	-113.3	0.34	
	SHM-05-41C SPR17	6/6/2017	NA	390	NA	8,000	NA	2,400	270	180	4.3	2.8	6.73	7.43	1130	0.90	-76.7	8.42	
	SHM-05-41C FAL17	11/20/2017	NA	740	NA	16,000	NA	2,900	360	25	2.9	3.1	9.66	7.05	559	0.39	-97.1	6.62	
	SHM-05-41C SPR18	4/20/2018	NA	800	NA	18,000	NA	3,000	370	23	3.1	3.6	8.02	7.06	808	1.87	-118.9	0.15	
	SHM-05-41C_SPR19	04/15/2019		**91**		**10,000**		**3,700**	**280**	**550**	10 U	**6**	9.8	6.8	2,600	1.2	-90	4.5	
	SHM-05-41C_FAL19	11/08/2019		**29**		**3,400**		**820 J**	**86**	**1,900**	**14 J**	1.0 U	8.3	6.8	5,900	0.05	-53	6.9	
SHM-05-42A	SHM-05-42A-101707	10/17/2007	1.01 J	NA	180	NA	8.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-42A	8/12/2010	NA	1	NA	388	NA	140	18	1.6	5.6	<1.0	10.39	6.50	61	1.20	89.5	NA	Test Kit (Filtered) < 5
	SHM-05-42A-042210	4/22/2010	2.5	NA	1200	NA	153	NA	160	2.0	5.8	NA	9.63	6.08	71	5.11	-95.0	3.5	
	SHM-05-42A-101310	10/13/2010	1.2	NA	250	NA	138	NA	230	2.2	5.9	NA	9.82	5.75	70	0.31	102.7	1	
	SHM-05-42A-040511	4/5/2011	1.1	NA	200	NA	105	NA	210	2.3	6.4	NA	8.76	6.05	70	0.16	95.2	0	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-05-42A-100711	10/7/2011	0.8	NA	100	NA	15	NA	190	1.8	4.5	NA	10.27	5.23	61	1.95	156.3	0.08	
	SHM-05-42A-041112	4/11/2012	2.3	NA	500	NA	29	NA	170	2.7	<3.8	NA	9.00	5.60	63	6.09	186.2	2700	
	SHM-05-42A-101812	10/18/2012	0.7	NA	45 J	NA	42 J	NA	23	3.3	4.3	NA	9.87	6.04	66	0.54	125.5	0.73 B	
	SHM-05-42A-052213	5/22/2013	NA	0.89 J	NA	224	NA	103	23.2	2.8	5.6	0.65 J	9.61	6.06	62	0.38	86.2	0.00	
	SHM-05-42A-102313	10/23/2013	NA	2.0 U	NA	111	NA	66	23	2.8	6.3 J	NA	7.97	6.09	61	2.53	73.2	0.28	
	SHM-05-42A-042314	4/23/2014	NA	2.0 U	NA	961	NA	193	23.0	4.3	7.5 J	3.1	9.16	5.86	62	0.23	101.2	0.88	
	SHM-05-42A-100914	10/9/2014	NA	2.0 U	NA	130	NA	130	34.9	5.5	7.6 J	0.87 J	10.57	5.81	73	0.09	123.7	2.20	
	SHM-05-42A_FA115	10/28/2015	NA	4.0 U	NA	122	NA	199	31.9	4.5	8.3	0.98 J	9.41	5.33	76	0.91	103.7	0.2	
	SHM-05-42A FAL16	11/18/2016	NA	3.0 U	NA	110	NA	510	33	4.8	11	0.96 J	9.02	6.21	89	0.25	144.6	0.86	
	SHM-05-42A FAL17	11/28/2017	NA	3.0 U	NA	170	NA	680	27	5.5	7.5	0.5 U	8.73	6.42	105	0.27	127.3	4.11	
	SHM-05-42A FAL18	11/15/2018	NA	3.0 U	NA	950	NA	680	31	5.7	7.4	0.960 J	7.47	5.92	164	0.24	46.7	2.01	
	SHM-05-42A_FAL19	11/05/2019		3.0 U		50 U		**50**	**26**	**8.3**	**5.8**	**0.78 J**	9.8	5.8	84	0.23	100	2.3	
SHM-05-42B	SHM-05-42B-101707	10/17/2007	304	NA	94000	NA	1,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-42B-010908	1/9/2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-05-42B-042210	4/22/2010	72	NA	37000	NA	2,540	NA	290	23	5.2	NA	9.77	6.52	863	0.19	-272.0	6.0	
	SHM-05-42B-101310	10/13/2010	197	NA	47000	NA	2,710	NA	300	25	3.9	NA	9.89	6.52	691	0.53	-64.6	1.0	
	SHM-05-42B	4/1/2011	189	NA	61000	NA	3,070	NA	340	32	3.3	NA	8.79	6.44	759	0.25	-63.0	0	
	SHM-05-42B-100711	10/7/2011	230	NA	61000	NA	2,790	NA	330	31	3.4	NA	10.42	6.36	755	0.26	-44.1	0.3	
	SHM-05-42B-041112	4/11/2012	239	NA	58000	NA	2,520	NA	320	26	<2.4	NA	9.55	6.45	895	0.54	-59.0	37000	
	SHM-05-42B-101812	10/18/2012	241	NA	52000	NA	2,600	NA	300	25	3.2	NA	10.17	6.53	643	0.69	-116.8	48	
	SHM-05-42B-052213	5/22/2013	NA	238	NA	51,100	NA	2,900	318	27.7	4.5 U	3.4	9.92	6.58	655	0.37	-49.9	1.2	
	SHM-05-42B-102313	10/23/2013	NA	232	NA	43,200	NA	3,280	313	20.7	3.3 J	NA	10.79	6.48	654	0.16	-105.7	0.96	
	SHM-05-42B-042314	4/23/2014	NA	229	NA	38,000	NA	6,110	308	17.7	2.0 J	3.9	9.36	6.43	643	0.14	-36.9	3.08	
	SHM-05-42B-100914	10/9/2014	NA	215	NA	34,300	NA	6,450	293	17	1.5 J	2.9	10.69	6.60	498	0.10	-78.6	3.4	
	SHM-05-42B_FA115	10/28/2015	NA	206	NA	27,500	NA	6,950	221	14.5	2.4 J	2.5	9.73	6.33	389	0.41	-11.2	0.21	
	SHM-05-42B FAL16	11/18/2016	NA	180	NA	27,000	NA	6,500	200	22	3.7	2.3	9.07	6.56	441	0.40	-8.3	97	
	SHM-05-42B FAL17	11/28/2017	NA	160	NA	20,000	NA	4,200	110	38	3.6	1.5	8.52	7.17	364	0.48	-34.2	2.87	
	SHM-05-42B FAL18	11/15/2018	NA	160	NA	21,000	NA	4,800	150	26	3.3	1.8	7.52	6.54	517	0.47	-38.1	3.52	
	SHM-05-42B_FAL19	11/05/2019		**170**		**29,000**		**6,300**	**170**	**34**	**9.7**	**1.6**	9.6	6.4	450	0.19	-54	4.7	
SHP-05-045A	SHP-05-045A	8/9/2010	36	34	21,600	22,100	NA	NA	NA	NA	NA	3.6	13.97	6.20	294	0.30	-32.2	--	Test Kit (Filtered) 10
	SHP-05-45A_FA115	10/28/2015	NA	28	NA	17,500	NA	325	109	7.5	5.0 U	6.3	--	--	--	--	--	--	
SHP-05-046B	SHP-05-046B	8/9/2010	51	81	26,800	34,800	NA	NA	NA	NA	NA	14	12.93	5.71	662	0.81	3.0	--	Test Kit (Filtered) 80
	SHP-05-46B_FA115	10/28/2015	NA	7.7	NA	802	NA	361	93.7	26.5	5.0 U	12.3	--	--	--	--	--	--	
SHM-07-03	SHM-07-03	10/31/2007	44.4 J	<0.5	10,700	73 J	494	211	21.2	6.4	24	--	--	--	--	--	--	--	
	SHM-07-03	8/12/2010	NA	0.29 J	NA	54	NA	10	18	8.2	10	<1.0	12.25	5.81	81	6.61	133.9	--	Test Kit (Filtered) < 5
	SHM-07-03-052813	5/28/2013	NA	1.0	NA	<100	NA	<15	16.6	28.5	6.4	1.3	12.84	5.81	147	4.82	139.2	12.02	
	SHM-07-03-60915	6/9/2015	NA	2.0 U	NA	98.7 J	NA	18	16.6	180	8.8 J	0.77 J	12.59	5.75	601	7.55	136.7	7.34	
	SHM-07-03	6/30/2016	NA	3.2	NA	660	NA	82	13	200	7.6	1.3	17.42	5.78	686	4.42	140.8	36.7	
	SHM-07-03-SPR17	06/01/2017	NA	3.0 U	NA	83	NA	23	13	210	5.6	1.0 U	12.63	5.70	786	7.40	76.5	9.81	
	SHL-DUP06-SPR17	06/01/2017	NA	3.0 U	NA	170	NA	24	12	20	5.8	1.0 U	--	--	--	--	--	--	
	SHM-07-03-FAL17	11/17/2017	NA	3.0 U	NA	470	NA	41	12	150	6.2	0.5 U	10.11	6.09	435	0.60	59.4	11.15	
	SHM-07-03 SPR18	4/17/2018	NA	3.1	NA	620	NA	60	16	840	9	1.0 U	11.31	5.96	3125	4.32	85.1	51.3	
	SHM-07-03_FALL18	11/19/2018	NA	3.0 U	NA	540	NA	27	180	170	6.8	2.5	8.46	5.33	638	4.22	232	12.5	
	SHM-07-03_SPR19	04/18/2019		3.0 U		**260**		3.0 U	**28**	**170**	**10**	**1.6**	8.3	5.6	650	5.4	1,700	22	
	SHM-07-03_FAL19	11/07/2019		3.0 U		**200**		**7.3 J**	**16**	**130**	**8.8**	**1.9**	9.2	5.6	444	7.8	117.6	602	
SHM-07-05X	SHM-07-05	10/31/2007	15	NA	391	NA	81	NA	46	60	12	NA	11.1	7.61	429	1.85	19.0	5.01	
	SHM-07-05X-60815	6/8/2015	NA	4.8	NA	50 U	NA	7.5 U	157	77	28	4.2	13.70	7.41	460	6.47	37.9	3.05	
	SHM-07-05 SPR16	6/30/2016	NA	11	NA	50 U	NA	10	160	200	25	2.0	17.63	6.06	1,000	0.03	56.2	13.5	
	SHM-07-05 SPR17	6/1/2017	NA	54	NA	870	NA	550	120	1,100	19	3.3	14.70	7.19	3,798	1.46	-45.9	20.00	
	SHM-07-05 FAL17	11/17/2017	NA	890	NA	19,000	NA	2,200	220	24	6.4	2.2	9.48	7.17	472	0.18	-106.3	2.85	
	SHM-07-05X SPR18	4/18/2018	NA	430	NA	11,000	NA	1,500	170	1,300	13	3.1	13.48	6.83	4,659	1.20	-57.1	11	
	SHM-07-05X_FAL18	11/26/2018	NA	100	NA	9,800	NA	1,700	210	96	6.8	2.9	9.59	6.63	785	0.85	6	32.1	
	SHM-07-05X_SPR19	04/18/2019		**950**		**23,000**		**1,900**	**220**	**130**	**8**	**2.8**	7.6	6.7	1,500	2	-66	35	
	SHM-07-05X_FAL19	11/08/2019		**500**		**18,000**		**1,900**	**240**	**68**	**8.7**	**3.1**	7.4	6.8	660	0.46	11	14	
SHM-10-01	SHM-10-01-071310	7/13/2010	1.16 J	0.68 J	508	373	10500 J	10,600	130	12	6.8	NA	12.38	6.19	297	0.18	63.5	3.34	
	SHM-10-01	8/12/2010	NA	3.51 J	NA	886	NA	10,700	130	14	7.0	1.5	11.86	6.61	291	0.49	42.2	NA	
	SHM-10-01-090810	9/8/2010	8.2	7.9	1,740	1,680	10,200	10,300	140	11	8.7	1.6	12.68	6.31	299	0.12	11.3	0.15	
	SHM-10-01-102412	10/24/2012	NA	1.4	NA	210	NA	NA	88.6	8.5	6.2 U	NA	11.51	6.39	143	0.40	48.3	0.95	
	SHM-10-01-052913	5/29/2013	NA	1.3	NA	124	NA	5970 J	72.9	4.0	6.5	5.3	10.58	6.53	160	0.16	51.2	0.00	
	SHM-10-01-60915	6/9/2015	NA	2.0 U	NA	92.7 J	NA	14,800	137	17.5	8.6 J	1.1	10.96	6.08	310	1.03	98.0	0.50	
SHM-10-02	SHM-10-02-071510	7/15/2010	0.7	0.43 J	1,190	881	2,110	2,180	250	160	20	NA	12.24	6.42	836	0.45	80.8	3.47	
	Dup-071510	7/15/2010	0.6	0.45 J	1,170	890	2,130	2,170	250	160	21	NA	NA	NA	NA	NA	NA	NA	
	SHM010-02-090710	9/7/2010	1.1	1.1	973	843	2,190	2,190	260	120	19	2.5	12.45	5.94	881	0.87	-258.3	0.64	
	SHM-10-02-102212	10/22/2012	NA	1.1	NA	100 UJ	NA	NA	448	61.5	7.4 U	NA	12.18	6.52	726	0.48	40.2	1.78	
	SHM-10-02-052913	5/29/2013	NA	1.5	NA	33.7 J	NA	2,450	444	61.5	8.8	3.8	11.37	6.53	537	0.20	73.2	1.04	
	SHM-10-02-60815	6/8/2015	NA	3.2 J	NA	50 U	NA	4,700	291	215.0	11.6	2.0	11.28	6.47	1173	0.69	59.8	0.31	
	SHM-10-02 FAL17	11/21/2017	NA	3.0 U	NA	75 U	NA	1,800	140	88	5.8	1.5	11.47	7.38	530	0.80	202.9	1.92	
	SHM-10-02_FAL18	11/28/2018	NA	3.0 U	NA	50 U	NA	1,600	130	93	7.1	1.2	10.6	6.38	580	1.7	139	1.51	
	SHM-10-02_FAL19	11/14/2019		3.0 U		50 U		**1,400**	**90**	**120**	**7.8**	**1.3**	11	6.7	500	9.6	150	1.1	
SHM-10-03	SHM-10-03-071410	7/14/2010	2.4	0.78 J	1,630	866	122	153	96	1000	38	NA	16.09	6.60	3331	1.47	75.7	31.7	
	SHM-10-03-090710	9/7/2010	1.47 J	0.51 J	1,420	1,030	73	44	78	1100	39	< 1	11.93	6.31	3341	1.72	148.1	13.4	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-10-03-102312	10/23/2012	NA	1.0 U	NA	79 J	NA	NA	57.2	900	38.2	NA	13.75	6.51	2230	1.45	-3.6	21.9	
	SHM-10-03-052413	5/24/2013	NA	1.5	NA	50.6 J	NA	37	71.8	870	35.4	0.72 J	11.49	6.54	1981	0.61	61.5	3.68	
	SHM-10-03-60915	6/9/2015	NA	4.2	NA	50 U	NA	38	73.8	1000	66.7	0.61 J	12.61	6.41	3485	0.31	140.0	2.54	
	SHM-10-03 FAL17	11/21/2017	NA	3.0 U	NA	75 U	NA	15	170	320	19	1.0	11.60	6.96	1162	0.52	103.1	4.89	
	SHM-10-03_FAL18	11/28/2018	NA	3.0 U	NA	50 U	NA	7.5 J	170	260	13	1.0 U	9.8	6.83	1,170	2.21	152	2.37	
	SHM-10-03_FAL19	11/14/2019		**8.5**		50 U		**4.0 J**	**150**	**120**	**11**	**1.4**	9.6	7.1	580	4.2	120	2.6	
SHM-10-04	SHM-10-04-071410	7/14/2010	1.6	0.6	3800 J	5,190	2,190	2,500	99	74	84	NA	10.82	6.37	630	0.23	9.9	17.7	
	SHM-10-04-090710	9/7/2010	1.0 J	0.79 J	1,880	1,650	3,210	3,100	100	92	87	2.7	12.1	5.99	656	0.23	43.7	4.28	
	SHM-10-04-102212	10/22/2012	NA	1.0 U	NA	100 U	NA	NA	81.4	82.5	70.9	NA	11.64	5.89	460	0.27	65.0	4.15	
	SHM-10-04-052913	5/29/2013	NA	1.0	NA	<100	NA	622	99.5	83.0	81.7	1.9	10.18	6.01	382	0.16	180.1	1.67	
	SHM-10-04-60815	6/8/2015	NA	2.0 U	NA	50 U	NA	597	58.2	140.0	65.1	1.3	10.89	6.14	710	0.24	96.9	0.17	
	SHM-10-04 FAL17	11/21/2017	NA	3.0 U	NA	180	NA	330	100	92	17	1.5	11.23	6.33	473	0.26	151.2	1.28	
	SHM-10-04_FAL18	11/26/2018	NA	3.0 U	NA	50 U	NA	320	80	97	23	1.1	10.7	6.16	522	0.39	71	2.97	
	SHM-10-04_FAL19	11/14/2019		3.0 U		50 U		**330**	**71**	**89**	**20**	**1.1**	11	6.8	420	0.43	100	3.1	
SHM-10-05A	SHM-10-05A-071510	7/15/2010	4.7	4.6	1,970	1,880	590	620	43	34	10	NA	19.06	6.29	186	1.42	31.7	5.12	
	SHM-10-05A-090810	9/8/2010	5.7	5.2	790	677	105	122	36	29	11	< 1	20.2	5.27	200	3.20	-29.0	8.92	
	SHM-10-05A-102312	10/23/2012	NA	3.0	NA	68 J	NA	NA	42.1	30.5	8.0	NA	14.43	6.04	208	4.84	164.8	4.3	
	SHM-10-05 (EPA)	10/24/2012	<20	NA	5700	NA	21	NA	48	4.0	3.3	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-05A-052213	5/22/2013	NA	3.1	NA	30 U	NA	16	38.7	30.7	7.2	0.79 J	13.51	6.26	145	1.31	158.1	2.47	
	SHM-10-05A-60915	6/9/2015	NA	3.0 J	NA	50 U	NA	10.3 J	29.1	35.5	9.5 J	0.70 J	13.99	6.10	207	1.86	208.2	1.26	
	SHM-10-05A FAL17	11/16/2017	NA	2.1 J	NA	75 U	NA	5	25	48	11	0.5 U	11.92	6.68	242	1.60	161.9	4.17	
	SHM-10-05A_FAL18	11/13/2018	NA	3.0 U	NA	50 U	NA	3.7 J	24	62	6.7	1.0 U	11.4	6.18	276	1.38	65.7	24.7	
	SHM-10-05A_FAL19	11/12/2019		**2.0 J**		50 U		**2.4 J**	**32**	**32**	**9.5**	**0.62 J**	11	5.7	210	2.6	180	4.2	
SHM-10-06	SHM-10-06-070810	7/8/2010	2210 J	1680 J	130000 J	117,000	724	699	360	17	0.89	NA	21.74	6.62	754	0.55	-93.8	21.4	
	SHM-10-06-090810	9/8/2010	2,580	2,710	144,000	145,000	10	10	300	15	0.49 J	5	11.59	6.16	783	2.83	-64.3	3.72	
	SHM-10-06-102312	10/23/2012	NA	2,300	NA	111,000	NA	NA	184	16.5	5.0 U	NA	15.78	6.57	587	1.18	-122.1	3.38	
	SHM-10-06 (EPA)	10/23/2012	1,900	NA	110000	NA	1,900	NA	117	14	0.99	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-06-052313	5/23/2013	NA	1,980	NA	107,000	NA	1,890	227	16.2	4.5 U	3.7	13.22	6.60	473	0.86	-120.7	4.66	
	SHM-10-06-100814	10/8/2014	NA	1,900	NA	92,000	NA	2,080	238	18	4.8 J	2.9	11.45	6.73	515	0.41	-119.3	3.49	
	SHM-10-06_FA115	10/22/2015	NA	2,150	NA	88,800	NA	2,090	183	18	3.7 J	5.4	10.98	6.65	535	0.41	-123.5	3.00	
	SHM-10-06 FAL16	11/21/2016	NA	1,700	NA	77,000	NA	3,100	210	27	5.1	2.3	8.43	6.83	613	1.55	-89.3	0.18	
	SHM-10-06 FAL17	11/16/2017	NA	1,600	NA	88,000	NA	5,000	180	26	5.4	2.5	9.72	6.90	483	0.31	-79.1	3.57	
	SHM-10-06_FAL18	11/12/2018	NA	1,200	NA	81,000	NA	3,300	160	27	5.7	2.5	12.2	6.64	592	0.2	-82.1	2.9	
	SHM-10-06_FAL19	11/01/2019		**1,300**		**81,000**		**2,400**	**150**	**29**	**11**	**2.2**	11	6.6	580	0.08	-75	3.4	
SHM-10-06A	SHM-10-06A-070710	7/7/2010	65	61	20900 J	19900 J	1650 J	1,620	100	3.4	2.5 B	NA	19.74	6.51	209	1.49	-22.6	5.38	
	SHM-1--06A-090910	9/9/2010	102	94.2	44,600	42,900	3,940	4,080	190	11	3.2	3.3	10.65	5.94	431	0.39	-157.3	40.6	
	SHM-10-06A-102412	10/24/2012	NA	72	NA	19,900	NA	NA	67	4.5	5.9 U	NA	10.98	5.90	190	0.63	-203.0	13.91	
	SHM-10-06A (EPA)	10/24/2012	80	NA	20000	NA	2,100	NA	46	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-06A-052213	5/22/2013	NA	72.8	NA	11,400	NA	1,430	48.6	1.8	4.5 U	1.9	12.60	6.57	90	0.55	-12.3	3.67	
	SHM-10-06A-112013	11/20/2013	NA	22.9	NA	3,410	NA	1,960	53.9	1.5	2.1 J	1.8	9.34	6.49	107	0.22	-61.6	0.44	
	SHM-10-06A-100714	10/7/2014	NA	95.6	NA	27,800	NA	3,480	119	10.0	2.7 J	5.4	11.77	6.19	199	0.41	-25.1	4.63	
	SHM-10-06A_FA115	10/21/2015	NA	4.0 U	NA	100 U	NA	1,170	26.8	1.5	5.1	2.2	11.47	6.78	65	0.59	53.1	6.39	
	SHM-10-06A FAL16	12/2/2016	NA	76	NA	11,000	NA	1,200	59	11	9.6	1.7	9.04	6.08	147	2.43	36.2	9.41	
	SHM-10-06A FAL17	11/30/2017	NA	74	NA	28,000	NA	190	61	15	7.7	1.6	8.24	7.00	170	2.99	55.9	23	
	SHM-10-06A_FAL18	11/07/2018	NA	64	NA	6,100	NA	550	57 J	8.7	6.4	1.4 U	10.5	5.87	164	0.58	13.8	4.91	
	SHM-10-06A_FAL19	11/07/2019		**63**		**8,900**		**710**	**93**	**13**	**6.1**	1.0 U	11	6	220	0.99	40	9.9	
SHM-10-07	SHM-10-07-052710	5/27/2010	816 J	818 J	75800 J	70600 J	3230 J	3110 J	300	48	8.6	NA	13.43	6.97	751	0.15	-195.0	237	
	SHM-10-07-090910	9/9/2010	979	918	62,300	56,800	2,050	1,940	240	41	2.3	3.5	12.39	6.54	635	0.43	-105.6	15.4	
	SHM-10-07-102212	10/22/2012	NA	1,100	NA	69,000	NA	NA	191	46.5	5.0 U	NA	12.10	6.45	516	0.13	-86.0	21.3	
	SHM-10-07 (EPA)	10/22/2012	990	NA	66000	NA	2,200	NA	143	58	0.14	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-07-052313	5/23/2013	NA	1,210	NA	94,900	NA	2,670	243	61.7	5.6	3.5	12.03	6.50	561	1.23	-109.6	4.60	
	SHM-10-07-100714	10/7/2014	NA	861	NA	53,330	NA	2,150	162	55	1.9 J	2.8	12.23	6.80	634	0.27	-92.8	44.00	
	SHM-10-07_FA115	10/22/2015	NA	926	NA	43,900	NA	2,410	127	55.5	4.0 J	2.8	12.29	6.61	453	0.48	-117.1	7.21	
	SHM-10-07 FAL16	12/1/2016	NA	750	NA	26,000	NA	3,400	130	54	10	2.3	12.11	6.83	413	0.78	-87.4	NA	
	SHM-10-07 FAL17	11/7/2017	NA	970	NA	44,000	NA	1,800	110	52	6.9	1.9	11.18	6.66	360	0.47	-72.9	7.93	
	SHM-10-07_FAL18	11/09/2018	NA	900	NA	39,000	NA	1,800	100	54	8.8	1.9	10.7	6.68	498	0.29	-82.7	283	
	SHM-10-07_FAL19	11/06/2019		**1,000**		**52,000**		**2,000**	**150**	**64**	**7.7**	**1.9**	11	6.6	580	3.1	-97	15	
SHM-10-08	SHM-10-08-071510	7/15/2010	2.7	0.73 J	2,610	1310 J	910	885 J	480	71	15	NA	10.95	6.73	917	0.21	33.7	7.15	
	SHM-10-08-090710	9/7/2010	1.4	1.55	1,270	1,260	359	376	500	79	15	3.8	12.1	6.19	1079	3.61	-233.0	1.37	
	SHM-10-08-102212	10/22/2012	NA	1.9	NA	37 J	NA	NA	459	53.5	7.8 U	NA	11.59	6.63	713	0.40	45.1	0.0	
	SHM-10-08-052113	5/21/2013	NA	1.9	NA	42.8 J	NA	242	499	55.7	10.4	3.2	11.86	6.73	721	0.49	7.8	1.7	
	SHM-10-08-60815	6/8/2015	NA	3.6 J	NA	50 U	NA	328	426	120	6.9 J	2.6	10.69	6.36	937	0.39	102.8	1.29	
	SHM-10-08 FAL17	11/21/2017	NA	3.0 U	NA	75 U	NA	470	430	51	7.1	3.0	10.80	7.22	878	1.26	219.8	1.7	
	SHM-10-08_FAL18	11/26/2018	NA	2.0 J	NA	50 U	NA	540	430	58	11	3.0	9.96	6.57	759	2.05	82.4	4.65	
	SHM-10-08_FAL19	11/14/2019		3.0 U		50 U		**550**	**350**	**69**	**7.9**	**2.1**	9.8	6.3	710	4.2	170	3.6	
SHM-10-10	SHM-10-10-071310	7/13/2010	2.0 J	1.25 J	1,020	799	24,600	24,200	350	19	0.56 J	NA	12.10	6.61	658	0.85	28.7	4.52	
	SHM-10-10	8/12/2010	NA	3.62 J	NA	1,180	NA	22,000	320	23	0.79 J	3.9	11.27	6.57	622	0.76	-9.1	NA	
	SHM-10-10-090810	9/8/2010	2.57 J	2.4 J	833	700	27,400	25,200	320	17	0.34 J	3.8	13.13	6.55	617	0.16	63.3	0.71	
	SHM-10-10-102412	10/24/2012	NA	1.0	NA	180	NA	NA	295	21	5.0 U	NA	12.06	6.55	464	0.28	37.6	3.25	
	SHM-10-10-052913	5/29/2013	NA	1.7	NA	82.5 J	NA	26,400	343	18.5	4.5 U	2.9	11.22	6.62	579	3.07	48.8	0.46	
	SHM-10-10-112013	11/20/2013	NA	2.0 J	NA	48.7 J	NA	23,300	256	61	2.9 J	15.8	11.98	6.53	557	0.36	75.2	0.39	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-10-10-101014	10/10/2014	NA	2.6 J	NA	50 U	NA	25,800	327	44	4.0 J	3.5	12.08	6.57	484	0.26	78.8	0.98	
	SHM-10-10_FA115	10/23/2015	NA	2.9 J	NA	100 U	NA	16,000	271	50.7	6.6 J	3.9	11.73	6.53	561	4.59	17.2	0.89	
	SHM-10-10 FAL16	11/29/2016	NA	3.5	NA	21 J	NA	10,000	240	49	3.6	2.9	11.97	6.65	488	2.06	105.7	6.01	
	SHM-10-10 FAL17	11/27/2017	NA	3.0 U	NA	75 U	NA	8,600	150	280	46	2.0	11.51	7.35	1040	0.31	117.6	1.39	
	SHM-10-10_FALL18	11/20/2018	NA	3.0 U	NA	50 U	NA	5,900	14	260	7.3	0.66 J	9.31	6.37	1,150	0.21	186	6.19	
	SHM-10-10_FAL19	11/11/2019		3.0 U		50 U		**8,400**	**260**	**93**	**4.9**	**2.6**	11	6.5	790	0.58	43	1.2	
SHM-10-11	SHM-10-11	8/30/2010	356	342 J	60,600	55,700	2,490	2,320	160	24	19	3.3	13.19	6.12	419	1.68	-32.0	4.05	
	SHM-10-11-101910	10/19/2010	470	463	60,500	61,000	2,160	2,260	140	23	19 J	3.4	11.57	6.28	4.14	0.41	-42.1	4.28	
	SHM-10-11-102312	10/23/2012	NA	440	NA	56,100	NA	NA	76.7	26	29.3	NA	11.18	6.27	304	1.78	-34.0	1.1	
	SHM-10-11(EPA)	10/23/2012	460	NA	56000	NA	2,200	NA	67	25	28	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-11-052313	5/23/2013	NA	460	NA	65,100	NA	2,510	102	21.2	30.3	2.9	11.25	6.15	287	0.80	-46.1	2.01	
	SHM-10-11-111913	11/19/2013	NA	432	NA	60,400	NA	2,400	121	30	34.7	2.7	10.63	6.41	421	0.33	-43.5	0.45	
	SHM-10-11_FA115	10/21/2015	NA	503	NA	59,700	NA	2,430	51.5	31.5	45.1	2.6	11.23	6.01	348	0.40	-19.9	1.54	
	SHM-10-11 FAL16	12/1/2016	NA	520	NA	52,000	NA	2,600	120	29	48	2.5	11.13	6.32	345	0.80	-49.7	16.9	
	SHM-10-11 FAL17	11/30/2017	NA	540	NA	59,000	NA	2,900	89	32	52	2.4	10.95	7.05	363	0.25	-38.1	9.19	
	SHM-10-11_FAL18	11/09/2018	NA	620	NA	61,000	NA	3,600	73	33	74	2.7	11.3	6.34	504	0.21	-49.9	5.81	
	SHM-10-11_FAL19	11/07/2019		**560**		**63,000**		**2,800**	**150**	**32**	**51**	1.0 U	11	6.2	500	0.2	-21	15	
SHM-10-12	SHM-10-12	8/30/2010	2,880	3,560	78,600	104,000	5,400	7,000	240	3.7	1.7	4.1	14.41	6.04	460	3.55	-34.9	8.43	
	SHM-10-12-102010	10/20/2010	2,980	3,120	88,700	90,000	6,070	6,200	240	4.4	1.4	4.3	10.92	5.93	432	0.32	-14.5	1.6	
	SHM-10-12-102312	10/23/2012	NA	4,100	NA	78,600	NA	NA	131	2.5	<5.0	NA	11.49	5.74	322	0.29	8.4	0.2	
	SHM-10-12 (EPA)	10/23/2012	3,100	NA	76,000	NA	5,700	NA	65	3.5	1.8	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-12 D (EPA)	10/23/2012	3,100	NA	77,000	NA	5,800	NA	65	3.5	1.8	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-12-052313	5/23/2013	NA	3,580	NA	56,300	NA	6,450	171	7.3	7.9	23.9	11.84	6.09	302	0.26	-44.9	4.36	
	SHM-10-12-111913	11/19/2013	NA	3,570	NA	89,600	NA	6,270	210	4	3.8 J	3.5	10.49	6.35	428	0.72	-19.3	0.16	
	SHM-10-12-100714	10/7/2014	NA	3,510	NA	84,100	NA	6,970	191	3.5	4.0 J	3.9	13.99	6.02	368	0.31	-29.1	0.43	
	SHM-10-12_FA115	10/22/2015	NA	3,850	NA	85,600	NA	7,760	136	4.5	6.1	4.1	10.70	6.09	452	0.33	-27.1	0.38	
	SHM-10-12 FAL16	12/1/2016	NA	2,900	NA	65,000	NA	7,000	200	8.1	9.7	4.0	12.79	6.12	367	1.99	-22.6	NA	
	SHM-10-12 FAL17	11/30/2017	NA	3,300	NA	79,000	NA	7,700	210	4.9	3.5	3.5	10.83	6.89	392	0.35	-19.0	6.62	
	SHM-10-12_FAL18	11/08/2018	NA	3,300	NA	79,000	NA	6,500	170	4.9	3.7	3.1	11.1	5.58	443	0.25	-12.7	23.8	
	SHL-DUP05_FAL19	11/14/2019		**3,200**		**71,000**		**5,800**	**160**	**3.1**	**2.2**	**2.9**	9.5	5.4	400	0.26	20	25	
	SHM-10-12_FAL19	11/14/2019		**3,400**		**65,000**		**5,400**	**170**	**4.1**	**2.6**	**2.9**	9.5	5.4	400	0.26	20	25	
SHM-10-13	GP-10-13-090110	9/1/2010	619 J	575	88,600	84,100	1,900	1850 J	380	18	< 0.12	5.6	13.57	6.32	782	2.76	-68.6	18.8	
	SHM-10-13-101910	10/19/2010	700	672	95,500	94,600	2,100	2,060	360	21	< 0.12	8.7	12.48	6.27	743	0.12	-52.5	12	
	SHM-10-13-102312	10/23/2012	NA	670	NA	68,800	NA	NA	296	17	5.3 U	NA	12.49	6.42	597	0.11	-44.5	14.2	
	SHM-10-13 (EPA)	10/23/2012	630	NA	66000	NA	2,200	NA	240	18.0	0.11 J	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-13-052313	5/23/2013	NA	565	NA	83400 J	NA	1,130	292	19.7	4.5 U	5.1	12.59	6.35	571	0.22	-91.7	14.4	
	SHM-10-13-100714	10/7/2014	NA	532	NA	55,700	NA	1,670	266	24.5	22	4.7	11.83	6.56	527	0.20	-112.2	3.05	
	SHM-10-13_FA115	10/22/2015	NA	4.5	NA	354	NA	327	162	35.7	102	2.8	13.09	6.47	629	0.29	62.7	3.50	
	SHM-10-13 FAL16	11/28/2016	NA	530	NA	67,000	NA	1,000	280	16	1.0 U	3.9	8.98	6.50	432	1.80	-46.8	3.11	
	SHM-10-13 FAL17	11/9/2017	NA	450	NA	82,000	NA	1,300	260	21	1.0 U	3.5	11.73	6.76	374	0.36	-61.2	7.84	
	SHM-10-13_FAL18	11/14/2018	NA	570	NA	72,000	NA	1,200	230	22	4.9	3.2	9.13	6.98	614	1.08	-64.5	65.2	
	SHM-10-13_FAL19	11/06/2019		**460**		**69,000**		**960**	**260**	**30**	**2.5**	**4.1**	10	6.5	710	0.55	-39	12	
SHM-10-14	SHM-10-14-090210	9/2/2010	4,280	4,100	75,200	73,000	4,700	4,720	360	6.3	3.7	8.7	14.48	6.35	645	0.18	-87.4	34.7	
	SHM-10-14-101910	10/19/2010	5990 J	5,860	98,300	92,700	4350 J	4,180	320	4.8	0.67 J	62	11.99	6.35	693	0.36	-38.6	34.5	
	SHM-10-14-102312	10/23/2012	NA	6200 J	NA	94,400	NA	NA	194	5.0	5.0 U	NA	12.4	6.26	445	0.13	-41.0	4.88	
	SHM-10-14 (EPA)	10/23/2012	5,900	NA	87000	NA	3,900	NA	124	4.5	1.1	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-14-052313	5/23/2013	NA	5,540	NA	83,100	NA	2,800	241	5.8	6.4	21.3	11.43	6.24	467	0.20	-67.0	10.08	
	SHM-10-14-100814	10/8/2014	NA	5,380	NA	92,100	NA	2,810	283	5.5	1.8 J	23.2	13.73	6.30	482	0.19	-76.1	4.56	
	SHM-10-14_FA115	10/22/2015	NA	2,320	NA	63,500	NA	3,650	169	4.0	2.7 J	4.7	12.25	6.22	418	0.37	-30.2	3.68	
	SHM-10-14 FAL16	11/28/2016	NA	4,900	NA	85,000	NA	2,300	280	4.5	1.0 U	3.8	11.18	6.40	433	0.14	-46.3	12.4	
	SHM-10-14 FAL17	11/9/2017	NA	5,400	NA	95,000	NA	2,300	240	5.2	1.0 U	3.9	11.1	6.49	430	0.66	-42.1	4.7	
	SHM-10-14_FAL18	11/08/2018	NA	3,900	NA	75,000	NA	2,600	200	4.2	1.0 U	3.5	13	7.65	512	0.50	-79.8	55.1	
	SHL-DUP09_FAL19	11/06/2019		**4,500**		**80,000**		**2,400**	**210**	**4**	**2.3**	**3.4**	11	6.5	470	11	31	13	
	SHM-10-14_FAL19	11/06/2019		**4,500**		**78,000**		**2,400**	**200**	**4**	**2.4**	**3.4**	11	6.5	470	11	31	13	
SHM-10-15	GP-10-15-090110	9/1/2010	7,930	8,110	62,500	63,300	10,400	10,700	210	5.7	3.8	4.2	16.02	6.21	503	0.25	-52.7	16.3	
	SHM-10-15-090110	9/1/2010	7,930	8,110	62,500	63,300	10,400	10,700	240	11.0	8.4	3.2	16.02	6.21	503	0.25	-52.7	16.3	
	SHM-10-15-102010	10/20/2010	6,090	6,230	50,400	52,000	8,440	8,680	230	12.0	10	4	11.95	5.94	510	0.36	-10.9	59.5	
	SHM-10-15-102312	10/23/2012	NA	7,000	NA	46,600	NA	NA	172	10.0	9.5 U	NA	11.98	6.43	376	0.20	-49.0	5.1	
	SHM-10-15 (EPA)	10/23/2012	5,800	NA	45000	NA	8,000	NA	147	9.5	10	NA	NA	NA	NA	NA	NA	NA	
	SHM-10-15-052413	5/24/2013	NA	1,090	NA	8,290	NA	1,960	196	7.5	7.4	3.4	15.1	6.37	440	0.49	-73.9	11.97	
	SHM-10-15-112013	11/20/2013	NA	5,740	NA	47,400	NA	8,210	210	9.5	10.9	2.8	10.41	6.51	48	0.38	-65.9	10.31	
	SHM-10-15-100714	10/7/2014	NA	5870 J	NA	46500 J	NA	8530 J	207	9.0	11.6	2.6	12.26	6.45	351	0.08	-90.8	29.7	
	SHM-10-15_FA115	10/23/2015	NA	5,450	NA	41,500	NA	7,600	197	9.0	11.3	2.9	11.06	6.25	492	0.76	-60.1	1.05	
	SHM-10-15 FAL16	11/22/2016	NA	5,100	NA	44,000	NA	7,700	210	12	11	2.8	10.75	6.44	382	0.99	-56.3	8.19	
	SHM-10-15 FAL17	11/9/2017	NA	6,400	NA	52,000	NA	8,600	200	12	9.3	2.5	10.4	6.70	327	0.47	-30.2	5.52	
	SHM-10-15_FAL18	11/14/2018	NA	5,800	NA	48,000	NA	8,200	200	12	10	2.7	9.69	6.96	497	0.50	-60.1	50.3	
	SHM-10-15_FAL19	11/14/2019		**5,600**		**44,000**		**7,300**	**200**	**12**	**14**	**2.4**	10	6.4	430	0.16	79	6.8	
SHM-10-16	SHM-10-16-090210	9/2/2010	487	495	50,200	53,100	1,710	1,790	330	31	2.9	5.3	11.4	6.98	784	0.17	-233.8	78.5	
	SHM-10-16-102010	10/20/2010	1,180	1,090	51,800	46,900	1,250	1,150	320	28	3.2	10	10.63	6.77	793	0.34	-129.2	34.6	
	SHM-10-16-102312	10/23/2012	NA	1,600	NA	41,700	NA	NA	281	24.5	6.8 U	NA	10.15	6.64	533	0.26	-86.2	0.65	
	SHM-10-16 (EPA)	10/24/2012	1,500	NA	<40	NA	<20	NA	247	24	3.0	NA	NA	NA	NA	NA	NA	NA	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-10-16-052813	5/28/2013	NA	1,350	NA	42,700	NA	1,280	309	21	4.7 J	3.8	9.39	6.71	632	0.15	-128.0	0.08	
	SHM-10-16-112013	11/20/2013	NA	1,530	NA	44,500	NA	1,480	312	24	2.9 J	3.7	9.39	6.75	677	0.19	-115.6	0.84	
	SHM-10-16_FA115	10/28/2015	NA	1,760	NA	44,600	NA	1410 J	290	29	4.6 J	4.0	10.11	7.02	354	2.63	-13.1	0.31	
	SHM-10-16 SPR16	6/27/2016	NA	1,900	NA	43,000	NA	1,600	300	23	2.2	3.3	1.52	6.77	690	11.27	-93.8	1.74	
	SHM-10-16 FAL16	11/29/2016	NA	1,600	NA	43,000	NA	1,700	320	21	2.8	2.8	9.1	6.76	523	1.12	-101.9	5.87	
	SHM-10-16 SPR17	6/2/2017	NA	1,800	NA	79,000	NA	4,000	190	25	8.5	2.7	10.87	6.77	704	6.65	-68.0	6.36	
	SHM-10-16 FAL17	11/17/2017	NA	1,200	NA	40,000	NA	1,800	290	20	3.2	2.2	9.3	6.93	429	0.30	-75.5	4.74	
	SHM-10-16_FAL18	11/15/2018	NA	1,100	NA	37,000	NA	1,700	260	21	3.9	2.1	9.02	6.64	756	0.33	-50.1	0.50	
	SHL-DUP08_FAL19	11/13/2019		**1,100**		**38,000**		**1,700**	**280**	**24**	**3.7**	**1.9**	7.6	6.5	560	0.69	42	11	
	SHM-10-16_FAL19	11/13/2019		**1,200**		**37,000**		**1,700**	**280**	**24**	**3.7**	**1.9**	7.6	6.5	560	0.69	42	11	
SHM-11-02	SHM-11-02-102212	10/22/2012	NA	7.1	NA	2,000	NA	NA	228	42	15.9	NA	14.43	7.32	468	0.21	-135.0	19.6	
	SHM-11-02-112013	11/20/2013	NA	3.2 J	NA	2,470	NA	146	92.4	35	9.9 J	37.9	10.82	8.38	241	0.30	-279.2	21.3	
	SHM-11-02-042414	4/24/2014	NA	2.0 U	NA	1,270	NA	268	51.5	34.7	5.3 J	42.0	10.77	7.23	196	0.79	-118.3	22.7	
	SHM-11-02-100714	10/8/2014	NA	2.0 U	NA	5,030	NA	224	109	40.5	1.2 J	20.8	15.44	7.91	351	0.06	-289.0	19	
	SHM-11-02-6052015	6/5/2015	NA	2.0 U	NA	1,720	NA	479	43.7	36.5	0.50 U	39.2	17.08	7.35	232	0.13	-195.4	8.50	
	SHM-11-02_FA115	10/27/2015	NA	4.0 U	NA	3,340	NA	278	50.5	36	5.0 U	27.7	12.3	7.21	247	0.40	-232.6	13.0	
	SHM-11-02 SPR16	6/27/2016	NA	3.0	NA	12,000	NA	310	130	49	0.8 U	2.9	0.44	7.33	400	19.40	-188.0	22.70	
	SHM-11-02 FAL16	11/16/2016	NA	3.0 U	NA	15,000	NA	330	140	45	1.0 U	3.1	11.82	7.32	343	0.79	-139.9	11.7	
	SHM-11-02 SPR17	5/31/2017	NA	3.0 U	NA	13,000	NA	280	140	45	1.0 U	3.4	12.27	7.39	312	0.19	-209.6	8.14	
	SHM-11-02 FAL17	11/6/2017	NA	2.5 J	NA	14,000	NA	330	160	47	1.7	1.9	13.06	7.26	500	0.31	-177.6	5.25	
	SHM-11-02 SPR18	4/19/2018	NA	2.0 J	NA	17,000	NA	310	160 J	46	1.0 U	1.8	8.84	7.57	505	1.05	-198.5	9.99	
	SHM-11-02_FAL18	11/07/2018	NA	9	NA	31,000	NA	1,900	280	45	1.0 U	70	15.1	6.94	841	0.52	-144	34.1	
	SHM-11-02_SPR19	04/16/2019		**37**		**34,000**		**2,300**	**280**	**44**	1.0 U	**2.6**	12	7.6	750	0.4	-240	8.6	
	SHM-11-02_FAL19	11/13/2019		**33**		**22,000**		**1,600**	**250**	**47**	**1.1**	1.0 U	9.5	7.4	630	0.24	-190	9.9	
SHM-11-06	SHM-11-06-102212	10/22/2012	NA	920	NA	84,100	NA	NA	287	20.5	5.0 U	NA	13.11	6.41	561	1.80	-83.0	4.24	
	SHM-11-06-052813	5/28/2013	NA	1,020	NA	73,200	NA	990	262	20.0	6.8	3.1	12.08	6.54	495	0.34	-105.7	3.19	
	SHM-11-06-112013	11/20/2013	NA	1,000	NA	74,600	NA	938	220	23.0	6.8 J	3.2	9.29	6.45	578	0.36	-104.4	2.23	
	SHM-11-06-100814	10/8/2014	NA	825	NA	63,600	NA	818	173	35.5	5.2 J	2.7	12.69	6.53	633	0.20	-88.3	2.18	
	SHM-11-06_FA115	10/27/2015	NA	821	NA	4,680	NA	687	118	40.5	13.7	2.2	11.35	6.62	492	0.65	-131.2	0.74	
	SHM-11-06 FAL16	11/16/2016	NA	900	NA	56,000	NA	1,400	170	50	0.77 J	--	11.78	6.30	433	1.40	-67.1	5.17	
	SHM-11-06-SPR17	06/06/2017	NA	730	NA	67,000	NA	1,700	160	54	2.2	1.9	8.86	6.12	415	0.31	-59.9	6.12	
	SHM-11-06 FAL17	11/7/2017	NA	780	NA	62,000	NA	1,400	150	50	5.9	1.8	11.46	6.52	413	0.31	-54.9	7.21	
	SHM-11-06 SPR18	4/13/2018	NA	600	NA	56,000	NA	1,400	160	49	7.4	1.9	11.61	7.18	524	0.70	12.7	1.7	
	SHM-11-06_FAL18	11/12/2018	NA	750	NA	64,000	NA	1,400	140	48	6.2	1.9	12.5	6.53	560	0.22	-69.9	14	
	SHM-11-06_SPR19	04/18/2019		**680**		**59,000**		**1,300**	**140**	**48**	**8.4**	**1.9**	9.3	6.6	590	0.9	-72	17	
	SHL-DUP03_FAL19	11/01/2019		**810**		**68,000**		**1,600**	**190**	**46**	**8.1**	**1.9**	10	6.3	640	0.18	-61	3.4	
	SHM-11-06_FAL19	11/01/2019		**780**		**69,000**		**1,700**	**190**	**46**	**8.6**	**2.1**	10	6.3	640	0.18	-61	3.4	
PZ-12-01	PZ-12-01-052813	5/28/2013	NA	441	NA	27,100	NA	3,930	201	38.0	13.6	2.4	12.41	6.50	421	0.23	-86.3	4.19	
	PZ-12-01-SPR17	05/25/2017	NA	680	NA	41,000	NA	3,100	190	49	5.2	2.6	10.49	5.89	416	0.52	-18.6	12.10	
	PZ-12-01-FAL17	11/3/2017	NA	420	NA	53,000	NA	670	150	14	2.9	2.1	14.09	6.43	532	0.52	-63.1	7.93	
	PZ-12-01 SPR18	4/12/2018	NA	700	NA	55,000	NA	2,800	180	45	8.4	2.4	10.96	6.36	544	0.94	-0.30	7.18	
	PZ-12-01_FAL18	11/06/2018	NA	570	NA	59,000	NA	1,800	140	48	5.9	2.2	11.2	6.27	583	1.01	-38.4	23.4	
	PZ-12-01_SPR19	04/18/2019		**470**		**54,000**		**1,700**	**170**	**58**	**11**	**3.3**	10	6.5	660	0.71	-54	9.6	
	PZ-12-01_FAL19	11/01/2019		**560**		**52,000**		**1,800**	**140**	**62**	**14**	**2**	11	6.4	600	0.36	-64	4.5	
PZ-12-02	PZ-12-02-052113	5/21/2013	NA	627	NA	58,600	NA	1,330	213	42.2	4.5 U	2.8	12.33	6.37	665	0.15	-87.0	4.58	
	PZ-12-02-SPR17	05/26/2017	NA	500	NA	56,000	NA	840	180	33	1.3	2.6	10.18	6.01	378	0.34	-34.6	10.31	
	PZ-12-02-FAL17	11/3/2017	NA	660	NA	45,000	NA	2,200	150	46	6.1	2.7	13.14	6.31	477	0.33	-63.7	1.72	
	PZ-12-02 SPR18	4/12/2018	NA	400	NA	60,000	NA	780	160	34	4.2	2.5	11.90	6.91	466	0.93	36	4.07	
	PZ-12-02_FAL18	11/06/2018	NA	300	NA	64,000	NA	930	180	41	0.55 J	3.5	11.7	6.17	621	0.35	-58.1	23.7	
	PZ-12-02_SPR19	04/18/2019		**190**		**73,000**		**1,300**	**240**	**47**	**6**	**5.8**	9.8	6.4	780	1.2	-57	5.5	
	PZ-12-02_FAL19	11/01/2019		**270**		**74,000**		**1,200**	**220**	**68**	**2.8**	**3.9**	12	6.4	770	1.5	-64	3.1	
PZ-12-03	PZ-12-03-052413	5/24/2013	NA	659	NA	40,100	NA	2,950	227	52.7	20.8	3.3	12.21	6.60	563	0.23	-105.4	1.94	
	PZ-12-03-SPR17	05/26/2017	NA	600	NA	39,000	NA	2,700	170	33	5.6	2.3	10.04	6.35	359	0.30	-64.1	10.92	
	PZ-12-03 FAL17	11/6/2017	NA	620	NA	41,000	NA	3,800	140	12	48	2.8	13.07	6.44	416	0.47	-60.1	9.32	
	PZ-12-03 SPR18	4/19/2018	NA	610	NA	32,000	NA	3,000	140 J	40	7.4	2.0	7.94	6.63	511	1.12	-75.6	2.15	
	PZ-12-03_FAL18	11/07/2018	NA	560	NA	31,000	NA	3,300	150	47	5.1	1.8	13.3	6.35	537	0.43	-59.2	31.7	
	PZ-12-03_SPR19	04/18/2019		**630**		**39,000**		**3,900**	**170**	---	---	**2**	10	6.7	600	0.64	-65	12	
	SHL-DUP01	04/18/2019		**640**		**38,000**		**3,800**	**170**	**55**	**3.4**	**2**	10	6.7	600	0.64	-65	12	
	PZ-12-03_FAL19	10/30/2019		**790**		**63,000**		**4,600**	**190**	**51**	**20**	**1.9**	11	6.3	630	0.29	-80	2.7	
PZ-12-04	PZ-12-04-052413	5/24/2013	NA	610	NA	56,300	NA	1,310	171	50.7	5.0	3.5	13.29	6.53	447	0.29	-86.9	4.29	
	PZ-12-04-SPR17	05/26/2017	NA	640	NA	47,000	NA	850	110	10	1.9	2.1	10.43	6.30	258	0.29	-61.9	9.69	
	PZ-12-04-FAL17	11/6/2017	NA	68	NA	3,700	NA	1,200	150	23	1.0	2	13.31	6.22	474	0.33	-78.2	9.42	
	PZ-12-04 SPR18	4/19/2018	NA	690	NA	53,000	NA	1,300	130 J	13	2.8	2.2	8.61	6.45	451	2.96	-58.1	1.38	
	PZ-12-04_FAL18	11/07/2018	NA	630	NA	56,000	NA	1,600	99 J	39	0.96 J	1.8	13.3	7.22	461	0.55	-65	16.3	
	PZ-12-04_SPR19	04/18/2019		**670**		**66,000**		**1,700**	**150**	**44**	**1.8**	**2.2**	11	6.5	580	0.52	-61	4	
	PZ-12-04_FAL19	10/30/2019		**730**		**78,000**		**2,000**	**180**	**62**	**2.4**	**2.2**	12	6.4	630	0.26	-72	5.2	
PZ-12-05	PZ-13-05-052213	5/22/2013	NA	741	NA	67,700	NA	1,710	188	31.2	4.5 U	2.4	12.24	6.46	571	0.31	-99.6	0.87	
	PZ-12-05-SPR17	05/26/2017	NA	260	NA	24,000	NA	1,300	55	2.4	12	1.3	10.05	6.27	128	0.27	-44.7	6.91	
	PZ-12-05-FAL17	11/6/2017	NA	260	NA	32,000	NA	1,900	86	2	8.0	1.1	12.48	6.12	225	0.16	-43.1	0.29	
	PZ-12-05 SPR18	4/13/2018	NA	190	NA	29,000	NA	2,000	76	2.1	8.8	1.3	12.39	6.41	204	0.36	-68.7	1.09	
	PZ-12-05_FAL18	11/07/2018	NA	140	NA	33,000	NA	2,200	57 J	1.8	13 J	1.3 U	12.6	5.8	215	0.22	-8.0	15.2	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
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Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	PZ-12-05_SPR19	04/16/2019		**220**		**56,000**		**3,600**	**59**	**9.1**	**23**	**1.4**	12	6.2	340	0.65	-66	4.8	
	PZ-12-05_FAL19	10/30/2019		**210**		**38,000**		**2,500**	**120**	**7.7**	**13**	**1.1**	12	6.2	290	2	-39	3.5	
PZ-12-06	PZ-12-06-052413	5/24/2013	NA	244	NA	54,600	NA	1,350	293	51.0	10.4	29.5	13.02	6.23	700	1.57	-71.6	2.9	
	PZ-12-06-SPR17	05/26/2017	NA	41 J	NA	20,000	NA	2,000	65	1.4	7.8	1.1	9.98	6.38	129	0.32	-24.3	8.46	
	PZ-12-06-FAL17	11/6/2017	NA	49	NA	27,000	NA	2,600	90	1.6	36	1.4	13.10	6.08	279	0.57	-39.7	6.97	
	PZ-12-06 SPR18	4/13/2018	NA	25	NA	19,000	NA	2,400	100	3.1	14	1.1	11.99	6.14	254	0.73	-52.3	2.12	
	PZ-12-06_FAL18	11/07/2018	NA	48	NA	16,000	NA	1,900	58 J	0.56	17 J	1.2 U	13.5	6.17	188	0.29	-21.7	15.8	
	PZ-12-06_SPR19	04/16/2019		**31**		**23,000**		**6,800**	**100**	**7.6**	**70**	**2.8**	12	5.9	430	0.56	-9.6	5.7	
	PZ-12-06_FAL19	10/29/2019		**40**		**16,000**		**2,900**	**100**	**2**	**15**	**0.96 J**	16	6	230	0.31	-29	6.6	
	SHL-DUP01_FAL19	10/29/2019		**43**		**17,000**		**3,000**	**100**	**2**	**15**	**0.97 J**	16	6	230	0.31	-29	6.6	
PZ-12-07	PZ-12-07-052413	5/24/2013	NA	484	NA	29,000	NA	1,620	105	6.3	12.7	2.2	11.54	6.41	276	0.29	-390.0	18	
	PZ-2012-07-SPR17	06/03/2017	NA	110	NA	7,500	NA	1,300	59	2.5	33	1.3	11.00	5.93	109	4.64	14.6	8.86	
	PZ-2012-07-FAL17	11/6/2017	NA	3.8	NA	75 U	NA	1,200	75	2.3	32	1.2	13.14	6.37	212	3.26	22.9	17.9	
	PZ-12-07 SPR18	4/12/2018	NA	72.0	NA	3,200	NA	850	64	1.9	30	1.2	12.25	6.61	200	3.42	3.8	1.97	
	PZ-12-08_FAL18	11/09/2018	NA	3.0 U	NA	35 J	NA	19	13	0.82	1.4	2.8	13.5	6.13	37	6.63	78.3	25.5	
	PZ-12-07_SPR19	04/16/2019		**100**		**4,500**		**1,500**	**120**	**2.2**	**44**	**1.7**	11	6.7	350	2.5	-14	9.7	
	PZ-12-07_FAL19	11/01/2019		**94**		**5,100**		**1,400**	**94**	**4.2**	**99**	**2.2**	12	6.4	440	2.9	47	8.7	
PZ-12-08	PZ-12-08-052413	5/24/2013	NA	1.9	NA	174	NA	361	46.4	5.8	7.4	6.9	10.63	5.90	125	2.68	131.7	9.2	
	PZ-2012-08-SPR17	06/03/2017	NA	3.1	NA	590	NA	44	21	0.67	3.7	2.5	10.36	7.38	39	8.60	23.9	14.80	
	PZ-2012-08-FAL17	11/6/2017	NA	2.3 J	NA	2,200	NA	1,600	55	1.3	21	1.9	13.94	5.82	194	0.48	68.0	24.2	
	PZ-12-08 SPR18	4/13/2018	NA	1.5 J	NA	420	NA	790	30	1.0	7.4	1.8	9.79	6.01	90	7.68	94.8	1.02	
	PZ-12-08_FAL18	11/09/2018	NA	3.0 U	NA	35 J	NA	19	13	0.82	1.4	2.8	13.5	6.13	37	6.63	78.3	25.5	
	PZ-12-08_SPR19	04/12/2019		**160**		**23,000**		**1,200**	**70**	**1**	**26**	0.50 U	10	6.1	240	3.9	52	89	
	PZ-12-08_FAL19	10/31/2019		**17**		**14,000**		**2,600**	**88**	**5.6**	**13**	**1.2**	13	5.8	230	0.35	64	26	
PZ-12-09	PZ-12-09-052113	5/21/2013	NA	1.1	NA	30 U	NA	176	55.3	4.3	27.0	1.1	13.24	6.34	187	3.83	112.6	3.46	
	PZ-12-09-SPR17	06/08/2017	NA	3.0 U	NA	50 U	NA	30	80	3.1	34	1.1	10.48	6.53	177	3.02	63.0	6.88	
	PZ-12-09-FAL17	11/7/2017	NA	3.0 U	NA	75 U	NA	2.4 J	55	1.6	21	0.81 J	11.87	6.91	131	7.48	83.4	1.95	
	PZ-12-09 SPR18	4/12/2018	NA	3.0 U	NA	50 U	NA	17	80	2.1	26	1.0 U	11.38	6.88	233	4.12	79.5	2.22	
	PZ-12-09_FAL18	11/06/2018	NA	3.0 U	NA	26 J	NA	10 U	76 J	1.5	16	1.0 U	11.8	6.21	200	0.97	55.8	3.95	
	PZ-12-09_SPR19	04/16/2019		3.0 U		50 U		**37**	**72**	**1.3**	**13**	0.50 U	11	6.8	200	1.9	120	8.7	
	PZ-12-09_FAL19	10/31/2019		**3.1**		50 U		**12**	**69**	**1.4**	**20**	**0.64 J**	12	6.3	180	0.86	160	10	
PZ-12-10	PZ-12-10-052213	5/22/2013	NA	0.69 J	NA	30 U	NA	2.5 U	15.5	1.8	4.5 U	2.0	10.19	5.88	43	10.37	191.3	1.1	
	PZ-12-10-SPR17	06/08/2017	NA	3.0 U	NA	50 U	NA	3.0 U	25	0.99	6.7	1.1	9.47	5.67	46	9.67	131.6	6.50	
	PZ-12-10-FAL17	11/7/2017	NA	3.0 U	NA	75 U	NA	5.0 U	36	0.81	8.1	0.89 J	12.02	6.30	74	7.24	129.9	1.95	
	PZ-12-10 SPR18	4/12/2018	NA	3.0 U	NA	21 J	NA	1.4 J	17	0.86	2.0	1.0 U	9.67	6.24	44	10.04	121.5	1.57	
	PZ-12-10_FAL18	11/06/2018	NA	3.0 U	NA	50 U	NA	3.0 U	38 J	0.98	2.3	1.0 U	13.1	5.35	88	3.5	74.3	2.98	
	PZ-12-10_SPR19	04/16/2019		3.0 U		**790**		**8.8**	**44**	**0.91**	**6.1**	0.50 U	9.1	6.1	97	3.5	170	2.6	
	PZ-12-10_FAL19	10/31/2019		3.0 U		50 U		**1.2 J**	**36**	**0.86**	**11**	**0.69 J**	13	5.2	95	6.8	180	1.9	
SHM-13-01	SHM-13-01-112113	11/21/2013	NA	2.2 J	NA	30 U	NA	7.4 J	25.3	32	11.9	0.82 J	10.15	6.46	163	6.48	165.1	0.31	
	SHM-13-01_FA115	10/27/2015	NA	2.1 J	NA	100 U	NA	15 U	14.4	48	7.6	0.47 J	10.93	6.13	198	7.92	99.9	0.61	
	SHM-13-01 FAL17	11/28/2017	NA	1.5 J	NA	75 U	NA	6	16	95	6.7	0.5 U	10.25	6.20	306	6.41	58.6	0.4	
	SHM-13-01_FAL18	11/26/2018	NA	1.5 J	NA	50 U	NA	5.7 J	17	130	7.6	1.0 U	11.1	5.99	476	8.45	114	3.97	
	SHM-13-01_FAL19	11/14/2019		**1.9 J**		50 U		**3.3 J**	**17**	**340**	**9.5**	**0.93 J**	11	5.8	1,100	4.5	110	9	
SHM-13-02	SHM-13-02-052913	5/29/2013	NA	2.5	NA	30 U	NA	7,960	160	9.5	6.5	33.6	11.5	7.23	311	0.16	-107.7	0.22	
	SHM-13-02-112113	11/21/2013	NA	2.7 J	NA	250	NA	9,490	161	8	5.7 J	1.9	10.89	6.99	24	0.10	-17.0	1.84	
	SHM-13-02-101014	10/10/2014	NA	2.6 J	NA	261	NA	15,800	220	31	5.0 J	1.6	12.04	6.72	430	0.22	-8.6	0.26	
	SHM-13-02_FA115	10/23/2015	NA	2.6	NA	100 U	NA	13,200	155	14.8	10	1.7	11.04	6.83	302	0.26	4.9	0.96	
	SHM-13-02 FAL16	11/29/2016	NA	1.8 J	NA	35 J	NA	12,000	170	21	6.8	1.6	10.3	6.84	382	1.31	41.3	2.65	
	SHM-13-01 FAL17	11/27/2017	NA	3 U	NA	59 J	NA	20,000	180	120	8.1	2.1	10.8	6.66	510	3.04	86.0	0.25	
	SHM-13-02_FAL18	11/15/2018	NA	3.0 U	NA	50 U	NA	17,000	98	160	8.9	1.7	8.65	6.12	509	0.59	75	0.63	
	SHM-13-02_FAL19	11/11/2019		3.0 U		50 U		**9,400**	**160**	**51**	**7.1**	**1.7**	11	6.5	430	4.3	46	4.6	
SHM-13-03	SHM-13-03-052913	5/29/2013	NA	318	NA	13,600	NA	6,740	372	39	5.6	4.4	11.72	6..56	730	0.14	-99.2	1.20	
	SHM-13-03-112013	11/20/2013	NA	137	NA	11,200	NA	9,640	391	38	5.0 J	4.3	10.26	6.50	563	0.40	-41.8	0.54	
	SHM-13-03-042314	4/23/2014	NA	120	NA	6,770	NA	7,990	287	24.2	4.7 J	7.3	9.27	6.10	433	0.16	-12.5	0.22	
	SHM-13-03-101014	10/10/2014	NA	80.8	NA	7,590	NA	12,100	390	37.5	4.7 J	3.7	12.63	6.53	557	0.13	-57.7	0.69	
	SHM-13-03-60815	6/8/2015	NA	75.5	NA	7,190	NA	12,600	380	36.5	6.6 J	6.6	13.15	6.48	677	0.25	-71.3	3.98	
	SHM-13-03_FA115	10/23/2015	NA	68.7	NA	6,610	NA	10,800	273	37.2	5.4 J	3.9	12.60	6.43	473	0.29	-91.4	0.81	
	SHM-13-03 SPR16	6/28/2016	NA	53	NA	5,500	NA	9,300	300	37	2.8	4.1	1.22	6.33	590	16.38	-46.4	5.41	
	SHM-13-03 FAL16	11/28/2016	NA	55	NA	5,800	NA	8,400	120	93	7.3	1.9	9.87	6.63	544	1.40	-40.7	2.4	
	SHM-13-03-SPR17	06/07/2017	NA	46	NA	3,900	NA	8,900	290	32	7.4	3.8	8.10	7.00	661	0.66	-65.6	4.74	
	SHM-13-03-FAL17	11/27/2017	NA	46	NA	4,000	NA	12,000	180	130	4.2	2.5	11.37	6.61	452	3.02	119.3	0.97	
	SHM-13-03 SPR18	4/25/2018	NA	26	NA	830	NA	9,900	320	44	5.8	3.0	10.01	6.66	702	0.89	-18.5	7.66	
	SHM-13-03_FALL18	11/19/2018	NA	44	NA	2,000	NA	13,000	120	160	3.8	2.5	9.84	6.52	993	0.23	59.9	3.77	
	SHM-13-03_SPR19	04/16/2019		**110**		**7,000**		**8,400**	**200**	**200**	**4.6**	**2.5**	8.1	6.4	1,100	0.37	4	3.6	
	SHM-13-03_FAL19	11/11/2019		**140**		**8,600**		**10,000**	**280**	**32**	**6**	**2.5**	11	6.4	620	0.4	-1	0.98	
SHM-13-04	SHM-13-04-052813	5/28/2013	NA	2,060	NA	40,900	NA	2,130	39.8	200	10	1.8	11.7	6.46	717	0.71	-73.6	3.63	
	SHM-13-04-042414	4/24/2014	NA	61.1	NA	334	NA	238	29.6	167	10.0	0.92 J	10.57	6.35	866	3.21	92.4	2.18	
	SHM-13-04-101314	10/13/2014	NA	693	NA	6,410	NA	392	41.4	110	12.5	1.6	11.94	6.48	464	2.04	-13.2	2.31	
	SHM-13-04-60915	6/9/2015	NA	620	NA	12,500	NA	843	33.3	175	14.3	1.1 J	11.55	5.89	680	2.01	41.1	2.68	
	SHM-13-04_FA115	10/28/2015	NA	212	NA	4,620	NA	429	38.1	175	11.8	0.94	11.93	6.43	595	1.81	-19.3	3.49	
	SHM-13-04 SPR16	6/28/2016	NA	20	NA	110	NA	72	39	310	15	1.2	3.22	6.29	1,251	14.58	153.6	10.77	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-13-04 FAL16	11/28/2016	NA	140 J	NA	2,500	NA	260 J	48	180	11	0.93 J	12.16	6.31	750	3.86	44.0	11.4	
	SHM-13-04 SPR17	6/6/2017	NA	350	NA	4,700	NA	3,700	57	57	57	1.3	9.53	6.32	617	3.97	69.9	12.90	
	SHM-13-04 FAL17	11/14/2017	NA	160	NA	3,200	NA	520	42	250	13	0.50 U	11.9	6.65	813	2.19	65.1	4.93	
	SHM-13-04 SPR18	4/17/2018	NA	340	NA	5,900	NA	620	61	200	7.9	1.2	10.96	6.59	850	3.20	14.2	11.2	
	SHM-13-04_FAL18	11/13/2018	NA	190 J	NA	2,400	NA	180	45	120	9.7	1.0 U	12.3	6.63	565	5.82	7.3	49.5	
	SHM-13-04_SPR19	04/15/2019		**430**		**2,400**		**100**	**41**	**75**	**9.8**	0.50 U	11	6.5	380	4.7	40	26	
	SHM-13-04_FAL19	11/12/2019		**600**		**3,400**		**84**	**46**	**250**	**11**	**1.1**	10	6.3	1	4	58	2.5	
SHM-13-05	SHM-13-05-052813	5/28/2013	NA	8.9	NA	597	NA	4,680	423	37	12.3	4.7	11.14	6.88	629	0.27	-136.0	2.05	
	SHM-13-05-112113	11/21/2013	NA	6.8	NA	1,860	NA	5,720	425	41.5	11.4	4.5	10.27	7.94	44	0.44	-154.6	2.11	
	SHM-13-05-101314	10/13/2014	NA	11	NA	4,580	NA	5,940	455	36.0	8.4 J	3.6	11.04	6.88	686	0.44	-159.0	1.11	
	SHM-13-05_FA115	10/28/2015	NA	12.3	NA	3,470	NA	3,660	359	43.0	12.5	3.9	11.19	6.94	688	0.39	-94.1	0.74	
	SHM-13-05 FAL16	11/28/2016	NA	11	NA	3,700	NA	3,500	360	41	12	3.0	10.7	6.88	808	1.76	-52.9	0.84	
	SHM-13-05 FAL17	11/16/2017	NA	8.4	NA	3,000	NA	3,600	410	38	9.9	2.8	10.71	6.98	656	0.37	-46.9	3.2	
	SHM-13-05_FAL18	11/13/2018	NA	12	NA	3,300	NA	3,600	390	37	12	2.6	10.5	7.23	831	0.51	-58.4	25.6	
	SHM-13-05_FAL19	11/12/2019		**16**		**3,100**		**3,400**	**410**	**39**	**12**	**2.5**	9.3	6.8	740	0.36	48	15	
SHM-13-06	SHM-13-06-061313	6/13/2013	NA	3180 J	NA	19700 J	NA	1,830	84	19	6.4	1.0	12.43	7.16	287	0.14	-154.4	4.07	
	SHM-13-06-112113	11/21/2013	NA	2,540	NA	39900 J	NA	2,490	33	145	11.4	1.5	11.33	6.84	587	0.25	-119.4	1.24	
	SHM-13-06-042414	4/24/2014	NA	2,850	NA	25,000	NA	1,820	61.3	69.7	8.9 J	1.5	11.71	6.94	446	0.28	-104.3	2.51	
	SHM-13-06-101314	10/13/2014	NA	2,360	NA	25,400	NA	1,570	45.8	130.0	9.9 J	1.1	11.99	7.04	569	0.10	-145.6	1.23	
	SHM-13-06-60815	6/8/2015	NA	2,460	NA	35,200	NA	1,840	39.5	240.0	10.1	0.91 J	11.75	7.00	924	0.18	-128.2	1.53	
	SHM-13-06-122215	12/22/2015	NA	2,160	NA	32,600	NA	1,640	56.7	192.0	9.1	1.0	--	--	--	--	--	--	
	SHM-13-06 SPR16	6/28/2016	NA	2,500	NA	30,000	NA	1,400	70	130	7.1	1.4	0.43	6.55	666	14.44	-98.2	8.36	
	SHM-13-06 FAL16	11/28/2016	NA	2,700	NA	27,000	NA	1,200	80	110	6.5	1.4	11.96	7.10	429	0.46	-123.4	11.7	
	SHM-13-06 SPR17	6/6/2017	NA	2,800	NA	36,000	NA	3,100	110	110	110	1.9	12.93	6.84	638	0.64	-100.1	6.03	
	SHM-13-06 FAL17	11/14/2017	NA	2,700	NA	43,000	NA	2,100	86	130	5.1	1.3	11.6	7.07	518	0.32	-103.1	17.2	
	SHM-13-06 SPR18	4/17/2018	NA	2,700	NA	29,000	NA	2,200	85	80	5.1	1.2	10.58	7.10	441	0.57	-106.1	3.01	
	SHM-13-06_FAL18	11/13/2018	NA	2,400	NA	25,000	NA	1,400	89	140	6.7	1.4	11.4	7.67	720	0.45	-133	54.6	
	SHL-DUP06	04/16/2019		**2,900**		**17,000**		**1,000**	**74**	**65**	**6.3**	0.50 U	7.8	6.4	450	0.79	-51	6.6	
	SHM-13-06_SPR19	04/16/2019		**3,100**		**18,000**		**1,100**	**73**	**70**	**6.3**	**1.4**	7.8	6.4	450	0.79	-51	6.6	
	SHM-13-06_FAL19	11/12/2019		**1,900**		**18,000**		**880**	**44**	**100**	**5.7**	**1**	10	6.4	440	0.45	41	11	
SHM-13-07	SHM-13-07-112113	11/21/2013	NA	1,340	NA	30,000	NA	2,710	45	225	12.1	1.6	12.5	6.80	773	0.14	-97.4	4.7	
	SHM-13-07-042414	4/24/2014	NA	1,280	NA	39,200	NA	3,660	30.7	212	7.7 J	1.2	10.97	6.84	734	0.29	-106.1	26.8	
	SHM-13-07-101014	10/10/2014	NA	962	NA	25,200	NA	2,160	62.1	165	16	8.8	12.82	6.90	787	0.15	-126.3	4.9	
	SHM-13-07-60815	6/8/2015	NA	946	NA	18,800	NA	3,460	57.2	120	10.4	3.2	12.73	6.82	565	0.19	-60.7	24.80	
	SHM-13-07_FA115	10/23/2015	NA	531	NA	11,500	NA	1,390	90.6	68	11.6	1.7	12.36	6.88	366	0.17	-140.2	4.83	
	SHM-13-07 SPR16	6/28/2016	NA	320	NA	29,000	NA	4,900	80	260	6.7	1.5	0.76	6.28	990	15.01	-47.1	9.72	
	SHM-13-07 FAL16	11/28/2016	NA	140	NA	9,100	NA	1,800	85	200	9.8	1.4	12	6.57	918	2.10	-9.1	13	
	SHM-13-07-SPR17	06/07/2017	NA	230	NA	6,900	NA	790	87	49	8.9	2.0	11.48	6.30	267	0.22	-15.3	19.20	
	SHM-13-07-FAL17	11/28/2017	NA	620	NA	16,000	NA	2,700	97	230	8.2	1.4	12.07	7.52	874	0.26	-67.3	5.24	
	SHM-13-07 SPR18	4/17/2018	NA	470	NA	18,000	NA	2,300	86	120	7.9	1.4	10.81	6.83	610	0.82	-53.9	6.17	
	SHM-13-07_FALL18	11/20/2018	NA	490	NA	20,000	NA	2,200	260	95	5.2	6.4	9.83	6.6	630	0.21	-27	25.2	
	SHM-13-07_SPR19	04/16/2019		**470**		**23,000**		**3,100**	**60**	**100**	**5.8**	**1.4**	8.6	6.2	560	0.49	-18	12	
	SHM-13-07_FAL19	11/11/2019		**750**		**27,000**		**4,700**	**65**	**180**	**4.9**	**1.2**	12	6.4	770	0.15	-39	16	
SHM-13-08	SHM-13-08-061313	6/13/2013	NA	928	NA	35,900	NA	941	141	8.5	7.3	2.8	12.75	6.84	378	0.74	-122.4	2.92	
	SHM-13-08-112113	11/21/2013	NA	994	NA	35,400	NA	826	116	8	3.7 J	3.2	11.32	6.84	323	0.24	-131.1	0.98	
	SHM-13-08-042414	4/24/2014	NA	1,040	NA	50,600	NA	1,170	173	14.8	4.9 J	3.8	11.26	6.89	439	0.38	-123.8	1.14	
	SHM-13-08-101314	10/13/2014	NA	978	NA	52200 J	NA	1,160	140	130	6.5 J	3.6	11.81	6.90	733	0.16	-146.1	0.39	
	SHM-13-08-60815	6/8/2015	NA	975	NA	113,000	NA	2,180	112 J	140 J	0.50 UJ	2.4 J	14.12	6.76	376	0.83	-88.1	6.10	
	SHM-13-08_FA115	10/28/2015	NA	954	NA	78,000	NA	1,620	126	145	10.4	2.8	11.30	6.46	7.28	0.47	-148.0	3.21	
	SHM-13-08 SPR16	6/29/2016	NA	770	NA	68,000	NA	1,600	90	140	2.7	2.6	0.30	6.54	782	15.68	-106.1	3.58	
	SHM-13-08 FAL16	11/28/2016	NA	870	NA	62,000	NA	1,500	200	74	4.0	2.9	11.85	6.93	714	1.74	-132.2	3.01	
	SHM-13-08-SPR17	06/06/2017	NA	900	NA	74,000	NA	2,100	67	240	4.4	2.4	10.75	6.73	1,084	0.37	-45.9	9.89	
	SHM-13-08-FAL17	11/14/2017	NA	810	NA	54,000	NA	1,400	90	130	3.5	2.1	11.07	7.05	464	0.55	-117.3	6.94	
	SHM-13-08 SPR18	4/17/2018	NA	830	NA	48,000	NA	1,300	95	95	4.8	2.6	10.79	6.82	556	0.68	-78.3	1.83	
	SHM-13-08_FALL18	11/19/2018	NA	310	NA	32,000	NA	940	250	50	4.1	3.2	9.75	6.71	442	0.39	29.8	33.2	
	SHM-13-08_SPR19	04/16/2019		**800**		**30,000**		**760**	**73**	**31**	**3.7**	**2**	9.4	6.5	320	0.36	-66	5.3	
	SHM-13-08_FAL19	11/11/2019		**930**		**41,000**		**970**	**100**	**33**	**4.4**	**1.9**	11	6.4	390	0.55	70	4.7	
SHM-13-14S	SHM-13-14S	2/19/2014	NA	2.0 U	NA	241	NA	56	58.0	91.0	9.6 J	1.2	6.53	5.88	440	0.59	96.3	1.97	
	SHM-13-14S-101014	10/10/2014	NA	2.0 U	NA	94. 1 J	NA	87	75.2	100.0	8.1 J	1.9	12.82	5.87	320	0.45	139.4	0.88	
	SHM-13-14S FAL16	12/02/0216	NA	4.0	NA	280	NA	160	51	200	0.45 J	2.7	12.11	5.71	693	0.27	179.1	32.1	
	SHM-13-14S FAL17	11/27/2017	NA	3 U	NA	75 U	NA	1,300	29	150	2.9	1.3	10.55	6.74	569	0.28	155.4	4.75	
	SHM-13-14S_FAL18	11/15/2018	NA	3.0 U	NA	50 U	NA	710	35	110	13	1.3	10.6	6.16	463	0.83	70.5	3.65	
	SHM-13-14S_FAL19	11/11/2019		**1.9 J**		50 U		**410**	**42**	**140**	**19**	**1.8**	11	5.9	650	0.39	57	0.71	
SHM-13-14D	SHM-13-14D	2/19/2014	NA	7.9	NA	11,800	NA	1,190	81.0	48.0	12.3	1.9	9.18	6.85	349	0.09	-82.0	26.0	
	SHM-13-14D-101014	10/10/2014	NA	9.6	NA	20,900	NA	2,910	43.6	320.0	7.2 J	1.3	12.4	6.75	1233	0.19	-79.6	1.2	
	SHM-13-14D FAL16	12/2/2016	NA	9.1	NA	4,900	NA	1,400	48	130	7.5	0.93 J	13.71	6.82	478	2.37	23.9	70	
	SHM-13-14D FAL17	11/27/2017	NA	11	NA	1,600	NA	190	77	56	7.7	1.7	10.76	6.87	332	3.29	159.9	5.58	
	SHM-13-14D_FAL18	11/15/2018	NA	6.1	NA	2,600	NA	370	83	75	6.4	1.8	11	6.58	474	0.59	31.4	2.51	
	SHM-13-14D_FAL19	11/11/2019		**12**		**2,600**		**470**	**74**	**120**	**7**	**1.4**	11	6.4	490	0.24	29	0.78	
SHM-13-15	SHM-13-15	2/19/2014	NA	3.8 J	NA	623	NA	4,860	273	46.0	7.7 J	2.9	9.16	6.59	642	0.44	-172.7	42.3	
	SHM-13-15-101014	10/10/2014	NA	8.1	NA	1,050	NA	4,480	315	37.5	5.5 J	2.8	13.35	6.56	704	0.15	20.4	0.23	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHM-13-15 FAL16	12/2/2016	NA	5.5	NA	1,400	NA	3,600	200	82	8.2	1.8	12.15	6.58	612	0.24	-6.9	0.94	
	SHM-13-15 FAL17	11/27/2017	NA	5.7	NA	1,100	NA	7,200	380	48	10	3.4	10.45	7.27	790	0.74	12.7	7.52	
	SHM-13-15_FAL18	11/15/2018	NA	1.6 J	NA	200	NA	1,000	150	84	7.7	1.8	8.95	7.2	607	0.33	46.5	1.0	
	SHM-13-15_FAL19	11/11/2019		**5.1**		**770**		**5,800**	**430**	**43**	**9.6**	**3.2**	11	6.1	920	0.41	44	2.9	
EPA-PZ-2012-1A	EPA-PZ2012-1A-101314	10/13/2014	NA	2.0 U	NA	121	NA	937	40.3	21.5	5.1 J	2.2	10.09	5.93	145	0.38	109.0	0.36	
	EPA-PZ-2012-1A_FA115	10/22/2015	NA	4.0 U	NA	149	NA	470	39.1	52.2	12.3	2.3	10.51	5.44	290	0.27	71.6	1.28	
	EPA-PZ-2012-1A FAL16	11/17/2016	NA	3.0 U	NA	200	NA	380	25	61	2.7	1.7	10.27	6.13	263	0.17	127.2	9.09	
	EPA-PZ-2012-1A SPR17	5/25/2017	NA	3.0 U	NA	210	NA	240	36	27	7.6	2.6	7.97	5.99	219	0.54	36.2	7.59	
	EPA-PZ-2012-1A FAL17	11/14/2017	NA	3.0 U	NA	110	NA	160	43	5.3	11	2.8	8.78	6.79	1.69	135.00	167.0	1.60	
	EPA-PZ-2012-1A SPR18	04/16/2018	NA	3.0 U	NA	83	NA	110	40	5.8	4.9	3.0	7.24	6.06	101	1.46	99	3.16	
	EPA-PZ-2012-1A_FAL18	11/13/2018	NA	3.0 U	NA	160	NA	190	51	6.9	3.8	2.3	10.2	5.67	203	0.15	-11.3	1.22	
	EPA-PZ-2012-1A_SPR19	04/16/2019		3.0 U		**270**		**250**	**51**	**3.3**	**3.2**	**2.4**	7.4	6.1	120	0.59	140	2.3	
	EPA-PZ-2012-1A_FAL19	11/07/2019		3.0 U		**190**		**240**	**43**	**11**	**3.6**	**3**	9.6	6.1	120	0.24	79	4.1	
EPA-PZ-2012-1B	EPA-PZ2012-1B-101314	10/13/2014	NA	160	NA	21,500	NA	6,900	304	16.5	3.8 J	2.4	10.92	6.54	587	0.14	-58.8	28.2	
	EPA-PZ-2012-1B_FA115	10/22/2015	NA	288	NA	19,200	NA	9,450	266	18.5	6.7 J	2.2	11.01	5.91	635	0.60	-59.0	8.66	
	EPA-PZ-2012-1B FAL16	11/17/2016	NA	260	NA	16,000	NA	9,600	250	22	5.5	1.8	10.43	6.58	519	0.13	3.7	0.92	
	EPA-PZ-2012-1B SPR17	5/25/2017	NA	240	NA	14,000	NA	9,700	260	26	6.7	1.9	9.44	6.37	665	0.52	-23.5	26.07	
	EPA-PZ-2012-1B FAL17	11/14/2017	NA	200	NA	13,000	NA	11,000	220	30	6.6	1.7	9.08	7.22	540	3.06	22.5	3.57	
	EPA-PZ-2012-1B SPR18	04/16/2018	NA	170	NA	13,000	NA	10,000	210	37	11	1.7	7.07	6.75	519	0.94	0.30	1.98	
	EPA-PZ-2012-1B_FAL18	11/13/2018	NA	170	NA	13,000	NA	9,700	200	34	11	1.6 U	10.7	6.39	648	0.35	-72.7	54.7	
	EPA-PZ-2012-1B_SPR19	04/16/2019		**160**		**15,000**		**13,000**	**240**	**26**	**3.4**	**2.1**	8.3	6.5	590	0.68	11	35	
	EPA-PZ-2012-1B_FAL19	11/07/2019		**220**		**13,000**		**9,400**	**190**	**30**	**20**	**2.7**	9.8	6.4	480	0.28	-33	18	
EPA-PZ-2012-2A	EPA-PZ2012-2A-101414	10/14/2014	NA	2.0 U	NA	50 U	NA	7.5 U	7.6	1.5	7.7 J	1.2	10.64	5.89	40	5.63	223.4	0.69	
	EPA-PZ-2012-2A_FA115	10/22/2015	NA	4.0 U	NA	100 U	NA	15 U	9.3	1.8	7.5 J	0.42 J	13.12	4.85	47	5.18	130.1	0.85	
	EPA-PZ-2012-2A FAL16	11/17/2016	NA	3.0 U	NA	28 J	NA	1.7 J	7.5	9.1	5.5	0.58 J	10.63	6.04	60	5.11	172.4	0.94	
	EPA-PZ-2012-2A SPR17	5/31/2017	NA	3.0 U	NA	50 U	NA	1.8 J	9.0	5.6	5.7	1.0 U	8.91	5.99	79	3.01	36.7	6.73	
	EPA-PZ-2012-2A FAL17	11/8/2017	NA	3.0 U	NA	75 U	NA	2.0 J	8.6 U	8.5	4.6	0.45 J	9.96	6.26	58	4.72	59.3	6.96	
	EPA-PZ-2012-2A SPR18	4/16/2018	NA	3.0 U	NA	50 U	NA	3.0 J	7.6	6.8	5.5	1.0 J	6.88	6.04	53	5.96	126.9	2.95	
	EPA-PZ-2012-2A_FAL18	11/13/2018	NA	1.9 J	NA	160	NA	160	8.9	8.3	5.4	1.0 U	11.2	5.43	121	2.63	32.5	0.99	
	EPA-PZ-2012-2A_SPR19	04/12/2019		3.0 U		50 U		**1.5 J**	**10**	**2.6**	**5.8**	0.50 U	7.1	5.8	47	5.3	190	0.72	
	EPA-PZ-2012-2A_FAL19	10/24/2019		3.0 U		50 U		**1.6 J**	**9.4 J**	**4.4**	**6.9**	**0.46 J**	10	5.4	51	6.6	160	1.4	
EPA-PZ-2012-2B	EPA-PZ2012-2B-101414	10/14/2014	NA	2.0 U	NA	51.7 J	NA	5,910	152	11.5	3.5 J	2.2	11.5	6.37	298	0.56	112.9	0.55	
	EPA-PZ-2012-2B_FA115	10/22/2015	NA	4.0 U	NA	100 U	NA	7,080	159	17.0	7.5	1.8	13.34	5.40	380	0.51	79.1	0.67	
	EPA-PZ-2012-2B FAL16	11/17/2016	NA	3.0 U	NA	44 J	NA	6,100	150	18	4.9	1.8	10.44	6.27	324	0.17	114.7	0.69	
	EPA-PZ-2012-2B SPR17	5/31/2017	NA	3.3	NA	59	NA	6,800	160	21	4.6	1.7	10.91	6.09	400	0.66	14.6	8.45	
	EPA-PZ-2012-2B FAL17	11/8/2017	NA	3.0 U	NA	26 J	NA	7,400	180	31	5.1	1.7	9.78	6.46	386	0.97	22.9	3.97	
	EPA-PZ-2012-2B SPR18	4/16/2018	NA	3.0 U	NA	21 J	NA	6,000	140	27	7.0	1.8	8.19	6.32	354	0.94	87.9	2.29	
	EPA-PZ-2012-2B_FAL18	11/13/2018	NA	3.0 U	NA	50 U	NA	6,600	130	36	9.2	1.6 U	10.3	6.92	506	0.28	-24.9	3.98	
	EPA-PZ-2012-2B_SPR19	04/12/2019		3.0 U		**97**		**6,400**	**130**	**35**	**13**	**1.7**	8.4	6.2	390	0.57	150	12	
	EPA-PZ-2012-2B_FAL19	10/24/2019		3.0 U		**250**		**6,200**	**140**	**35**	**10**	**1.6**	11	5.9	380	0.35	180	27	
EPA-PZ-2012-3A	EPA-PZ2012-3A-100814	10/8/2014	NA	21.2	NA	19,200	NA	730	108	15.0	1.2 J	8.4	11.68	5.86	299	0.50	0.4	0	
	EPA-PZ-2012-3A_FA115	10/26/2015	NA	16.4	NA	16,400	NA	674	105	39.5	1.1 J	9.1	12.80	5.19	392	0.01	-11.5	1.14	
	EPA-PZ-2012-3A FAL16	11/18/2016	NA	23	NA	14,000	NA	710	75	66	0.56 J	8.7	9.76	6.09	416	1.60	-16.0	3.36	
	EPA-PZ-2012-3A SPR17	5/25/2017	NA	19	NA	17,000	NA	850	73	94	0.50 J	8.7	10.01	5.85	534.00	1.08	-11.5	9.78	
	EPA-PZ-2012-3A FAL17	11/8/2017	NA	12	NA	14,000	NA	670	80	67	0.57 J	8.6	11.22	6.16	371	0.02	8.1	1.83	
	EPA-PZ-2012-3A SPR18	4/24/2018	NA	13	NA	12,000	NA	600	92	48	1.2	10	11.82	6.29	389	0.69	-18.4	3.40	
	EPA-PZ-2012-3A_FAL18	11/14/2018	NA	15	NA	13,000	NA	690	100	44	1.2	9.9	9.66	5.51	373	0.81	42.7	5.5	
	EPA-PZ-2012-3A_SPR19	04/16/2019		**15**		**16,000**		**920**	**89**	**32**	1.0 U	**11**	11	6.1	340	0.51	16	8	
	EPA-PZ-2012-3A_FAL19	10/28/2019		**16**		**17,000**		**950**	**96**	**34**	**0.94 J**	**9.7**	11	5.6	320	0.38	50	1.9	
EPA-PZ-2012-3B	EPA-PZ20123B-100914	10/9/2014	NA	3,830	NA	62,100	NA	5,930	265	15.5	48.6	2.5	11.18	6.70	658	0.21	-113.9	12.1	
	EPA-PZ-2012-3B_FA115	10/26/2015	NA	4,070	NA	63,400	NA	6,620	260	17.0	4.5 J	3.3	12.71	5.41	701	0.26	-109.4	4.61	
	EPA-PZ-2012-3B FAL16	11/18/2016	NA	3,600	NA	52,000	NA	5,600	220	19	6.7	2.0	10.61	6.76	626	1.67	-106.6	16.5	
	EPA-PZ-2012-3B SPR17	5/25/2017	NA	4,000	NA	49,000	NA	5,600	200	22	8.5	2.3	10.31	6.55	658	2.41	-65.7	21.98	
	EPA-PZ-2012-3B FAL17	11/9/2017	NA	3,400	NA	53,000	NA	6,300	220	23	8.6	2.1	10.7	6.98	496	0.38	-92.2	11.04	
	EPA-PZ-2012-3B SPR18	4/24/2018	NA	2,900	NA	45,000	NA	5,500	210	25	12	1.6	11.6	6.98	638	0.77	-96.2	7.26	
	EPA-PZ-2012-3B_FAL18	11/14/2018	NA	3,000	NA	44,000	NA	5,600	200	27	11	1.8 U	8.77	6.34	577	0.18	-53.6	14.4	
	EPA-PZ-2012-3B_SPR19	04/16/2019		**2,700**		**45,000**		**5,800**	**180**	**28**	**12**	**1.9**	12	6.7	610	0.42	-80	33	
	SHL-DUP03_SPR19	04/16/2019		**3,000**		**45,000**		**5,700**	**180**	**28**	**11**	**1.9**	12	6.7	610	0.42	-80	33	
	EPA-PZ-2012-3B_FAL19	10/28/2019		**3,200**		**49,000**		**5,900**	**180**	**29**	**15**	**1.7**	10	6.5	560	0.27	-54	9.7	
EPA-PZ-2012-4A	EPA-PZ2012-4A-100814	10/8/2014	NA	4.8	NA	16,500	NA	2,740	45.8	145.0	10.4	6.3	13.04	6.03	690	0.03	-26.8	0.47	
	EPA-PZ-2012-4A_FA115	10/26/2015	NA	5.6	NA	14,300	NA	2,000	48.4	210.0	6.1	7.6	12.94	6.43	769	0.35	-33.1	1.02	
	EPA-PZ-2012-4A FAL16	11/17/2016	NA	5.1	NA	5,200	NA	710	69	110	9.4	12	13.2	6.21	525	1.13	5.6	0.91	
	EPA-PZ-2012-4A SPR17	5/25/2017	NA	2.9 J	NA	3,100	NA	400	67	49	5.4	15	9.84	6.34	368	0.38	-4.0	6.42	
	EPA-PZ-2012-4A FAL17	11/8/2017	NA	3.4	NA	4,800	NA	610	74	63	4.2	11	12.4	6.45	347	0.12	-2.3	1.73	
	EPA-PZ-2012-4A SPR18	4/16/2018	NA	2.5 J	NA	3,700	NA	500	83	39	5.9	11	6.73	6.43	324	0.79	-15.9	0.72	
	EPA-PZ-2012-4B_FAL18	11/13/2018	NA	2,000	NA	75,000	NA	880	190	21	3.2	2.9	10	6.3	614	0.30	-42.4	3.1	
	EPA-PZ-2012-4A_SPR19	04/15/2019		**2.5 J**		**4,100**		**560**	**79**	**29**	**3.4**	**11**	11	6.4	290	0.71	2	2.7	
	EPA-PZ-2012-4A_FAL19	10/31/2019		**4.5**		**7,000**		**920**	**79**	**55**	**2.7**	**8.9**	13	6.2	360	0.3	-33	2.7	
EPA-PZ-2012-4B	EPA-PZ-2012-4B-100614	10/6/2014	NA	2,680	NA	76,800	NA	784	208	15.5	4.9 J	2.6	12.92	6.60	578	0.35	-118.5	3.33	
	EPA-PZ-2012-4B_FA115	10/26/2015	NA	3,520	NA	85,600	NA	984	224	17.0	11.0	4.0	11.71	6.68	515	0.45	-119.2	14.1	
	EPA-PZ-2012-4B FAL16	11/17/2016	NA	2,200	NA	70,000	NA	640	210	18	0.90 J	2.7	11.81	6.36	569	1.46	-70.9	13.23	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	EPA-PZ-2012-4B SPR17	5/25/2017	NA	2,300	NA	73,000	NA	850	200	19	1.1	3.1	10.25	6.45	670	0.52	-64.2	10.50	
	EPA-PZ-2012-4B FAL17	11/8/2017	NA	2,300	NA	71,000	NA	890	220	21	2.2	2.5	10.66	6.76	550	0.22	-73.2	2.09	
	EPA-PZ-2012-4B SPR18	4/16/2018	NA	1,900	NA	72,000	NA	790	200	23	3.7	2.8	6.7	6.63	632	1.04	-65.1	14.10	
	EPA-PZ-2012-4B_FAL18	11/13/2018	NA	2,000	NA	75,000	NA	880	190	21	3.2	2.9	10	6.3	614	0.30	-42.4	3.10	
	EPA-PZ-2012-4B_SPR19	04/15/2019		**2,000**		**72,000**		**880**	**140**	**22**	**6.8**	**2.9**	12	6.6	600	0.6	-63	14	
	EPA-PZ-2012-4B_FAL19	10/31/2019		**2,100**		**62,000**		**690**	**130**	**26**	**17**	**2.1**	12	6.5	510	1.7	-98	9.5	
	SHL-DUP06_FAL19	10/31/2019		**2,000**		**74,000**		**740**	**130**	**26**	**17**	**2**	12	6.5	510	1.7	-98	9.5	
EPA-PZ-2012-5A	EPA-PZ2012-5A-101414	10/14/2014	NA	2.0 U	NA	6,450	NA	86	24	16.5	7.2 J	6	11.27	5.57	93	0.07	71.1	2.68	
	EPA-PZ-2012-5A_FA115	10/26/2015	NA	4.0 U	NA	6,560	NA	90	21.6	9.5	5.5	5.8	10.25	5.51	101	0.48	35.9	1.08	
	EPA-PZ-2012-5A FAL16	11/17/2016	NA	3.0 U	NA	6,300	NA	79	22	12	4.3	5.5	10.68	5.90	84	0.22	48.9	0.88	
	EPA-PZ-2012-5A SPR17	5/31/2017	NA	3.0 U	NA	6,400	NA	83	23	12	4.3	6.0	10.49	5.45	133	0.48	25.9	9.13	
	EPA-PZ-2012-5A FAL17	11/10/2017	NA	3.0 U	NA	6,300	NA	84	22	13	3.5	5.5	9.5	5.82	85	0.56	56.7	2.78	
	EPA-PZ-2012-5A SPR18	4/23/2018	NA	1.5 J	NA	6,500	NA	87	23	14	5.1	6.2	9.4	5.71	111	0.85	6.2	7.72	
	EPA-PZ-2012-5A_FAL18	11/15/2018	NA	1.5 J	NA	6,200	NA	90	18	14	3.9	5.9	7.73	6.42	71	0.27	112	1.94	
	EPA-PZ-2012-5A_SPR19	04/12/2019		**1.5 J**		**7,200**		**96**	**22**	**15**	**4.2**	**6.5**	7.9	5.7	120	0.39	36	5.2	
	EPA-PZ-2012-5A_FAL19	11/05/2019		**2.2 J**		**6,800**		**96**	**24**	**16**	**5.1**	**6.3**	9.5	5.2	110	0.2	80	3.3	
EPA-PZ-2012-5B	EPA-PZ2012-5B-101414	10/14/2014	NA	3.2 J	NA	471	NA	11,900	311	6.5	3.6 J	1.9	11.01	6.44	598	0.16	34.3	0.01	
	EPA-PZ-2012-5B_FA115	10/26/2015	NA	3.7	NA	181	NA	12,300	286	18.0	1.7 J	2.2	10.72	6.13	626	0.33	24.4	1.42	
	EPA-PZ-2012-5B FAL16	11/17/2016	NA	2.4 J	NA	130	NA	11,000	250	20	2.7	1.7	10.15	6.62	501	0.19	21.4	0.83	
	EPA-PZ-2012-5B SPR17	5/31/2017	NA	1.6 J	NA	130	NA	11,000	230	24	2.7	1.7	7.76	7.00	534	0.90	108.9	3.14	
	EPA-PZ-2012-5B FAL17	11/10/2017	NA	3.0 U	NA	290	NA	10,000	220	30	3.5	1.6	9.3	6.69	435	0.18	86.3	3.24	
	EPA-PZ-2012-5B SPR18	4/23/2018	NA	3.0 U	NA	100	NA	9,600	220	35	7.2	1.8	10.3	6.39	539	0.78	18.3	3.74	
	EPA-PZ-2012-5B_FAL18	11/15/2018	NA	12	NA	910	NA	10,000	200	40	7.1	1.6	7.53	6.35	344	0.54	16.1	10.4	
	EPA-PZ-2012-5B_SPR19	04/12/2019		**2.7 J**		**390**		**11,000**	**200**	**42**	**8.9**	**1.7**	8.8	6.4	530	0.33	38	4.4	
	EPA-PZ-2012-5B_FAL19	11/05/2019		**14**		**940**		**9,800**	**190**	**40**	**12**	**1.3**	9.4	6.2	450	0.28	-22	2	
EPA-PZ-2012-6A	EPA-PZ2012-6A-100914	10/9/2014	NA	2.0 U	NA	50 U	NA	7.5 U	31.6	41.0	21.9	0.87 J	9.37	6.28	323	7.40	177.3	0.97	
	EPA-PZ-2012-6A_FA115	10/26/2015	NA	4.0 U	NA	100 U	NA	15 U	25.8	67.0	12.8	1.6	8.76	6.64	289	8.50	37.2	5.19	
	EPA-PZ-2012-6A FAL16	11/17/2016	NA	1.6 J	NA	34 J	NA	3.0 U	24	3.4	4.0	0.98 J	8.81	7.02	71	6.32	202.8	6.51	
	EPA-PZ-2012-6A SPR17	5/24/2017	NA	3.0 U	NA	50 U	NA	1.5 J	21	72	34	1.2	8.71	5.98	407	11.98	18.3	13.48	
	EPA-PZ-2012-6A FAL17	11/9/2017	NA	3.0 U	NA	29 J	NA	5.0 U	37	9.7	14	1.5	9.2	6.81	112	5.17	43.8	3.35	
	EPA-PZ-2012-6A SPR18	4/20/2018	NA	3.0 U	NA	50 U	NA	2.9 J	39	150	28	1.3	8.1	6.54	588	7.95	38.2	2.63	
	EPA-PZ-2012-6A_FAL18	11/09/2018	NA	3.0 U	NA	50 U	NA	3.0 U	62	14	19	2.0	10.1	6.68	216	8.56	37	3.6	
	EPA-PZ-2012-6A_SPR19	04/22/2019		**1.6 J**		50 U		**7.8 J**	**25**	**58**	**3.7**	0.50 U	12	6.3	260	9.2	160	5	
	EPA-PZ-2012-6A_FAL19	10/25/2019		3.0 U		50 U		3.0 U	**32**	**4.7**	**4**	**0.85 J**	9.7	6.1	88	7	180	13	
EPA-PZ-2012-6B	EPA-PZ2012-6B-100914	10/9/2014	NA	515	NA	18,000	NA	1,020	49.1	1.5	3.7 J	9.5	9.84	6.94	158	0.54	-123.2	0.73	
	EPA-PZ-2012-6B_FA115	10/26/2015	NA	386	NA	19,600	NA	667	46.4	5.0	3.5 J	1.4	8.36	6.31	102	0.75	10.3	2.81	
	EPA-PZ-2012-6B FAL16	11/17/2016	NA	370	NA	24,000	NA	870	67	5.7	4.5	1.2	8.99	6.55	166	0.75	-30.0	12	
	EPA-PZ-2012-6B SPR17	5/24/2017	NA	430	NA	27,000	NA	900	57	16	3.1	1.5	9.45	6.42	268	0.66	-38.7	9.46	
	EPA-PZ-2012-6B FAL17	11/9/2017	NA	350	NA	21,000	NA	1,000	53	9.4	3.6	1.4	9.3	7.14	165	0.20	-97.7	4.55	
	EPA-PZ-2012-6B_SPR18	4/20/2018	NA	96	NA	4,900	NA	760	44	6.4	4.6	1.5	8.8	6.98	159	0.87	-69.7	2.90	
	EPA-PZ-2012-6B_FAL18	11/09/2018	NA	300	NA	18,000	NA	890	48	3.4	3.4	1.4 U	9.18	6.74	100	1.76	4.5	37.4	
	EPA-PZ-2012-6B_SPR19	04/22/2019		**350**		**19,000**		**950**	**39**	**17**	**12**	**1.6**	12	6.8	200	6.8	-55	36	
	EPA-PZ-2012-6B_FAL19	10/25/2019		**370**		**17,000**		**960**	**47**	**10**	**9.4**	**1.3**	10	6.6	190	0.15	-60	9.9	
EPA-PZ-2012-7A	EPA-PZ2012-7A-101414	10/14/2014	NA	2.0 U	NA	50 U	NA	121	60	150.0	9.3 J		13.19	6.60	604	1.80	97.0	1.04	
	EPA-PZ-2012-7A_FA115	10/27/2015	NA	4.0 U	NA	100 U	NA	5.9 J	40.2	145.0	7.9	0.80 J	11.19	3.95	654	2.72	136.1	0.82	
	EPA-PZ-2012-7A FAL16	11/21/2016	NA	3.0 U	NA	28 J	NA	49	28	320	6.8	0.77 J	10.03	6.31	815	4.93	123.1	2.49	
	EPA-PZ-2012-7A SPR17	5/24/2017	NA	3.0 U	NA	19 J	NA	16	22	210	8.2	1.0	11.82	6.01	812	8.35	38.0	8.70	
	EPA-PZ-2012-7A FAL17	11/17/2017	NA	3.0 U	NA	75 U	NA	22	25	160	4.0	0.5 U	10.19	6.41	549	3.01	161.3	4.52	
	EPA-PZ-2012-7A SPR18	4/18/2018	NA	3.0 U	NA	50 U	NA	6.4 J	25	160	6.1	1.0 U	10.69	6.15	608	4.82	87.5	0.95	
	EPA-PZ-2012-7A_FAL18	11/16/2018	NA	3.00 U	NA	50.0 U	NA	8.00 J	30	89	9.7	0.66 J	8.85	6.08	373	5.6	14.5	0.68	
	EPA-PZ-2012-7A_SPR19	04/19/2019		3.0 U		50 U		3.0 U	**21**	**180**	**2.1**	0.50 U	10	5.7	660	6	120	1.8	
	EPA-PZ-2012-7A_FAL19	10/31/2019		**2.3 J**		50 U		**47**	**22**	**120**	**5**	**0.67 J**	12	6	450	3.6	94	2.8	
EPA-PZ-2012-7B	EPA-PZ2012-7B-101414	10/14/2014	NA	1,250	NA	34,800	NA	1,460	77.4	0.77 U	4.9 J	2.4	12.9	6.67	229	0.20	-92.9	3.18	
	EPA-PZ-2012-7B_FA115	10/27/2015	NA	1,330	NA	36,900	NA	1,380	773	3.0	12.2	3.6	11.69	5.59	275	0.95	-115.4	0.68	
	EPA-PZ-2012-7B FAL16	11/21/2016	NA	1,000	NA	26,000	NA	930	45	34	0.5 U	1.5	10.13	6.60	202	7.04	-55.2	17.2	
	EPA-PZ-2012-7B SPR17	5/24/2017	NA	1,500	NA	18,000	NA	930	39	1.8	3.5	1.4	11.50	6.45	175	0.41	-58.1	11.35	
	EPA-PZ-2012-7B FAL17	11/17/2017	NA	1,200	NA	19,000	NA	830	44	1.7	3.5	1.3	9.99	6.91	140	0.33	-94.1	389.00	
	EPA-PZ-2012-7B SPR18	4/18/2018	NA	1,300	NA	20,000	NA	1,200	46	2.3	3.5	1.5	9.4	6.81	161	1.01	-83.3	5.97	
	EPA-PZ-2012-7B_FAL18	11/16/2018	NA	1,100	NA	16,000	NA	1,000	40	1.2	3.4 J	1.5	10	6.54	138	0.57	-65.1	15.8	
	EPA-PZ-2012-7B_SPR19	04/19/2019		**1,500**		**22,000**		**2,700**	**52**	**9.6**	**5**	0.50 U	11	6.2	210	0.77	-34	1	
	EPA-PZ-2012-7B_FAL19	11/05/2019		**1,300**		**23,000**		**1,900**	**50**	**1.3**	**4.7**	**1.3**	9.8	6.7	150	0.23	-93	6.4	
EW-1	EW-1 SPR16	8/29/2016	NA	1,500	NA	62,000	NA	2,100	260	16	2	4.8	--	--	--	--	--	--	
(collected from ATP port)	EW-1_SPR17	6/14/2017	NA	1,900	NA	63,000	NA	2,200	170	15	3.7	4.5	--	--	--	--	--	--	
	EW-1_FAL17	11/28/2017	NA	1,800	NA	71,000	NA	2,200	180	15	3.8	4.2	--	--	--	--	--	--	
	EW-1 SPR18	04/19/2018	NA	1,500	NA	60,000	NA	2,100	190 J	15	4.1	4.7	--	--	--	--	--	--	
	EW-01_FAL18	12/18/2018	NA	1,900	NA	75,000	NA	2,500	240	15	4.2	4.3	--	--	--	--	--	--	
	EW-1@ATP Port_SPR19	04/12/2019		**1,500**		**64,000**		**2,100**	**200**	**15**	**4**	**4.4**	---	---	---	---	---	---	
	EW-1_FAL19	11/05/2019		**1,600**		**65,000**		**2,100**	**210**	**18**	**6.6**	**4.2**	---	---	---	---	---	---	
EW-4	EW-4 SPR16	8/29/2016	NA	2,400	NA	35,000	NA	2,200	130	9.1	4.2	2.0	--	--	--	--	--	--	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
(collected from ATP port)	EW-4_SPR17	6/14/2017	NA	3,500	NA	42,000	NA	2,700	100	8.1	4.4	2.0	--	--	--	--	--	--	
	EW-4_FAL17	11/28/2017	NA	3,500	NA	45,000	NA	2,700	98	7.5	4.5	1.9	--	--	--	--	--	--	
	EW-4 SPR18	04/19/2018	NA	3,300	NA	37,000	NA	2,300	110 J	6.4	4.6	2.2	--	--	--	--	--	--	
	EW-04_FAL18	12/18/2018	NA	4,000	NA	56,000	NA	3,200	160	6.8	5.0	2.4	--	--	--	--	--	--	
	EW-4@ATP Port_SPR19	04/12/2019		**2,900**		**41,000**		**2,400**	**100**	**5.2**	**4.4**	**1.9**	---	---	---	---	---	---	
	EW-4_FAL19	11/05/2019		**3,200**		**38,000**		**2,100**	**110**	**6.8**	**6.4**	**1.7**	---	---	---	---	---	---	
SHP-2016-1A	SHP-2016-1A-SPR17	05/23/2017	NA	3.0 U	NA	220	NA	82	15	1.2	4.9	1.0 U	10.32	4.77	42	7.46	140.6	9.35	
	SHP-2016-1A_FAL17	11/14/2017	NA	3.0 U	NA	75 U	NA	33	22	1.0	4.5	0.50 U	10.84	6.93	70	6.07	122.8	1.27	
	SHP-2016-1A_FAL18	11/13/2018	NA	3.0 U	NA	50 U	NA	4.0 J	21	0.69	3.7 J	1.0 U	12.5	5.38	63	2.79	79.6	6.98	
	SHP-2016-1A_SPR19	04/22/2019		3.0 U		50 U		**2.3 J**	**20**	**1.2**	**3**	0.50 U	8.5	5.1	56	8.1	170	4.8	
	SHP-2016-1A_FAL19	11/08/2019		3.0 U		**20 J**		**4.7 J**	**24**	**0.48 J**	**4.8**	**1.7**	11	5.7	68	-0.26	36	6.8	
SHP-2016-1B	SHP-2016-1B-SPR17	05/23/2017	NA	120	NA	21,000	NA	1,200	82	2.6	0.63 J	3.2	10.73	6.66	147	0.21	-96.4	12.45	
	SHP-2016-1B_FAL17	11/14/2017	NA	170	NA	27,000	NA	1,700	120	5.8	0.98 J	2.4	9.81	7.35	281	1.48	-46.7	3.07	
	SHP-2016-1B_FAL18	11/13/2018	NA	130	NA	16,000	NA	970	69	3.0	2.3	2.0	9.24	6.1	189	0.90	-9.9	7.5	
	SHP-2016-1B_SPR19	04/22/2019		**120**		**18,000**		**1,200**	**68**	**12**	**2.6**	**2.2**	11	5.7	230	0.48	-22	1.4	
	SHP-2016-1B_FAL19	11/08/2019		**180**		**34,000**		**1,700**	**140**	**11**	**7.3**	**4**	10	5.7	330	0.89	36	6.8	
SHP-2016-2A	SHP-2016-2A-SPR17	05/24/2017	NA	58	NA	4,300	NA	420	110	8.3	4.6	2.5	9.50	10.07	186	1.15	-177.6	95.90	
	SHP-2016-2A_FAL17	11/20/2017	NA	51	NA	420	NA	30	81	7.2	3.3	1.7	9.03	11.91	197	--	-196.3	13.20	
	SHP-2016-2A SPR18	04/23/2018	NA	32	NA	430	NA	32	92	6.4	3.9	1.6	10.01	9.65	234	1.76	-43.1	30.80	
	SHP-2016-2A_FAL18	11/15/2018	NA	17	NA	19 J	NA	190	58	5.1	3.1	1.1	9.14	9.44	184	3.07	-51.4	22.4	
	SHP-2016-2A_SPR19	04/19/2019		**16**		**22 J**		**450**	**64**	**3.3**	**4.8**	0.50 U	9.8	8.7	150	1.1	-31	8.5	
	SHP-2016-2A_FAL19	10/24/2019		**11**		**25 J**		**400**	**51**	**2.5**	**5**	**1.2**	11	8.1	120	2.5	160	4.6	
SHP-2016-2B	SHP-2016-2B-SPR17	05/24/2017	NA	350	NA	64,000	NA	2,700	220	16	0.47 J	2.7	9.53	6.48	421	0.51	-91.3	9.67	
	SHP-2016-2B_FAL17	11/20/2017	NA	550	NA	65,000	NA	2,900	200	20	0.88 J	2.7	8.3	8.76	528	--	-69.9	2.27	
	SHP-2016-2B-SPR18	04/23/2018	NA	420	NA	59,000	NA	2,600	200	18	2.2	2.6	9.96	6.83	578	0.81	-69.5	4.79	
	SHP-2016-2B_FAL18	11/15/2018	NA	430	NA	52,000	NA	2,700	170	18	2.4	2.3	8.14	6.79	634	0.27	-79.6	1.44	
	SHP-2016-2B_SPR19	04/19/2019		**450**		**43,000**		**2,200**	**150**	**9.6**	**4.3**	**2.2**	8.5	6.3	440	0.48	-49	2.5	
	SHP-DUP04	04/19/2019		**410**		**41,000**		**2,100**	**150**	**9.9**	**4.3**	**2.1**	8.5	6.3	440	0.48	-49	2.5	
	SHP-2016-2B_FAL19	10/24/2019		**560**		**46,000**		**2,400**	**170**	**15**	**5.1**	**2.2**	9.9	6.5	490	0.19	-33	3	
SHP-2016-3A	SHP-2016-3A-SPR17	05/23/2017	NA	4.8	NA	1,700	NA	190	61	2.7	3.7	3.0	7.26	7.06	97	1.59	-61.9	35.10	
	SHP-2016-3A_FAL17	11/15/2017	NA	7.0	NA	3,200	NA	590	77	8.2	0.92 J	3.8	8.49	7.96	171	1.87	-31.4	1.89	
	SHP-2016-3A SPR18	04/24/2018	NA	3.2	NA	5,000	NA	600	55	4.0	3.2	1.5	9.76	7.52	150	1.40	-87.5	1.09	
	SHP-2016-3A_FAL18	11/12/2018	NA	4.5	NA	9,400	NA	830	69	6.5	1.5	1.9	11	6.53	255	0.32	-81.4	0.90	
	SHP-2016-03A_SPR19	04/18/2019		**4**		**8,100**		**530**	**43**	**2.5**	**1.4**	0.50 U	4.3	6.3	120	1.1	-34	2	
	SHP-2016-3A_FAL19	10/28/2019		260 R		36,000 R		2,800 R	130 R	11 R	4.5 R	1.8 R	8.7	6.5	160	0.37	-52	3	
SHP-2016-3B	SHP-2016-3B-SPR17	05/23/2017	NA	240	NA	54,000	NA	4,100	200	18	0.56 J	3.5	8.67	6.45	398	0.32	-70.1	7.19	
	SHP-2016-3B_FAL17	11/15/2017	NA	270	NA	53,000	NA	4,000	240	18	0.47 J	2.9	8.91	7.87	512	2.51	-45.4	1.15	
	SHP-2016-3B SPR18	04/24/2018	NA	240	NA	43,000	NA	3,400	170	16	1.9	2.2	9.97	6.79	485	0.84	-49.6	3.85	
	SHP-2016-3B_FAL18	11/12/2018	NA	240	NA	43,000	NA	3,200	150	18	2.0	2.3	10.1	6.36	570	0.29	-72.5	3.62	
	SHP-2016-03B_SPR19	04/18/2019		**230**		**42,000**		**3,000**	**150**	**12**	**3.4**	**2.3**	6	6.2	420	0.52	-44	2.7	
	SHP-2016-3B_FAL19	10/28/2019		4.1 R		11,000 R		740 R	49 R	14 R	2.5 R	1.1 R	9.1	6.5	240	0.21	-86	2.9	
SHP-2016-4A	SHP-2016-4A-SPR17	05/24/2017	NA	10	NA	3,400	NA	150	57	4.9	6.2	2.5	9.94	7.05	98	0.73	-75.1	62.00	
	SHP-2016-4A_FAL17	11/16/2017	NA	4.6	NA	610	NA	170	43	5.5	2.6	1.4	7.19	8.30	91	2.08	-6.5	20.90	
	SHP-2016-4A SPR18	04/24/2018	NA	3.8	NA	1,600	NA	710	44	7.0	3.7	0.89 J	11	6.92	121	1.23	-43.0	5.18	
	SHP-2016-4A_FAL18	11/12/2018	NA	1.5 J	NA	960	NA	1,000	24	5.4	5.7	1.1 U	8.24	5.56	141	2.59	24.6	2.15	
	SHP-2016-4A_SPR19	04/19/2019		3.0 U		**84**		**640**	**24**	**6.2**	**6.6**	0.50 U	9.9	5.6	82	4.8	210	7.4	
	SHP-2016-04A_FAL19	11/05/2019		3.0 U		**24 J**		**580**	**16**	**8.9**	**7.8**	**0.63 J**	8.1	6.3	84	2.7	50	9.1	
SHP-2016-4B	SHP-2016-4B-SPR17	05/24/2017	NA	1,100	NA	75,000	NA	1,900	220	17	1.0 U	5.5	8.90	6.50	415	0.27	-95.4	6.68	
	SHP-2016-4B_FAL17	11/16/2017	NA	1,800	NA	62,000	NA	1,400	230	18	0.78 J	2.6	7.68	7.79	524	3.76	-58.9	2.65	
	SHP-2016-4B SPR18	04/23/2018	NA	1,300	NA	55,000	NA	1,500	190	17	2.1	2.3	9.37	6.71	541	0.75	-64.8	6.51	
	SHP-2016-4B_FAL18	11/12/2018	NA	1,400	NA	53,000	NA	1,500	160	16	2.6	2.3	8.86	6.3	594	0.50	-109	23.1	
	SHP-2016-4B_SPR19	04/19/2019		**1,400**		**41,000**		**1,300**	**130**	**10**	**4.7**	**1.9**	10	6.1	370	0.62	-62	4.2	
	SHP-2016-04B_FAL19	11/05/2019		**1,500**		**50,000**		**2,000**	**170**	**17**	**5.4**	**1.8**	8.3	6.5	490	31	-60	8.1	
SHP-2016-5A	SHP-2016-5A-SPR17	05/24/2017	NA	2.3 J	NA	8,000	NA	260	63	27	1.0 U	18	9.18	6.76	162	0.26	-78.3	9.94	
	SHP-2016-5A_FAL17	11/16/2017	NA	2.2 J	NA	4,900	NA	140	73	17	0.76 J	8.6	8.19	8.19	174	1.60	-59.4	5.74	
	SHP-2016-5A SPR18	04/24/2018	NA	2.5 J	NA	3,900	NA	110	70	14	2.8	7.9	11.58	7.02	191	0.40	-58.5	7.68	
	SHP-2016-5A_FAL18	11/14/2018	NA	2.8 J	NA	4,000	NA	140	66	40	6.7	5.6	9.69	6.26	375	0.24	14.6	1.52	
	SHP-2016-5A_SPR19	04/23/2019		**3.9**		**3,200**		**100**	**67**	**25**	**6.7**	**6.3**	8.8	6.5	240	0.59	-9.9	7.9	
	SHP-2016-05A_FAL19	11/05/2019		**3.2**		**4,400**		**190**	**65**	**67**	**4.8**	**4.1**	8.1	6.2	380	0.45	30	8.1	
SHP-2016-5B	SHP-2016-5B-SPR17	05/24/2017	NA	620	NA	66,000	NA	4,100	240	19	1.0 U	4.4	9.31	6.40	462	0.59	-76.9	7.86	
	SHP-2016-5B_FAL17	11/20/2017	NA	700	NA	64,000	NA	4,700	200	19	0.63 J	3.3	9.08	8.44	518	--	-64.1	1.96	
	SHP-2016-5B SPR18	04/24/2018	NA	620	NA	57,000	NA	4,300	200	19	2.3	2.8	10.81	7.19	578	0.75	-71.5	5.29	
	SHP-2016-5B_FAL18	11/14/2018	NA	520	NA	52,000	NA	4,000	190	21	1.2	2.6	8.21	6.85	735	0.87	-81	6.82	
	SHL-DUP05_SPR19	04/23/2019		**620**		**64,000**		**5,100**	**180**	**20**	**0.82 J**	**2.8**	9.2	6.7	600	0.69	-81	37	
	SHP-2016-5B_SPR19	04/23/2019		**610**		**64,000**		**5,100**	**180**	**21**	**0.81 J**	**2.6**	9.2	6.7	600	0.69	-81	37	
	SHP-2016-05B_FAL19	11/05/2019		**720**		**66,000**		**3,500**	**210**	**20**	**5.2**	**2.5**	8.5	6.5	590	0.34	-70	13	
SHP-2016-06A	SHP-2016-06A-SPR17	6/15/2017	NA	520	NA	64	NA	3,300	120	120	120	3.4	13.47	7.49	204	5.47	62.3	9.63	
	SHP-2016-06A_FAL17	11/28/2017	NA	600	NA	320	NA	2,000	130	13	74	9.0	8.25	6.78	413	0.60	-105.2	3.32	
	SHP-2016-06A SPR18	4/18/2018	NA	280	NA	120	NA	1,800	140	10	57	6.0	8.6	7.71	424	1.40	-113.8	6.86	
	SHP-2016-06A_FAL18	11/09/2018	NA	480	NA	94	NA	2,600	170	16	1.0 U	13	9.21	7.57	427	0.60	-183	4.55	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1A
Historical Groundwater Monitoring Well Analytical Results
Shepley's Hill Landfill - Devens Massachusetts

Well ID	Sample ID	Date	Arsenic Total (µg/L)	Arsenic Dissolved (µg/L)	Iron Total (µg/L)	Iron Dissolved (µg/L)	Manganese Total (µg/L)	Manganese Dissolved (µg/L)	Alkalinity mg CaCO3/L	Chloride mg/l	Sulfate mg/l	DOC mg/l	Temp °C	pH	Spec Cond µS/cm	DO mg/L	ORP mV	Turbidity NTU	Notes
	SHP-2016-06A_SPR19	04/17/2019		**2,800**		**1,400**		**1,900**	**190**	**16**	**150**	**22**	8.1	7.3	720	1.5	-97	2.3	
	SHP-2016-06A_FAL19	11/05/2019		**860**		**400**		**2,300**	**230**	**15**	**180**	**18**	10	7.2	690	0.68	-67	1.7	
SHP-2016-06B	SHP-2016-06B-SPR17	6/15/2017	NA	830	NA	120	NA	2,500	130	130	130	1.8	13.73	7.14	246	1.09	48.6	6.91	
	SHP-2016-06B_FAL17	11/28/2017	NA	1,300	NA	240	NA	1,600	130	10	110	5.8	7.2	6.81	469	0.79	-69.5	8.45	
	SHP-2016-06B-SPR18	4/18/2018	NA	1,300	NA	1,800	NA	4,700	240	51	730	36	10.14	7.73	1463	0.81	-113.9	7.25	
	SHP-2016-06B_FAL18	11/07/2018	NA	1,300	NA	1,000	NA	1,600	280	40	530	25	10.4	7.63	1,900	0.65	-75.2	41.8	
	SHP-2016-06B_SPR19	04/17/2019		**1,300**		**990**		**1,200**	**260**	**27**	**440**	**21**	9.6	7.5	1,600	0.42	-110	20	
	SHP-2016-06B_FAL19	11/05/2019		**1,200**		**1,100**		**1,200**	**310**	**17**	**380**	**36**	11	7.6	1,100	0.56	-96	6.2	
SHP-2016-06C	SHP-2016-06C-SPR17	6/14/2017	NA	320	NA	360	NA	1,900	140	140	140	2.9	18.59	7.51	276	1.07	38.7	8.70	
	SHP-2016-06C_FAL17	11/28/2017	NA	280	NA	140	NA	330	120	1.5	8.4	0.5 U	7.72	7.08	253	2.79	-87.1	9.57	
	SHP-2016-06C SPR18	4/18/2018	NA	210	NA	97 J	NA	220	120	1.6	10	1.0 U	10.35	7.77	236	0.50	-64.5	1.38	
	SHP-2016-06C_FAL18	11/07/2018	NA	300	NA	340	NA	230	120	1.8	22	1.0 U	11.2	7.64	255	0.38	-37.5	9.74	
	SHP-2016-06C_SPR19	04/17/2019		**250**		**130**		**220**	**120**	**1.5**	**9.2**	0.50 U	9.3	7.3	260	1.4	-42	4.1	
	SHP-2016-06C_FAL19	11/05/2019		**270**		**110**		**170**	**120**	**1.8**	**12**	**0.40 J**	11	7.9	240	2.2	-64	8	
SHP-2016-07A	SHP-2016-07A-SPR17	6/13/2017	NA	81	NA	5,900	NA	560	28	28	28	0.81 J	13.37	4.49	62	0.43	103.6	8.59	
	SHP-2016-07A_FAL17	11/30/2017	NA	12	NA	39 J	NA	7,300	64	2.5	8.8	1.9	8.62	6.60	149	5.30	154.1	5.88	
	SHP-2016-07A SPR18	4/19/2018	NA	84	NA	5,800	NA	5,400	32	2.0	4.0	1.4	8.13	6.05	60	0.87	40.3	3.15	
	SHP-2016-07A_FAL18	11/09/2018	NA	200	NA	410	NA	600	43	6.5	100	1.3 U	12.2	5.76	102	0.12	32.7	22.8	
	SHP-2016-7A_SPR19	04/22/2019		**19**		**3,400**		**3,600**	**20**	**1.5**	**3.4**	0.50 U	8.3	5.1	58	0.9	89	1.7	
SHP-2016-07B	SHP-2016-07B-SPR17	6/13/2017	NA	7.9	NA	270	NA	760	99	99	99	3.3	19.24	6.67	301	1.34	32.3	7.32	
	SHP-2016-07B_FAL17	11/30/2017	NA	11	NA	230	NA	1,700	100	4.3	42	1.9	10.53	7.32	290	1.47	-44.4	18.90	
	SHP-2016-07B SPR18	4/19/2018	NA	200	NA	870	NA	2,000	160	16	200	9.3	6.94	7.22	630	1.18	-45.9	23.20	
	SHP-2016-07B_FAL18	11/08/2018	NA	150	NA	10,000	NA	7,000	120	2.1	4.7	4.5	12	6.68	491	0.34	-43.9	8.43	
	SHP-2016-07B_SPR19	04/19/2019		**80**		**210**		**700**	**120**	**4.1**	**71**	**3**	14	7	380	0.87	-8.8	12	
	SHP-2016-07B_FAL19	11/06/2019		**35**		**84**		**350**	**110**	**2.9**	**36**	**1.5**	13	7.1	300	0.98	18	28	
SHM-93-10D	SHM-93-10D_FAL19	10/29/2019		3.0 U		**73**		**2.1 J**	**54**	**29**	**17 J**	**0.95 J**	11	12	400	0.51	88	20	
SHM-93-18B	SHM-93-18B_FAL19	11/13/2019		3.0 U		50 U		**1.4 J**	**60**	**51**	**33**	**0.61 J**	9.2	7.7	320	7.6	2.3	1.9	
SHM-93-24A	SHM-93-24A_FAL19	11/08/2019		3.0 U		50 U		**7.7 J**	**22**	**180**	**54**	**2.1**	11.5	5.8	713	9.4	124	12.4	

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
J = estimated result

U = non detect
NA = not applicable
"--" = no data

Table C-1B
Fall 2019 Supplemental Groundwater Sampling Results
AOC 5, Shepley's Hill Landfill
Former Fort Devens

Locations: Field Sample ID: Sample Date:		EW-01 EW-01_FAL19R 11/15/2019	EW-04 EW-04_FAL19R 11/15/2019	SHL-10 SHL-10_NOV19 11/13/2019	SHL-11 SHL-11_NOV19 11/11/2019	SHL-19 SHL-19_NOV19 11/11/2019	SHL-20 SHL-20_NOV19 11/11/2019	SHM-10-16 SHM-10-16_NOV19R 11/21/2019	SHM-93-22C SHM-93-22C_NOV19 11/11/2019	SHM-99-31C SHM-99-31C_FAL19R 11/14/2019	SHM-99-32X SHM-99-32X_NOV19 11/13/2019
Metals (UG/L)	Cleanup Levels *										
Aluminum	6,870	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	**36.0 J**	70.0 U	**110 J**	70.0 U
Arsenic	10	**1,700**	**3,200**	**880**	**910**	**3.00**	**1.80 J**	**1,100**	**4.20**	**140**	**55.0**
Chromium	100	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Iron	9,100	**66,000**	**40,000**	**47,000**	**52,000**	**80.0 J**	50.0 U	**33,000**	50.0 U	**11,000**	**7,100**
Lead	15	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	**9.00 J**	10.0 U
Manganese	291	**2,200**	**2,400**	**1,800**	**1,800**	**2.80 J**	**2.10 J**	**1,800**	**2.60 J**	**4,700**	**4,600**
Nickel	100	**7.30 J**	**6.20 J**	**6.40 J**	**4.30 J**	5.00 U	**3.20 J**	**41.0**	40.0 U	**6.30 J**	5.00 U
Sodium	20,000	**13,000**	**6,500**	**28,000**	**29,000**	**4,500**	**27,000**	**28,000**	**14,000**	**28,000**	**29,000**
VOC (UG/L)											
1,2-Dichlorobenzene	600	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U
1,2-Dichloroethane	5	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U
1,4-Dichlorobenzene	5	**0.710 J**	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	**0.870 J**	1.00 U	1.00 UJ	1.00 U
Field Parameters											
Temperature (°C)		--	--	10	10.12	10.11	10.57	8.9	8.61	9.43	8.2
Ph		--	--	5.5	6.31	6.3	5.99	7.43	6.95	6.67	6.3
Specific Conductivity (us/cm)		--	--	32	511	214	343	5.96	274	299	291
Dissolved Oxygen (mg/L)		--	--	6.2	0.42	5.6	2.6	7.7	4.12	0.78	6.01
ORP (mv)		--	--	210.1	-24.9	84.2	66.6	8.2	102.9	-77.5	110.8
Turbidity (NTU)		--	--	3.46	14.96	11.96	13.91	1.71	14.08	6.44	12.2

Notes:
* = Cleanup Levels from SHL ROD (1995)
Result greater than cleanup level.
Rejected analytical results
Detects are displayed in **bold font**
J: The analyte was positively identified, but the associated numerical value is estimated.
U: The analyte was not detected above the reported sample quantitation limit.
UJ: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is appropriate.
UG/L = microgram per liter

Table C-2
Annual Landfill Gas Monitoring
Shepley's Hill Landfill
Devens, Massachusetts
October 2015

Date: 10/20/15 **Weather: Partly Cloudy, 60 Degrees F** **Field Team: Teague Baker, Samantha Landry**

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	rge Rate (lp	rge Time (s	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-1	9:21	0.0	20.8	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.90
GV-2	10:50	0.1	19.4	0.0	27.0	0.0	1.2	0.8	4	167	0.1	16.4	0.0	83.0	1.0	4.2	2.5	--
GV-3	8:50	0.0	20.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.5	0.0	0.0	0.0	0.1	0.1	--
GV-4	9:00	0.1	10.0	0.0	71.0	0.0	8.7	2.1	4	167	0.2	10.1	0.0	100.0	0.0	10.1	3.1	--
GV-5	9:12	0.1	19.7	0.0	4.0	0.0	0.6	0.1	4	167	0.0	20.5	0.0	0.0	0.0	0.4	0.0	29.88
GV-6	13:16	0.0	3.3	0.0	100.0	0.0	13.7	7.6	4	167	0.0	1.7	0.0	100.0	0.0	14.8	7.8	--
GV-7	11:30	0.0	5.4	0.0	100.0	0.0	11.6	8.2	4	167	0.0	1.1	0.0	100.0	1.0	14.1	7.9	29.89
GV-8	11:39	0.0	12.7	0.0	45.0	0.0	6.2	1.4	4	167	0.0	10.6	0.0	27.0	0.0	7.3	0.8	--
GV-9	13:24	0.2	7.1	0.0	100.0	0.0	11.2	5.9	4	167	0.4	0.7	0.0	100.0	0.0	19.1	17.8	29.88
GV-10	13:03	0.0	4.2	0.0	100.0	0.0	11.6	4.2	4	167	0.0	2.0	0.0	100.0	0.0	12.4	4.3	--
GV-11	12:54	0.0	14.1	0.0	0.0	0.0	4.5	1.1	4	167	0.0	13.7	0.0	22.0	1.0	4.8	0.6	29.89
GV-12	13:35	0.1	7.5	0.0	100.0	0.0	10.2	8.3	4	167	0.0	0.8	0.0	100.0	0.0	14.6	11.8	29.88
GV-13	13:45	0.1	20.1	0.0	15.0	0.0	0.7	0.4	4	167	0.1	19.3	0.0	32.0	0.0	1.2	0.8	--
GV-14	14:00	0.1	20.4	0.0	15.0	0.0	0.6	0.3	4	167	0.0	13.9	0.0	100.0	0.0	7.0	11.9	--
GV-15	16:15	0.1	20.6	0.0	23.0	0.0	0.7	0.6	4	375	0.1	3.1	0.0	100.0	0.0	21.2	24.9	--
GV-16	15:55	0.1	20.1	0.0	27.0	0.0	23.7	17.3	4	375	0.2	6.1	0.0	100.0	0.0	16.7	11.0	--
GV-17	16:08	0.2	2.2	0.0	100.0	0.0	23.2	21.5	4	375	0.1	1.1	0.0	100.0	0.0	24.3	22.8	--
GV-18	16:25	0.1	5.6	0.0	100.0	0.0	21.2	29.1	4	375	0.2	8.8	0.0	100.0	0.0	17.1	24.1	--
LGP-01-01X	9:45	0.0	20.6	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.5	0.0	0.0	0.0	0.7	0.0	29.90
LGP-09-01XA	9:33	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.3	0.0	0.0	0.0	0.9	0.0	--
LGP-09-01XB	9:40	0.0	20.2	0.0	0.0	0.0	0.9	0.0	2	157	0.0	20.2	0.0	0.0	0.0	0.9	0.0	--
LGP-01-02X	9:58	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.2	0.0	0.0	0.0	1.3	0.0	--
LGP-09-02X	9:52	0.0	20.1	0.0	0.0	0.0	1.4	0.0	2	204	0.0	20.0	0.0	0.0	0.0	0.3	0.0	--
LGP-01-03X	10:10	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.3	0.0	0.0	0.0	1.1	0.0	--
LGP-09-03X	10:19	0.0	20.1	0.0	0.0	0.0	1.2	0.0	2	167	0.0	20.2	0.0	0.0	0.0	1.3	0.0	--
LGP-01-04X	11:11	0.0	20.1	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.8	0.0	29.89
LGP-09-04X	11:18	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	120	0.0	20.3	0.0	0.0	0.0	0.9	0.0	--
LGP-05-05X	15:35	0.2	14.4	0.0	6.0	0.0	6.0	0.0	2	93	0.3	1.1	0.0	44.0	0.0	18.9	1.5	29.88
LGP-09-05X	15:40	0.6	9.3	0.0	65.0	0.0	13.1	1.7	2	167	0.3	0.5	0.0	100.0	0.0	24.7	9.1	--
LGP-05-06X	15:23	0.0	17.0	0.0	0.0	0.0	3.7	0.0	2	93	0.0	17.3	0.0	0.0	0.0	3.5	0.0	--
LGP-09-06X	15:30	0.2	14.1	0.0	0.0	0.0	5.6	0.0	2	120	0.0	14.1	0.0	0.0	0.0	5.8	0.0	--
LGP-05-07X	15:17	0.1	10.8	0.0	0.0	0.0	7.3	0.0	2	65	0.0	8.1	0.0	0.0	0.0	12.7	0.0	--
LGP-05-08X	15:05	0.0	16.9	0.0	0.0	0.0	7.2	0.0	2	93	0.0	4.7	0.0	0.0	0.0	14.8	0.0	--
LGP-09-08X	15:10	0.1	10.5	0.0	5.0	0.0	13.9	0.0	2	185	0.1	0.7	0.0	9.0	0.0	20.3	0.3	--
LGP-05-09X	14:55	0.0	16.0	0.0	0.0	0.0	5.1	0.0	2	93	0.0	14.0	0.0	0.0	0.0	6.6	0.0	--
LGP-09-09X	15:00	0.1	11.3	0.0	0.0	0.0	9.7	0.0	2	185	0.0	3.7	0.0	0.0	6.0	16.7	0.0	--
LGP-05-10X	14:40	0.0	14.8	0.0	0.0	0.0	5.3	0.0	2	93	0.0	6.7	0.0	0.0	0.0	10.2	0.0	--
LGP-09-10X	14:45	0.1	10.4	0.0	0.0	0.0	9.7	0.0	2	148	0.0	2.9	0.0	5.0	0.0	16.5	0.0	--
LGP-05-11X	14:25	0.1	15.5	0.0	0.0	0.0	5.5	0.0	2	83	0.0	8.5	0.0	0.0	0.0	11.6	0.0	--
LGP-09-11X	14:30	0.3	7.7	0.0	20.0	0.0	14.1	0.5	2	139	0.1	2.9	0.0	2.0	3.0	17.2	0.0	--
LGP-05-13X	14:20	0.1	14.8	0.0	0.0	0.0	4.4	0.0	2	56	0.1	9.5	0.0	0.0	0.0	8.2	0.0	--
LGP-05-14X	14:10	0.2	15.7	0.0	13.0	0.0	4.7	0.4	2	93	0.1	9.9	0.0	6.0	5.0	9.6	0.1	
LGP-09-15X	13:50	0.1	16.3	0.0	0.0	0.0	4.6	0.0	2	111	0.0	15.3	0.0	0.0	0.0	6.1	0.0	--

Table C-3
Annual Landfill Gas Monitoring Results
Shepley's Hill Landfill - Devens, Massachusetts
October 2016

Date: 10/18/16 **Weather: Cloudy, 70 Degrees F** **Field Team: Teague Baker, Chris Terra**

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-1	17:48	0.1	8.8	0.0	21	0.0	9.4	1.1	4	167	0.1	6.1	0.0	24	0.0	11.8	1.2	29.55
GV-2	17:43	0.1	8.7	0.0	99	0.0	10.3	4.9	4	167	0.0	3.9	0.0	100	0.0	14.8	7.2	29.55
GV-3	17:31	0.0	18.3	0.0	13	0.0	1.8	0.6	4	167	0.0	19.9	0.0	0	0.0	0.0	0.0	29.55
GV-4	17:37	0.2	8.7	0.0	80	0.0	11.0	4.0	4	167	0.2	5.2	0.0	100	0.0	14.0	5.3	29.55
GV-5	17:01	0.0	14.2	0.0	0	0.0	5.0	0.0	4	167	0.0	12.4	0.0	0	0.0	6.3	0.0	29.55
GV-6	17:29	0.0	6.5	0.0	100	0.0	14.1	6.0	4	167	0.1	6.9	0.0	100	0.0	14.0	5.7	29.55
GV-7	17:10	0.0	11.8	0.0	100	0.0	7.7	5.6	4	167	0.0	2.5	0.0	100	0.0	16.8	11.0	29.55
GV-8	16:53	0.0	13.6	0.0	9	0.0	5.2	0.4	4	167	0.0	8.1	0.0	2	0.0	9.6	0.1	29.55
GV-9	17:17	0.0	5.5	0.0	100	0.0	15.7	7.6	4	167	0.0	4.9	0.0	100	0.0	17.1	13.7	29.55
GV-10	16:40	0.0	6.1	0.0	100	0.0	14.4	8.4	4	167	0.0	2.2	0.0	100	0.0	16.3	7.8	29.55
GV-11	16:46	0.1	13.8	0.0	23	0.0	4.9	1.1	4	167	0.0	12.2	0.0	15	0.0	5.6	0.7	29.55
GV-12	16:16	0.0	3.1	0.0	100	0.0	14.7	9.5	4	167	0.0	1.5	0.0	100	0.0	15.7	9.7	29.55
GV-13	8:44	0.0	19.6	0.0	0	0.0	0.3	0.0	4	167	0.0	19.7	0.0	0	0.0	0.1	0.0	29.73
GV-14	10:00	0.0	19.3	0.0	7	0.0	0.7	0.3	4	167	0.0	19.7	0.0	2	0.0	0.3	0.1	29.72
GV-15	16:05	0.0	2.7	0.0	100	0.0	23.3	22.3	4	375	0.0	2.8	0.0	100	0.0	22.9	21.2	29.55
GV-16	16:22	0.0	1.7	0.0	100	0.0	25.5	19.9	4	375	0.0	1.9	0.0	100	0.0	25.5	19.9	29.55
GV-17	16:30	0.0	1.7	0.0	100	0.0	27.5	26.0	4	375	0.0	3.6	0.0	100	0.0	25.1	24.3	29.55
GV-18	15:55	0.0	4.8	0.0	100	0.0	22.9	25.2	4	375	0.0	2.6	0.0	100	0.0	26.4	29.3	29.55
Northern Toe of Landfill																		
LGP-01-01X	17:56	0.0	18.9	0.0	0	0.0	1.4	0.0	2	83	0.0	19.3	0.0	0	0.0	0.9	0.0	29.55
LGP-09-01XA	18:01	0.0	19.7	0.0	0	0.0	0.5	0.0	2	157	0.0	19.6	0.0	0	0.0	0.6	0.0	29.55
LGP-09-01XB	18:05	0.0	19.5	0.0	0	0.0	0.7	0.0	2	157	0.0	19.5	0.0	0	0.0	0.7	0.0	29.55
LGP-01-02X	18:09	0.0	19.4	0.0	0	0.0	1.0	0.0	2	83	0.0	19.3	0.0	0	0.0	1.2	0.0	29.55
LGP-09-02X	18:12	0.0	19.4	0.0	0	0.0	1.0	0.0	2	204	0.0	19.5	0.0	0	0.0	0.9	0.0	29.55
LGP-01-03X	18:15	0.0	19.6	0.0	0	0.0	0.7	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
LGP-09-03X	18:19	0.0	19.4	0.0	0	0.0	0.9	0.0	2	167	0.0	19.4	0.0	0	0.0	1.0	0.0	29.55
LGP-01-04X	18:23	0.0	19.7	0.0	0	0.0	0.5	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
LGP-09-04X	18:27	0.0	19.7	0.0	0	0.0	0.6	0.0	2	120	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
Southwest Toe of Landfill																		
LGP-05-05X	15:41	0.0	8.0	0.0	100	0.0	16.7	9.7	2	93	0.0	2.6	0.0	100	0.0	27.6	16.7	29.65
LGP-09-05X	15:36	0.0	6.1	0.0	100	0.0	20.5	13.2	2	167	0.0	1.6	0.0	100	0.0	30.1	21.9	29.65
LGP-05-06X	15:29	0.0	16.8	0.0	0	0.0	3.0	0.0	2	93	0.0	16.3	0.0	0	0.0	3.5	0.0	29.65
LGP-09-06X	15:23	0.0	14.4	0.0	0	0.0	5.0	0.0	2	120	0.0	13.7	0.0	0	0.0	5.5	0.0	29.65
LGP-05-07X	15:15	0.1	10.7	0.0	4	0.0	10.4	0.2	2	65	0.0	9.4	0.0	0	0.0	11.9	0.0	29.65
LGP-05-08X	15:10	0.0	9.7	0.0	2	0.0	10.4	0.1	2	93	0.0	1.8	0.0	8	0.0	10.1	0.4	29.65
LGP-09-08X	15:05	0.1	8.4	0.0	13	0.0	12.0	0.6	2	185	0.2	4.4	0.0	27	0.0	19.3	1.3	29.65
Southeast Toe of Landfill																		
LGP-05-09X	14:58	0.0	10.6	0.0	0	0.0	9.0	0.0	2	93	0.0	8.3	0.0	0	0.0	11.4	0.0	29.65
LGP-09-09X	14:48	0.1	5.9	0.0	5	0.0	13.5	0.2	2	185	0.0	1.8	0.0	2	0.0	18.2	0.1	29.65
LGP-05-10X	14:38	0.3	8.3	0.0	46	0.0	11.7	2.3	2	93	0.0	1.6	0.0	100	0.0	20.1	5.2	29.65
LGP-09-10X	14:32	0.0	6.1	0.0	100	0.0	15.9	6.2	2	148	0.0	1.4	0.0	100	0.0	22.0	10.1	29.65
LGP-05-11X	14:22	0.2	7.8	0.0	24	0.0	11.7	1.2	2	83	0.1	2.7	0.0	54	0.0	17.8	2.7	29.65
LGP-09-11X	14:10	0.1	3.8	0.0	61	0.0	16.3	3.0	2	139	0.1	2.7	0.0	100	0.0	18.4	5.8	29.65
LGP-05-13X	9:40	0.0	14.8	0.0	0	0.0	5.0	0.0	2	56	0.0	13.3	0.0	0	0.0	6.6	0.0	29.72
LGP-05-14X	9:05	0.0	9.4	0.0	0	0.0	10.2	0.0	2	93	0.0	8.9	0.0	0	0.0	10.8	0.0	29.73
LGP-09-15X	8:29	0.0	15.6	0.0	0	0.0	4.8	0.0	2	111	0.0	14.8	0.0	0	0.0	5.8	0.0	29.73

Notes:
VOC = Volatile Organic Compounds
O_2 = Oxygen
LEL = Lower Explosive Limit
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
CH_4 = Methane
H_2S = Hydrogen Sulfide
"Hg = inches of Mercury
lpm = Liters per minute
sec = Seconds
ppm = Parts per million
% = Percentage

Reference: Sovereign Landfill Gas Monitoring; 18 October 2016

Table C-4
Annual Landfill Gas Monitoring Results
Shepley's Hill Landfill - Devens
Massachusetts
October 2017

Date: 10/18/17 **Weather: Sunny, 60 Degrees F** **Field Team: Teague Baker, Chris Terra**

		Initial Readings									Post Purge Readings							
ID	**Time**	**VOC (ppm)**	**0_2 (%)**	**H_2S (ppm)**	**LEL (%)**	**CO (ppm)**	**$C0_2$ (%)**	**CH_4 (%)**	**Purge Rate (lpm)**	**Purge Time (sec)**	**VOC (ppm)**	**0_2 (%)**	**H_2S (ppm)**	**LEL (%)**	**CO (ppm)**	**$C0_2$ (%)**	**CH_4 (%)**	**Bar. Pres.("Hg)**
Background	8:10	0	20.9	0	0	0	0.1	0.1										30.00
Landfill																		
GV-1	15:05	0.0	19.6	0.0	0.0	0.0	1.0	0.0	4	167	0.0	11.4	0.0	12.0	0.0	6.9	0.3	29.98
GV-2	14:58	0.0	20.5	0.0	5.0	0.0	0.5	0.1	4	167	0.0	11.3	0.0	69.0	0.0	6.7	2.7	29.99
GV-3	14:39	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	29.98
GV-4	14:48	0.0	13.3	0.0	61.0	0.0	4.8	2.1	4	167	0.0	15.2	0.0	30.0	0.0	4.1	1.0	29.97
GV-5	13:47	0.0	18.0	0.0	0.0	0.0	1.3	0.0	4	167	0.0	18.1	0.0	0.0	0.0	1.9	0.0	29.98
GV-6	14:31	0.0	14.8	0.0	46.0	0.0	4.0	1.0	4	167	0.0	14.3	0.0	49.0	0.0	43.0	1.8	29.97
GV-7	13:37	0.0	18.2	0.0	10.0	0.0	0.9	0.3	4	167	0.0	18.6	0.0	5.0	0.0	0.8	0.0	29.98
GV-8	13:56	0.0	17.7	0.0	9.0	0.0	1.8	0.1	4	167	0.0	17.8	0.0	0.0	0.0	1.9	0.0	29.95
GV-9	14:23	0.0	14.9	0.0	49.0	0.0	3.3	1.5	4	167	0.0	10.1	0.0	100.0	0.0	9.1	10.3	29.98
GV-10	14:17	0.0	18.6	0.0	0.0	0.0	0.9	0.0	4	167	0.0	17.6	0.0	0.0	0.0	1.3	0.0	29.98
GV-11	14:12	0.0	19.5	0.0	3.0	0.0	0.7	0.0	4	167	0.0	18.0	0.0	5.0	0.0	1.5	0.0	29.98
GV-12	13:11	0.0	20.5	0.0	0.0	0.0	0.2	0.0	4	167	0.0	20.3	0.0	0.0	0.0	0.4	0.0	29.99
GV-13	9:40	0.0	20.9	0.0	0.0	0.0	0.4	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.4	0.0	30.02
GV-14	10:20	0.0	20.5	0.0	0.0	0.0	0.6	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.3	0.0	30.02
GV-15	13:02	0.0	16.9	0.0	35.0	0.0	2.4	1.1	4	375	0.0	16.0	0.0	42.0	0.0	3.2	1.4	29.98
GV-16	13:19	0.0	17.2	0.0	14.0	0.0	2.4	0.4	4	375	0.0	16.8	0.0	12.0	0.0	2.7	0.3	29.90
GV-17	13:27	0.0	16.1	0.0	20.0	0.0	2.4	0.4	4	375	0.0	15.8	0.0	21.0	0.0	3.2	0.6	29.94
GV-18	12:55	0.0	20.2	0.0	7.0	0.0	0.5	0.1	4	375	0.0	20.3	0.0	0.0	0.0	0.5	0.1	29.98
Northern Toe of Landfill																		
LGP-01-01X	8:55	0.0	20.3	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.4	0.0	0.0	0.0	0.9	0.0	30.00
LGP-09-01XA	9:00	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.2	0.0	0.0	0.0	1.0	0.0	30.00
LGP-09-01XB	9:05	1.0	20.1	0.0	0.0	0.0	1.0	0.0	2	157	0.0	20.1	0.0	0.0	0.0	1.0	0.0	30.00
LGP-01-02X	9:18	0.0	19.9	0.0	0.0	0.0	1.3	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.2	0.0	30.01
LGP-09-02X	9:13	0.0	19.8	0.0	0.0	0.0	1.1	0.0	2	204	0.0	19.9	0.0	0.0	0.0	1.2	0.0	30.00
LGP-01-03X	8:40	0.0	20.2	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.1	0.0	0.0	0.0	1.2	0.0	30.00
LGP-09-03X	8:46	0.0	19.8	0.0	0.0	0.0	1.5	0.0	2	167	0.0	19.8	0.0	0.0	0.0	1.6	0.0	30.00
LGP-01-04X	8:20	0.0	20.4	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.3	0.0	0.0	0.0	1.0	0.1	30.00
LGP-09-04X	8:27	0.0	20.5	0.0	0.0	0.0	0.6	0.0	2	120	0.0	20.3	0.0	0.0	0.0	1.0	0.0	30.00
Soutwest Toe of Landfill																		
LGP-05-05X	11:55	0.0	15.2	0.0	40.0	0.0	8.1	1.5	2	93	0.0	14.3	0.0	0.0	0.0	6.9	0.0	30.00
LGP-09-05X	11:48	0.0	10.6	0.0	100.0	0.0	13.8	4.6	2	167	0.0	12.8	0.0	0.0	0.0	9.4	0.0	30.00
LGP-05-06X	11:36	0.0	17.6	0.0	0.0	0.0	2.7	0.0	2	93	0.0	17.6	0.0	0.0	0.0	3.5	0.0	30.00
LGP-09-06X	11:41	0.0	14.4	0.0	0.0	0.0	6.1	0.0	2	120	0.0	14.5	0.0	0.0	0.0	6.1	0.0	30.01
LGP-05-07X	11:27	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	65	0.0	18.4	0.0	0.0	0.0	3.8	0.0	30.01
LGP-05-08X	11:18	0.0	12.4	0.0	0.0	0.0	0.4	0.0	2	93	0.0	10.7	0.0	0.0	0.0	10.3	0.0	30.01
LGP-09-08X	11:09	0.0	7.3	0.0	11.0	0.0	15.0	0.5	2	185	0.0	7.8	0.0	0.0	0.0	14.4	0.0	30.01
Southeast Toe of Landfill																		
LGP-05-09X	10:56	0.0	14.3	0.0	0.0	0.0	7.2	0.0	2	93	0.0	14.0	0.0	0.0	0.0	7.5	0.0	30.01
LGP-09-09X	11:00	0.0	10.5	0.0	5.0	0.0	0.1	0.0	2	185	0.0	10.5	0.0	0.0	0.0	11.1	0.0	30.01
LGP-05-10X	10:47	0.0	16.9	0.0	0.0	0.0	3.2	0.0	2	93	0.0	15.4	0.0	0.0	0.0	6.1	0.0	30.02
LGP-09-10X	10:42	0.0	18.6	0.0	0.0	0.0	2.2	0.0	2	148	0.0	12.0	0.0	0.0	0.0	9.8	0.0	30.02
LGP-05-11X	10:09	0.0	12.9	0.0	4.0	0.0	9.1	0.1	2	83	0.0	10.4	0.0	0.0	0.0	12.0	0.0	30.02
LGP-09-11X	10:17	0.0	8.9	0.0	18.0	0.0	15.2	1.0	2	139	0.0	6.5	0.0	0.0	0.0	15.8	0.0	30.02
LGP-05-13X	10:00	0.0	18.0	0.0	0.0	0.0	3.2	0.0	2	56	0.0	16.9	0.0	0.0	0.0	4.3	0.0	30.03
LGP-05-14X	9:52	0.0	11.8	0.0	0.0	0.0	9.7	0.0	2	93	0.0	11.5	0.0	0.0	0.0	11.1	0.0	29.95
LGP-09-15X	9:34	0.0	18.0	0.0	0.0	0.0	4.1	0.0	2	111	0.0	16.6	0.0	0.0	0.0	6.0	0.0	30.01

Notes:

VOC = Volatile Organic Compounds
O_2 = Oxygen
LEL = Lower Explosive Limit
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
CH_4 = Methane
H_2S = Hydrogen Sulfide
"Hg = inches of Mercury
lpm = Liters per minute
sec = Seconds
ppm = Parts per million
% = Percentage

Table C-5
Annual Landfill Gas Monitoring Results
Shepley's Hill Landfill - Devens Massachusetts
October 2018

Date: 10/18/18 **Weather: Sunny, 40 Degrees F** **Field Tea Chris Terra, Aidan Desrosiers**

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Bar. Pres.("Hg)
Background	9:10	0.0	21.4	0.0	0.0	0.0	0.0	0.0										30.06
Landfill Locations																		
GV-1	14:28	0.0	21.3	0.0	0.0	0.0	0.4	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.5	0.0	30.03
GV-2	14:23	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	0.0	0.0	0.0	0.1	0.0	30.03
GV-3	14:12	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.03
GV-4	14:18	0.0	21.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.0	0.0	30.03
GV-5	12:58	0.0	21.7	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.8	0.0	1.0	0.0	0.1	0.1	30.02
GV-6	14:06	0.0	21.1	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.1	0.0	30.03
GV-7	12:47	0.0	21.6	1.0	1.0	0.0	0.0	0.1	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
GV-8	12:52	0.0	21.7	1.0	0.0	0.0	0.1	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.1	0.0	30.02
GV-9	14:00	0.0	20.7	0.0	3.0	0.0	0.3	0.2	4	167	0.0	20.1	0.0	11.0	0.0	0.7	0.5	30.03
GV-10	12:41	0.0	21.6	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
GV-11	12:35	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.02
GV-12	12:28	0.0	21.2	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
GV-13	9:04	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	30.06
GV-14	12:21	0.0	21.3	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
GV-15	12:11	0.0	21.5	0.0	0.0	0.0	0.0	0.1	4	375	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.10
GV-16	12:00	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	375	0.0	21.7	0.0	0.0	0.0	0.0	0.0	30.10
GV-17	11:51	0.0	21.2	0.0	0.0	0.0	0.1	0.0	4	375	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.10
GV-18	11:40	0.0	20.9	0.0	0.0	0.0	0.2	0.0	4	375	0.0	21.2	0.0	0.0	0.0	0.1	0.0	30.10
Perimeter Landfill Locations																		
Northern Toe of Landfill LGP-01-01X	14:48	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	1.0	0.0	30.03
LGP-09-01XA	14:43	0.0	20.6	0.0	0.0	0.0	1.2	0.0	2	157	0.0	20.6	0.0	0.0	0.0	1.2	0.0	30.03
LGP-09-01XB	14:38	0.0	20.8	0.0	1.0	0.0	0.9	0.1	2	157	0.0	20.6	0.0	0.0	0.0	1.0	0.0	30.03
LGP-01-02X	15:01	0.0	18.7	0.0	0.0	0.0	3.2	0.0	2	83	0.0	18.8	1.0	0.0	0.0	3.2	0.0	30.03
LGP-09-02X	14:56	0.0	18.9	1.0	0.0	0.0	3.2	0.0	2	204	0.0	18.5	2.0	0.0	0.0	3.5	0.0	30.03
LGP-01-03X	15:07	0.0	19.9	1.0	0.0	0.0	1.8	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.6	0.0	30.03
LGP-09-03X	15:12	0.0	19.8	0.0	0.0	0.0	1.9	0.0	2	167	0.0	19.6	0.0	0.0	0.0	2.0	0.0	30.03
LGP-01-04X	15:20	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	83	0.0	20.4	0.0	0.0	0.0	1.6	0.0	30.03
LGP-09-04X	15:24	0.0	19.9	0.0	0.0	0.0	1.8	0.0	2	120	0.0	19.7	0.0	0.0	0.0	1.9	0.0	30.03
Southwest Toe of Landfill LGP-05-05X	11:27	0.0	14.9	1.0	66.0	0.0	8.7	3.3	2	93	0.0	19.5	1.0	6.0	0.0	2.6	0.3	30.10
LGP-09-05X	11:32	1.0	18.0	1.0	34.0	0.0	5.1	1.7	2	167	0.0	19.3	1.0	3.0	0.0	2.8	0.2	30.10
LGP-05-06X	11:20	0.0	14.2	2.0	0.0	0.0	5.3	0.0	2	93	0.0	14.6	2.0	0.0	0.0	5.2	0.0	30.10
LGP-09-06X	11:15	0.0	9.5	0.0	0.0	0.0	10.1	0.0	2	120	0.0	11.6	1.0	0.0	0.0	8.5	0.0	30.10
LGP-05-07X	11:08	0.0	12.5	1.0	7.0	0.0	10.5	0.4	2	65	0.0	16.3	0.0	0.0	0.0	6.7	0.0	30.10
LGP-05-08X	10:50	0.0	20.9	1.0	0.0	0.0	0.4	0.0	2	93	0.0	17.6	1.0	0.0	0.0	2.5	0.0	30.10
LGP-09-08X	10:56	0.0	8.4	2.0	4.0	0.0	15.7	0.2	2	185	0.0	7.8	2.0	0.0	0.0	16.1	0.0	30.10
Southeast Toe of Landfill LGP-05-09X	10:32	0.0	8.7	1.0	4.0	0.0	13.7	0.2	2	93	0.0	9.9	1.0	0.0	0.0	12.9	0.0	30.10
LGP-09-09X	10:26	1.0	6.7	1.0	32.0	0.0	15.1	1.6	2	185	0.0	7.1	1.0	2.0	0.0	15.2	0.1	30.10
LGP-05-10X	10:05	0.0	19.3	1.0	7.0	0.0	2.8	0.4	2	93	0.0	20.0	1.0	0.0	0.0	2.3	0.0	30.10
LGP-09-10X	10:11	0.0	20.8	1.0	0.0	0.0	1.6	0.0	2	148	1.0	12.1	1.0	0.0	0.0	11.8	0.0	30.10
LGP-05-11X	9:58	1.0	11.1	1.0	5.0	0.0	13.0	0.3	2	83	1.0	14.2	1.0	25.0	0.0	11.1	1.3	30.06
LGP-09-11X	9:51	0.0	8.1	0.0	85.0	0.0	14.1	4.3	2	139	0.0	2.9	1.0	24.0	0.0	18.7	1.2	30.06
LGP-05-13X	9:39	0.0	18.6	0.0	2.0	0.0	3.1	0.1	2	56	0.0	18.5	1.0	0.0	0.0	3.8	0.0	30.06
LGP-05-14X	9:31	0.0	1.0	1.0	31.0	0.0	11.0	1.6	2	93	0.0	0.2	0.0	39.0	0.0	11.9	1.9	30.06
LGP-09-15X	9:15	0.0	11.7	1.0	0.0	0.0	9.3	0.0	2	111	0.0	10.6	1.0	0.0	0.0	10.5	0.0	30.06

Notes:

VOC = Volatile Organic Compounds
O_2 = Oxygen
LEL = Lower Explosive Limit
CO = Carbon Monoxide

CO_2 = Carbon Dioxide
CH_4 = Methane
H_2S = Hydrogen Sulfide
"Hg = inches of Mercury

lpm = Liters per minute
sec = Seconds
ppm = Parts per million
% = Percentage

Reference: Sovereign Annual Landfill Monitoring Results, October 18, 2018.

Table C-6
Annual Landfill Gas Monitoring Results
Shepley's Hill Landfill
Devens, Massachusetts
October 2019

Date: 10/16/19 **Weather: Sunny, 50 Degrees F** **Field Team: Joe Rogers, Liam Henry**

			Initial Readings									Post Purge Readings							
Location	ID	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Bar. Pres.("Hg)
Landfill	Background	8:38	0.0	20.89	0.0	0.0	0.0	0.1	0.2										30.01
	GV-1	14:07	0.0	9.1	0.0	64.0	0.0	8.4	1.3	4	167	0.0	5.6	0.0	66.0	0.0	11.0	3.3	29.71
	GV-2	14:15	0.0	11.5	0.0	74.0	0.0	7.5	3.0	4	167	0.0	2.6	0.0	99.0	0.0	13.7	7.7	29.71
	GV-3	13:40	0.0	21.1	0.0	3.0	0.0	0.0	0.1	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.1	29.71
	GV-4	13:58	0.0	5.5	0.0	91.0	0.0	11.7	5.1	4	167	0.0	9.3	0.0	63.0	0.0	8.5	2.7	29.71
	GV-5	14:43	0.0	12.2	0.0	6.0	0.0	6.4	6.2	4	167	0.0	12.6	0.0	0.0	0.0	6.2	0.2	29.71
	GV-6	13:38	1.0	1.6	0.0	97.0	0.0	14.4	6.5	4	167	0.0	1.6	0.0	51.0	0.0	14.7	5.4	29.71
	GV-7	14:27	0.0	0.3	0.0	99.0	0.0	15.2	13.3	4	167	0.0	0.1	0.0	99.0	0.0	15.1	12.1	29.71
	GV-8	14:26	0.0	8.2	0.0	49.0	0.0	9.0	2.5	4	167	0.0	5.8	0.0	5.0	0.0	11.1	0.3	29.71
	GV-9	13:27	0.0	0.0	0.0	40.0	0.0	16.0	8.8	4	167	0.0	0.1	0.0	99.0	0.0	17.0	13.1	29.71
	GV-10	13:17	0.0	1.1	0.0	51.0	0.0	14.1	3.0	4	167	0.0	2.0	0.0	45.0	0.0	13.6	2.4	29.71
	GV-11	13:09	0.0	10.9	0.0	99.0	0.0	6.8	2.5	4	167	0.0	5.9	0.0	99.0	0.0	10.5	9.0	29.71
	GV-12	13:00	0.0	3.3	0.0	95.0	0.0	10.7	7.0	4	167	0.0	0.0	0.0	99.0	0.0	12.4	8.8	29.71
	GV-13	11:44	0.0	12.4	0.0	47.0	0.0	5.0	3.4	4	167	0.0	16.2	0.0	30.0	0.0	2.5	2.1	29.85
	GV-14	11:55	0.0	20.6	0.0	99.0	0.0	0.2	0.2	4	167	0.0	3.7	0.0	99.0	0.0	15.1	29.3	29.85
	GV-15	12:10	0.0	1.8	0.0	99.0	0.0	21.9	23.5	4	375	0.0	0.0	0.0	99.0	0.0	21.0	26.5	29.85
	GV-16	12:48	0.0	0.0	0.0	99.0	22.1	0.0	20.2	4	375	0.0	0.0	0.0	99.0	0.0	22.4	19.2	29.71
	GV-17	12:36	0.0	2.6	0.0	99.0	0.0	23.4	25.6	4	375	0.0	0.0	0.0	99.0	0.0	23.4	26.1	29.71
	GV-18	12:21	0.0	0.7	0.0	99.0	0.0	21.3	23.4	4	375	0.0	1.0	0.0	99.0	0.0	21.2	23.4	29.71
North Toe of Landfill	LGP-01-01X	15:37	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	83	0.0	21.1	0.0	0.0	0.0	0.5	0.1	29.64
	LGP-09-01XA	15:48	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	157	0.0	21.2	0.0	0.0	0.0	0.6	0.1	29.64
	LGP-09-01XB	15:43	0.0	20.8	0.0	0.0	0.0	0.7	0.1	2	157	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	LGP-01-02X	15:28	0.0	20.8	0.0	0.0	0.0	0.9	0.1	2	83	0.0	20.8	0.0	0.0	0.0	0.9	0.1	29.64
	LGP-09-02X	15:26	0.0	20.7	0.0	0.0	0.0	1.1	0.1	2	204	0.0	20.9	0.0	0.0	0.0	1.2	0.2	29.64
	LGP-01-03X	15:22	0.0	20.8	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	LGP-09-03X	15:16	0.0	20.8	0.0	0.0	0.0	1.0	0.1	2	167	0.0	20.7	0.0	0.0	0.0	1.0	0.1	29.64
	LGP-01-04X	15:05	0.0	20.9	0.0	0.0	0.0	0.5	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.2	29.65
	LGP-09-04X	15:11	0.0	21.0	0.0	0.0	0.0	0.2	0.1	2	120	0.0	21.0	0.0	0.0	0.0	0.6	0.1	29.65
Southwest Toe of Landfill	LGP-05-05X	8:33	0.0	11.7	0.0	12.0	0.0	11.7	0.8	2	93	0.0	9.9	0.0	0.0	0.0	0.1	0.2	29.95
	LGP-09-05X	8:43	0.55	22.0	0.0	53.0	0.0	0.2	0.2	2	167	0.0	3.0	0.0	31.0	0.0	0.2	0.2	29.95
	LGP-05-06X	9:00	0.0	18.3	0.0	0.0	0.0	2.3	0.2	2	93	0.0	18.8	0.0	0.0	0.0	2.5	0.2	29.93
	LGP-09-06X	8:52	0.0	16.2	0.0	0.0	0.0	0.2	0.2	2	120	0.0	16.1	0.0	0.0	0.0	5.0	0.2	29.93
	LGP-05-07X	9:09	0.0	18.2	0.0	0.0	0.0	3.7	0.2	2	65	0.0	15.4	0.0	0.0	0.0	6.0	0.2	NR
	LGP-05-08X	9:25	0.0	15.7	0.0	0.0	0.0	6.6	0.2	2	93	0.0	7.0	0.0	0.0	0.0	14.5	0.2	29.93
	LGP-09-08X	9:18	0.0	5.9	0.0	0.0	0.0	16.5	0.2	2	185	0.0	2.8	0.0	5.0	0.0	19.3	0.3	NR
Southeast Toe of Landfill	LGP-05-09X	9:53	0.0	14.4	0.0	0.0	0.0	15.2	0.2	2	93	0.0	20.9	0.0	0.0	0.0	7.4	0.2	29.86
	LGP-09-09X	9:37	0.0	10.1	0.0	0.0	0.0	10.9	0.2	2	185	0.0	5.4	0.0	0.0	0.0	15.3	0.2	29.93
	LGP-05-10X	10:06	0.0	15.4	0.0	0.0	0.0	5.2	0.2	2	93	0.0	8.3	0.0	0.0	0.0	11.9	0.2	29.86
	LGP-09-10X	10:15	0.0	2.5	0.0	5.0	0.0	14.1	0.3	2	148	0.0	2.7	0.0	7.0	0.0	17.7	0.5	29.86
	LGP-05-11X	10:36	0.0	14.8	0.0	0.0	0.0	5.6	0.2	2	83	0.0	8.5	0.0	0.0	0.0	10.9	0.2	29.86
	LGP-09-11X	10:30	0.0	6.8	0.0	0.0	0.0	11.9	0.2	2	139	0.0	4.6	0.0	0.0	0.0	15.0	0.2	29.86
	LGP-05-13X	11:16	0.0	17.0	0.0	0.0	0.0	3.8	0.2	2	56	0.0	12.5	0.0	0.0	0.0	6.6	0.2	29.85
	LGP-05-14X	11:22	0.0	12.4	0.0	0.0	0.0	7.7	0.2	2	93	0.0	12.5	0.0	0.0	0.0	7.5	0.2	29.85
	LGP-09-15X	11:33	0.0	17.0	0.0	0.0	0.0	4.2	0.2	2	111	0.0	16.0	0.0	0.0	0.0	5.7	0.2	29.85

Notes:

VOC = Volatile Organic Compounds
O_2 = Oxygen
LEL = Lower Explosive Limit
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
CH_4 = Methane
H_2S = Hydrogen Sulfide
"Hg = inches of Mercury
lpm = Liters per minute
sec = Seconds
ppm = Parts per million
% = Percentage

Reference: Sovereign Annual Landfill Montoring Results, 10/16/19

C.4 Shepley's Hill

Site Inspection

Shepley's Hill Landfill

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Shepley's Hill Landfill	**Date of inspection:** 02/10/80
Location and Region: Aver/Groton, MA	**EPA ID:** MA 7210025154
Agency, office, or company leading the five-year review: Roman Environmental Solutions	**Weather/temperature:** 35°F Rain Wind, Cloudy

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☐ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☑ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____

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

4. **Other interviews** (optional) ☐ Report attached.

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 [illegible] Office

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

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 TO POTW ☐ 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 [illegible]

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

7. **Groundwater Monitoring Records** ☐ Readily available ☒ Up to date ☐ N/A
   - Remarks Semi-annual LPM sampling & gauging (ground water)

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 [illegible]

10. **Daily Access/Security Logs** ☐ Readily available ☒ Up to date ☐ N/A
    - Remarks Primary and Secondary access gates are [illegible] Implemented.

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house
   - ☐ PRP in-house
   - ☐ Federal Facility in-house
   - ☐ Contractor for State
   - ☐ Contractor for PRP
   - ☑ Contractor for Federal Facility
   - ☐ Other _____

2. **O&M Cost Records**
   - ☐ Readily available
   - ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ☐ Breakdown attached

   Total annual cost by year for review period if 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 Fence does not [illegible] the whole landfill but is limited by the surrounding hills and woods

B. Other Access Restrictions

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

C. Institutional Controls (ICs)

1. **Implementation and enforcement** NA

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
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

_____

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

D. General

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

2. **Land use changes on site** ☒ N/A
Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

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 [illegible]

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 _____

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 _____

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 RIP reference well was not located during site walk

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 _____

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 _____

2. **Performance Monitoring** Type of monitoring Hydraulic
   ☐ 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

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☒ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☒ 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

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

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

D. Monitored Natural Attenuation

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.

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.).

N/A for site visit. See 2019 Annual Report for comment.

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

N/A for site visit. See 2019 Annual Report for comment.

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 [illegible] for comment, [illegible] apply

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. [illegible]

View of Shepley's Hill Landfill (SHL) Main Access Gate

View of Arsenic Treatment Plant (ATP) Gated enclosure

Front West side of the ATP

Rear East and south sides of the ATP

View of the northern portion of the landfill

View of a typical passive gas vent observed throughout the site

View of the eastern access gravel/dirt road on the landfill

View of a caped stickup well, RSK-32

View of a locked stickup monitoring well, PZ-12-01

View of dirt pile located in the southeast portion of the landfill

View of the southeast portion of the landfill area

Additional View of the southeast portion of the landfill

View of the southern portion of the landfill area

View of the central portion of the landfill area

View of the central southern portion of the landfill area

View of the central southeastern portion of the landfill area

Additional view of the southwestern portion of the landfill area

View of Shepley's Hill on the western edge of the landfill

View of central western portion of landfill area and Shepley's Hill

Additional view of Shepley's Hill on the western edge of the landfill

View of extraction well EW-1

View of paired EPA Monitoring wells in the Nearfield Area, northwest of ATP

View of extraction well EW-4

View of Cook Street, access road to SHL Main Entrance

View of a typical residential area observed in the North Impact Area

View of typical asphalt area observed in the North Impact Area.

Additional view of residential areas observed in the North Impact

C.5 Shepley's Hill

ARARs

TABLE 8
SUMMARY OF COVER SYSTEM PERFORMANCE STANDARDS

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

MASSACHUSETTS SOLID WASTE REGULATIONS 310 CMR 19.000	RCRA SUBTITLE C 40 CFR 264	RCRA SUBTITLE D 40 CFR 258	MASSACHUSETTS HAZARDOUS WASTE REGULATIONS 310 CMR 30.000	HOW COMPLIANCE IS ACHIEVED BY EXISTING COVER
Minimize percolation of water into landfill.	Minimize migration of liquids through landfill.	Minimize infiltration through landfill.	Minimize migration of liquids through landfill.	Geomembrane installations such as the existing one at Shepley's Hill Landfill have a permeability of 10 E -7 centimeters per second or less that minimizes infiltration and migration of liquid into landfilled waste. Sloped surface promotes runoff and minimizes infiltration. Vegetation promotes evapotranspiration.
	Have a permeability less than or equal to bottom liner or subsoils.	Have a permeability less than or equal to bottom liner or subsoils or less than 10 E-5 centimeters per second, whichever is less.	Have a permeability less than or equal to bottom liner.	Existing geomembrane permeability is less than that of sands underlying landfill. There is no bottom liner.
Promote drainage of precipitation.	Promote drainage and minimize erosion.		Promote drainage and minimize erosion of cover.	The existing cover is sloped to promote drainage and vegetated to prevent erosion.
Minimize erosion of final cover.		Minimize erosion of final cover.		The existing cover is sloped and vegetated to minimize erosion.
	Function with minimum maintenance		Function with minimum maintenance.	The existing cover was constructed in a manner to minimize maintenance. Monitoring and maintenance of cover systems to maintain integrity is normal practice.
Facilitate gas venting.				The existing collection piping and riser system facilitate gas venting. Analysis of gas samples from vents confirms that they function.

(continued)

TABLE 8
SUMMARY OF COVER SYSTEM PERFORMANCE STANDARDS

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

MASSACHUSETTS SOLID WASTE REGULATIONS 310 CMR 19.000	RCRA SUBTITLE C 40 CFR 264	RCRA SUBTITLE D 40 CFR 258	MASSACHUSETTS HAZARDOUS WASTE REGULATIONS 310 CMR 30.000	HOW COMPLIANCE IS ACHIEVED BY EXISTING COVER
Minimize percolation of water into landfill.	Minimize migration of liquids through landfill.	Minimize infiltration through landfill.	Minimize migration of liquids through landfill.	Geomembrane installations such as the existing one at Shepley's Hill Landfill have a permeability of 10 E -7 centimeters per second or less that minimizes infiltration and migration of liquid into landfilled waste. Sloped surface promotes runoff and minimizes infiltration. Vegetation promotes evapotranspiration.
Accommodate settling and subsidence to continue to meet performance standards.	Accommodate settling and subsidence to maintain cover integrity.		Accommodate settling and subsidence to maintain cover integrity.	Landfill materials were compacted and graded during construction of the existing cap to accommodate settling. Maintenance actions are possible to maintain cover integrity if or when settling occurs.
Ensure isolate of wastes from environment.				The existing cover isolates wastes from potential terrestrial receptors by covering them with soil and lowers groundwater to elevations interpreted to be below waste.

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Floodplains	Floodplain Management Executive Order No. 11988, [40 CFR Part 6, App. A]	Applicable	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	To the extent that any activity associated with this alternative takes place in the floodplain, the activity will be altered to comply with the law.
	Wetlands	Protection of Wetlands Executive Order No. 11990	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	To the extent that any activity associated with this alternative takes place in wetlands, the activity will be altered to comply with the law.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Surface Waters Endangered Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Applicable	Actions which affect species/habitat require consultation with U.S. Department of the Interior, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the NCP.	No off-site remedial actions performed for this alternative. On-site actions would be minimal and would include agency consultation prior to implementation.
	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Applicable	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	To minimize impact, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Floodplains Wetlands	Massachusetts Wetland Protection Act and Regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Applicable	Wetlands and land subject to flooding are protected under this Act and these regulations. Activities that will remove, dredge, fill, or alter protected areas (defined as areas within the 100-year floodplain) are subject to regulation and must file a Notice of Intent with the municipal conservation commission and obtain a Final Order of Conditions before proceeding with the activity. A Determination of Applicability or Notice of Intent must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	If remedial activities alter more than 5,000 square feet of protected area, the affected area will be restored within two growing seasons.
	Endangered Species	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq., 321 CMR 8.00]	Applicable	Actions must be conducted in a manner which minimizes the impact to Massachusetts listed endangered species and species listed by the Massachusetts Natural Heritage Program.	To minimize impacts, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Area of Critical Environmental Concern	Areas of Critical Environmental Concern [301 CMR 12.00]	Relevant and Appropriate	An Area of Critical Environmental Concern is of regional, state, or national importance or contains significant ecological systems with critical inter-relationships among a number-of-components. An eligible area must contain features from four or more of the following groups: (1) fishery habitats; (2) coastal feature; (3) estuarine wetland; (4) inland wetland; (5) inland surface water; (6) water supply area (i.e., aquifer recharge area); (7) natural hazard area (i.e., floodplain); (8) agricultural area; (9) historical/archeological resources; (10) habitat resource (i.e., for endangered wildlife; or (11) special use areas.	Activities must be controlled to minimize impacts to nesting areas of the Grasshopper Sparrow.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50-191.51]	Relevant and Appropriate	The National Primary Drinking Water Regulation establishes MCLs and non-zero Maximum Contaminant Level Goals for several common organic and inorganic contaminants. These MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated.
State Regulatory Authority	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Applicable	Massachusetts Surface Water Quality Standards designate the most sensitive uses for which surface waters of the Commonwealth are to be enhanced, maintained and protected and designate minimum water quality criteria for sustaining the designated uses. Surface waters at Fort Devens are classified as Class B. Surface waters assigned to this class are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation.	Discharges associated with remedial actions will be controlled/monitored to ensure that surface waters meet standards.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I. Groundwaters assigned to this class are fresh groundwaters designated as a source of potable water supply.	MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated.
	Groundwater	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.00]	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	MMCLs will be used to evaluate the performance of this alternative. If MMCLs are exceeded, the remedy will be re-evaluated.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Air	Massachusetts Ambient Air Quality Standards [310 CMR 6.00]	Relevant and Appropriate	Regulations specify primary and secondary ambient air quality standards to protect public health and welfare for certain pollutants	Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated.
	Air	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Relevant and Appropriate	Regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in excess of emission limitations in those regulations.	Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Solid waste landfill construction, operation, closure, and post-closure	Resource Conservation and Recovery Act (RCRA) [Subtitle D, 40 CFR 258]	Relevant and Appropriate	RCRA Subtitle D regulates the generation, transport, storage, treatment, and disposal of solid wastes. Regulations at 40 CFR 258 govern preparedness and prevention, closure, and post-closure at municipal solid waste landfills.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal solid waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.
	Hazardous waste landfill construction, operation, closure, and post-closure	Resource Conservation and Recovery Act (RCRA) [Subtitle C, 40 CFR 260,264]	Relevant and Appropriate	RCRA Subtitle C regulates the generation, transport, storage, treatment, and disposal of hazardous wastes. Regulations at 40 CFR 264 govern preparedness and prevention, closure, and post-closure at landfills.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.
State Regulatory Authority	Solid waste landfill construction, operation, closure, and post-closure.	Massachusetts Solid Waste Management Regulations [310 CMR 19.000]	Applicable	These regulations outline the requirements for construction, operation, closure, and post-closure at solid waste management facilities in the Commonwealth of Massachusetts.	This alternative includes components to meet closure and post-closure requirements at Shepley's Hill Landfill.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Hazardous waste landfill construction, operation, closure, and post-closure	Massachusetts Hazardous Waste Regulations [310 CMR 30.00]	Relevant and Appropriate	Regulates handling, storage, treatment, disposal, and record keeping at hazardous waste facilities.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of Massachusetts hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.

APPENDIX D –Devens Consolidated Landfill

D.1 Devens Consolidated Landfill

Additional Background Information

Chronology of Events Devens Consolidation Landfill and Contributor Sites

Event	Date
Fort Devens Final NPL listing	November 1989
Fort Devens/EPA signed a Federal Facilities Agreement (FFA) establishing a timetable for implementing clean-up activities	November 1991
Enhanced Preliminary Assessment	1992
Landfill Consolidation FS Report	September 1995
Contributor Sites (SA 6, SA 12, SA 13, AOC 9, AOC 11, AOC 40, and AOC 41) Site Inspections/Remedial Investigations	1994-1996
Landfill Remediation FS Report	January 1997
PP issued describing the Army's preferred remedy	December 1997
Off-site disposal evaluated	Spring/Summer 1998
Expanded on-site landfill site search	Spring/Summer 1998
Landfill Remediation FS Addendum Report	November 1998
Second PP issued describing the Army's Alternative 4C as the preferred option	December 1998
ROD signed	July 1999
First Five-Year Statutory Review	September 2000
Commenced Landfill Construction	September 25, 2000
Mobilized at AOCs 11 and 40, and SAs 12 and 13	October 2000
Mobilized at AOC 9	January 2001
Easement Agreement Tract No. 400E (DCL) (between MassDevelopment & Army)	June 2001
Work completed at AOCs 11 and SA 13	May 2002
Mobilized at AOC 41	July 2002
Work completed at AOC 41	September 2002
Landfill cap construction completed; work completed at AOC 40	November 2002
Work completed at AOC 9	December 2002
Work completed at SA 12	January 2003
Landfill site restoration	Spring 2003
O&M activities at landfill and remedial sites begins	July/August 2003
Remedial action complete. Closure Report	October 2003
Second Five-Year Statutory Review	September 2005
AOC 9, AOC 40, and SA 13 transferred to MassDevelopment via Quitclaim Deed	March 2006
DCL Incorporated into revised Devens LTMP	November 2008
Annual LTM (DCL)	2005-2009
Third Five-Year Review	September 2010
Annual LTM (DCL)	2010 - 2014
Fourth Five-Year Review	September 2015
Annual LTM (DCL)	2014 - 2019
2015 Five Year Review Addendum	June 2019
Fifth Five-Year Review	September 2020

Physical Characteristics

The Devens Consolidation Landfill (DCL) was constructed on the former Fort Devens golf course driving range in order to accommodate excavated material from seven remedial areas consisting of two Study Areas (SAs), four Areas of Contamination (AOCs), and one pesticide removal project at three Fort Devens housing areas.

Descriptions of the seven contributor sites are as listed below:

- SA 12: A half-acre location where construction debris and yard waste were deposited (approximately 8,700 cy);
- SA 13: A one-acre area used from 1965 to the mid-1990s for yard-waste (approximately 10,000 cy);
- AOC 9: An area used for storing wood, concrete, asphalt, metal, brick, glass, and tree stumps (approximately 121,000 cy);
- AOC 11: A former landfill used from 1975 to 1980 for disposal of wood-frame hospital demolition debris (approximately 35,000 cy);
- AOC 40: Four acres used for construction debris, ash, stumps, and logs (approximately 125,400 cy);
- AOC 41: A one quarter-acre landfill in the SPIA that was used up to the 1950s for disposal of non-explosive material and household debris (approximately 1,500 cy); and
- Housing areas Grant, Locust, and Cavite: Soils and walling materials contaminated with VOCs or pesticides (approximately 2,290 tons of soil and 1,240 tons of concrete).

The USEPA approved the ROD for landfill remediation of the first six areas in July 1999. It included provisions for either on-site or off-site disposal options. The on-site landfill construction alternative was selected as the best option. Construction of the DCL commenced in September 2000 and was completed in November 2002. The Remedial Action Closure Report prepared by Shaw Environmental (formerly Stone & Webster, Inc.) in September 2003 was accepted, certifying that the DCL was constructed and capped in accordance with the ROD, and met the performance standards and/or response objectives in the ROD. LTM activities have been performed since the completion of the landfill construction.

MassDevelopment maintains ownership of the DCL property and agreed to grant the Army a permanent easement to build and operate the landfill (Easement Agreement Track No. 400E, June 2001). The easement additionally details the Land Use Controls (LUC) between the Army and MassDevelopment for the DCL. The 1999 ROD had indicated Institutional Controls (ICs) "were planned for the proposed Consolidation Landfill." DCL LUCs have been evaluated through annual IC inspections, which are conducted per the "IC Monitoring Plan" included in the LTMP (HGL, 2008).

Hydrology

Groundwater flow patterns at the DCL show a northeasterly flow pattern. Groundwater elevations collected during LTM events remain consistent from year to year. Groundwater flow patterns beneath the landfill also remain consistent from year to year. Groundwater flow lines indicate the

groundwater level continues to be lower than the landfill liner.

Land and Resource Use

The landfill was constructed at the former golf course driving range at the intersection of Patton Road and Queenstown Street. The approved landfill easement occupies 16.88 acres with approximately 8.0 acres used for debris disposal. Restrictions are in place to prevent access and groundwater use.

History of Contamination

The following sections provide a summary of the primary DCL contributor sites that were transferred from Army control to the MassDevelopment for redevelopment and retain deed-recorded restrictions not allowing the property to be used for residential purposes. These sites include AOC 9, 40, and SA 13. AOC 41 is inclusive of the SPIA site and is discussed in the SPIA portion of the five-year review. As per the ROD, the remediation of contributor sites AOC 41 and SA 12 were considered non-CERCLA actions and are not subject to five-year site review requirements. In 2005, the Army provided clarification to the EPA indicating that AOC 11 was remediated to allow for unrestricted use. Based on the clarifications to the EPA, ICs and five-year site reviews were no longer needed for AOC 11.

AOC 9

A geophysical survey was performed during the 1996 SI to supplement information derived from evaluation of aerial photographs and to delineate the actual limits of the landfill. The results of the survey assisted in the placement of test pits and groundwater monitoring wells, and provided insight into the distribution of landfill debris. Results of the geophysical survey indicated that the landfill encompassed 5 acres with a larger northern pod containing the majority of landfill material and four smaller southern pods adjacent to the wetlands containing mostly near-surface debris.

The results of the 1996 SI [ABB Environmental Services, Inc. (ABB), 1996] at AOC 9 are summarized below.

<u>Surface Water Contamination</u>

During the 1996 SI (ABB, 1996) at AOC 9, surface water samples were collected from the Nashua River and the wetland area south of the debris landfill. Concentrations of some inorganics, including aluminum, iron, and lead were measured above ecological benchmark concentrations. The SI report suggested that detected inorganic concentrations in the river were generally representative of Nashua River water quality in the area. The SI report concluded that contaminant effects on surface water from AOC 9 debris were not likely significant.

<u>Sediment Contamination</u>

Relatively low concentrations of total petroleum hydrocarbons (TPH) and some inorganics were present in sediment samples collected from the wetland area south of the debris landfill. Relatively low concentrations of VOCs and semivolatile organic compounds (SVOC) were measured in sediment samples collected from the Nashua River. Concentrations of inorganics in Nashua River sediment samples were relatively consistent upstream and downstream of AOC 9 and likely represent typical Nashua River sediment quality in the area. The SI report concluded that contaminant effects on sediment from AOC 9 debris were likely typical of other contaminated reaches along the Nashua River.

Surface Soil Contamination

Organic compounds were not detected in surface soil samples collected at AOC 9. The inorganics copper, lead, and nickel were detected at a concentration above Devens background, but below USEPA Region III residential standards.

Subsurface Soil Contamination

During the 1996 SI soil samples were collected from four test pits excavated within the landfill limits. A total of eight soil samples were collected. Analytical results indicate the presence of polycyclic aromatic hydrocarbons (PAH) in soil, most likely attributed to the presence of ash and burnt wood debris. Total petroleum hydrocarbon levels were detected in all but one test pit located just outside the southern limit of mapped landfill materials. The 1996 SI determined a rough correlation existed between SVOC and TPH concentrations. The elevated concentrations of organic compounds detected in soil samples collected from the landfill test pits are likely derived from the ash and charred wood observed during sampling. The absence of volatile petroleum compounds in soil supports this contention.

Inorganic analytes including barium, calcium, chromium, copper, lead, nickel, potassium, silver, sodium and zinc, were detected above the calculated background concentrations for Fort Devens soils. The 1996 SI determined a rough correlation is evident between elevated concentrations of organic and inorganic analytes in test pits soils.

Groundwater Contamination

Two rounds of groundwater samples were collected from monitoring wells at the site during the SI. Chloroform was detected in AOC 9 groundwater. Chloroform was detected in one of ten samples collected during Round 1. The chloroform concentration was below Massachusetts drinking water standard. Several organics were detected in upgradient, downgradient, and cross-gradient wells. Eight of the 18 inorganics detected in unfiltered Round 1 samples exceeded their respective drinking water standard or guideline.

Inorganics were detected above background concentrations in nearly all groundwater samples collected from AOC 9 groundwater monitoring wells. The eight inorganics were aluminum, arsenic, chromium, cobalt, iron, lead, manganese, and nickel. Filtered samples collected during Round 2 showed reductions in concentrations of these inorganics, suggesting that the elevated concentrations detected in Round 1 were the result of suspended solids present in the samples. During Round 2, reported concentrations of chromium, lead, and nickel were below their respective drinking water standards or guidelines.

AOC 40

AOC 40 covers approximately 4 acres and was estimated to contain 110,000 cy of debris. Portions of the landfill area were situated in a wetland and were subsequently submerged under Cold Spring Brook Pond. The area was densely populated with trees and other vegetative cover. The northern edge of the landfill area dropped off abruptly to the wetland or to the pond with a difference in elevation ranging between 10 and 20 ft. The area is also within a recharge zone for the Patton water supply well.

The results of the supplemental remedial investigation (RI) (ABB, 1993) at AOC 40 are summarized below.

Surface Water Contamination

Inorganic analytes were detected in surface water samples collected from Cold Spring Brook Pond. Surface water contamination did not pose a risk to ecological receptors at the debris disposal area, based on comparison to ecological benchmarks developed to be protective of aquatic organisms.

Sediment Contamination

Sediments in Cold Spring Brook Pond contained PAHs, pesticides, and inorganics. Arsenic and dichlorodiphenyldichloroethane (DDD) were detected in concentrations determined to pose a risk to ecological receptors.

Surface Soil Contamination

Samples collected from the landfill soil cover contained PAHs, pesticides, and inorganics. The relatively low concentrations of surface soil contaminants posed neither human health nor ecological risks.

Groundwater Contamination

Groundwater quality at AOC 40 was investigated by two rounds of sampling as part of the RI, and by two rounds of sampling as part of the supplemental RI. Contaminants detected in groundwater were primarily inorganics. The supplemental RI (ABB, 1993) concluded that AOC 40 was not the source of contamination.

Study Area 13

SA 13 was used between 1965 and 1990 for disposal of construction debris, stumps, and brush. Debris volume was estimated to be approximately 10,000 cy. The landfill was less than one acre in size and is located on the west side of Lake George Street near Hattonsville Road on the former Main Post. SA 13 is surrounded by large trees, but no trees were growing on the landfill itself. Tree stumps, limbs, and trunks were deposited on the surface of the landfill and down the steep lower slope. A wetland was located at the base of this slope.

The results of the Supplemental SI (ABB, 1994 and 1995) at SA 13 are summarized below.

Surface Water Contamination

Organic and inorganic chemicals were detected in surface water samples collected from the wet area at the toe of the debris area. Nitroglycerine was detected in one of four surface water samples, at a concentration above its drinking water standard. Inorganic chemicals in surface water, particularly mercury, presented potential risks to sensitive aquatic ecological receptors.

Sediment Contamination

Sediment at SA 13 contained PAHs, TPH, pesticides, and inorganics. Pesticides in sediment presented a potential risk to sensitive aquatic ecological receptors.

Surface Soil Contamination

Soil samples collected from stained areas directly over the debris area contained PAHs, TPH, pesticides, and inorganics. Surface soil samples collected from the debris area contained higher concentrations of contaminants than those collected down slope of the landfill.

Groundwater Contamination

Contaminants detected in groundwater at SA 13 were primarily inorganics. Elevated detections were attributed to turbidity in unfiltered samples, not to the landfill.

Initial Response

A history of post-site investigation activities related to Devens landfill remediation is presented in this subsection.

The Landfill Consolidation Feasibility Study (FS) Report (*ABB-ES, 1995a*) contains an evaluation of options to consolidate debris from other landfills into a single waste disposal site. After reviewing the FS Report, the United States Army Forces Command (FORSCOM) requested evaluation of non-consolidation, containment options such as capping landfills in-place. In response to FORSCOM comments, the Debris Disposal Area Technical Memorandum (*ABB-ES, 1996b*), was issued in February 1996. The memorandum evaluated a cap-in-place and a consolidation option for each of the seven landfills.

To respond further to the FORSCOM comments, the Landfill Remediation FS Report was prepared (*ABB-ES, 1997*). This FS report evaluated nine debris management alternatives, including various combinations of No Further Action (NFA), capping in place, and debris removal and consolidation.

In the December 1997 Proposed Plan (PP), the Army proposed an alternative that consisted of debris removal at three of the debris disposal areas (AOCs 9 and 40, and SA 13), with consolidation at a new landfill to be constructed near the Shepley's Hill Landfill. Public comment on the Plan indicated a community preference for debris disposal either in an off-site landfill, or in a new on-site landfill. Also, because of AOC11's proximity to the Nashua River floodplain, the community indicated a preference that this AOC be fully excavated and the debris consolidated at the new landfill.

In response to public comment, the Army issued a second PP in November 1998. The proposed alternative included full debris removal at AOCs 9, 11, and 40, and SA 13, with disposal at either an off-site landfill, or at a new on-site landfill to be constructed at the former golf course driving range. The proposed alternative was evaluated in detail in the Landfill Remediation FS Addendum Report (*HLA, 1998*).

A ROD was issued in July 1999 (*HLA, 1999*). The ROD presented the selected remedial actions for seven debris disposal areas. In accordance with the ROD, the option of either onsite consolidation or off-site disposal of the debris would be based on a "best value" evaluation of proposal to be solicited upon completion of the design for both options. Methods and practices for construction and operations and closure of the DCL were documented in the Final Design Technical Specifications and Drawings for Consolidation Landfill (*USACE, 1999*). An evaluation of the on-site versus off-site disposal option was conducted and the findings were presented in the Remedy Selection Report (*S&W, 2000*). The remedy selection process indicated that disposal of the remedial debris in an on-site landfill to be built at the former golf course driving range on Patton Road was the "best value" alternative. The approved remedial alternative (Alternative 4c) documented in the ROD called for NFA at SA 6, limited removal at SA 12, and AOC 41, and full excavation of AOCs 9, 11, and 40, and SA 13, with on-site consolidation or off-site disposal.

D.2 Devens Consolidated Landfill

Figures

Figure D-1
Devens Consolidation Landfill (DCL)
Contributor Site Locations

References: LTMMP Update (Sovereign, 2015)
Aerial: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend
- Approximate AOC
- Approximate Housing
- Highway
- Major Road
- County Line
- Former Fort Devens Boundary

2020 Five Year Review
Devens Consolidation Landfill

Former Fort Devens Army Installation,
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 1,750 3,500
Feet

Date: 03/18/2020

Figure D-1

File: AR2019_MP_F6-1_DCL_Contributor.mxd

Figure D-2
Site Layout
Devens Consolidation Landfill

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Gas Vent
- Monitoring Well - Destroyed
- Landfill Gas Monitoring Well
- LFM-03-07 Well/Vent Identification
- Topographic Contour (ft

Notes:

LFM-03-07 was paved over by asphalt during parking lot construction for the neighboring Building. In July 2017 LFM-03-07 was uncovered.

LFM-99-06A was replaced by LFM-99-06A-RP in September 2015.

Gas vent locations were approximated based upon the locations displayed in Figure 2 of USACE New England District's Devens Consolidation Landfill 2004 Annual Report.

ft AMSL = feet above mean sea level
LTM = long term monitoring

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2020 Five year Review
Devens Consolidation Landfill

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 75 150
Feet

Date: 02/03/2020

Figure D-2

File: AR2019_MP_F6-1_DCL_SITE.mxd

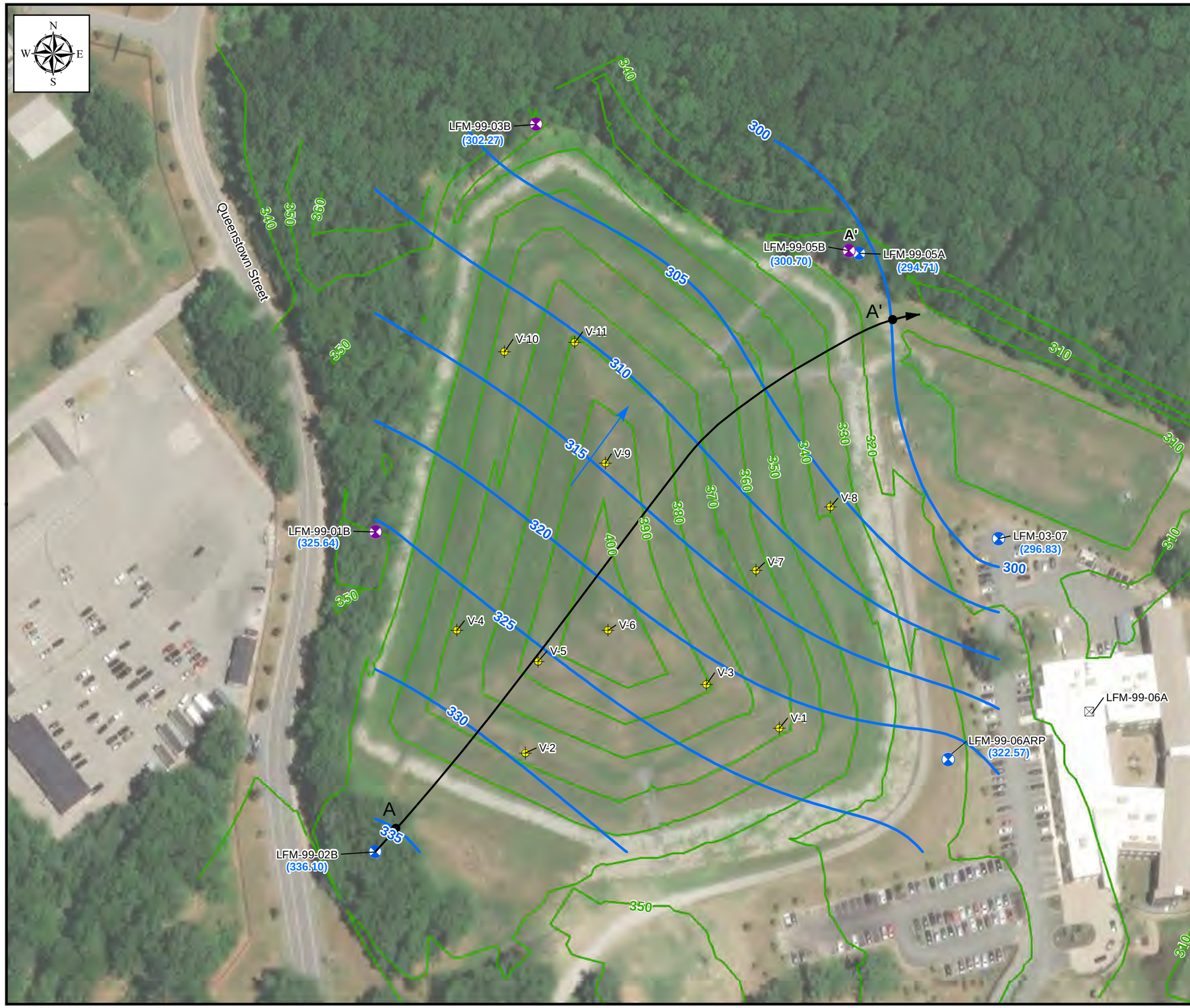


Figure D-3
Interpretive Water Table Elevation
Devens Consolidation Landfill
April 2019

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Gas Vent
- Monitoring Well - Destroyed
- Groundwater Elevation Contour (ft NGVD88) (Contour Interval = 5 ft)
- Groundwater Flow Direction
- (294.71) Groundwater Elevation (ft NGVD88)
- LFM-03-07 Well/Vent Identification
- A——A' Groundwater Gradient Calculation Location
- Topographic Contour (ft AMSL)

Notes:

LFM-03-07 was paved over with asphalt during parking lot construction for the neighboring building. In July 2017, LFM-03-07 was uncovered.

LFM-99-06A was replaced by LFM-99-06ARP in September 2015.

Gas vent locations were approximated based upon the locations displayed in Figure 2 of USACE New England District's Devens Consolidation Landfill 2004 Annual Report.

ft AMSL = Feet Above Mean Sea Level

LTM = Long-Term Monitoring

NGVD88 = National Geodetic Vertical Datum (1988)

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 Five year Review
Devens Consolidation Landfill

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 60 120
Feet

Date: 03/18/2020

Figure D-3

File: AR2019_MP_F6-2_DCL_GWC0419.mxd

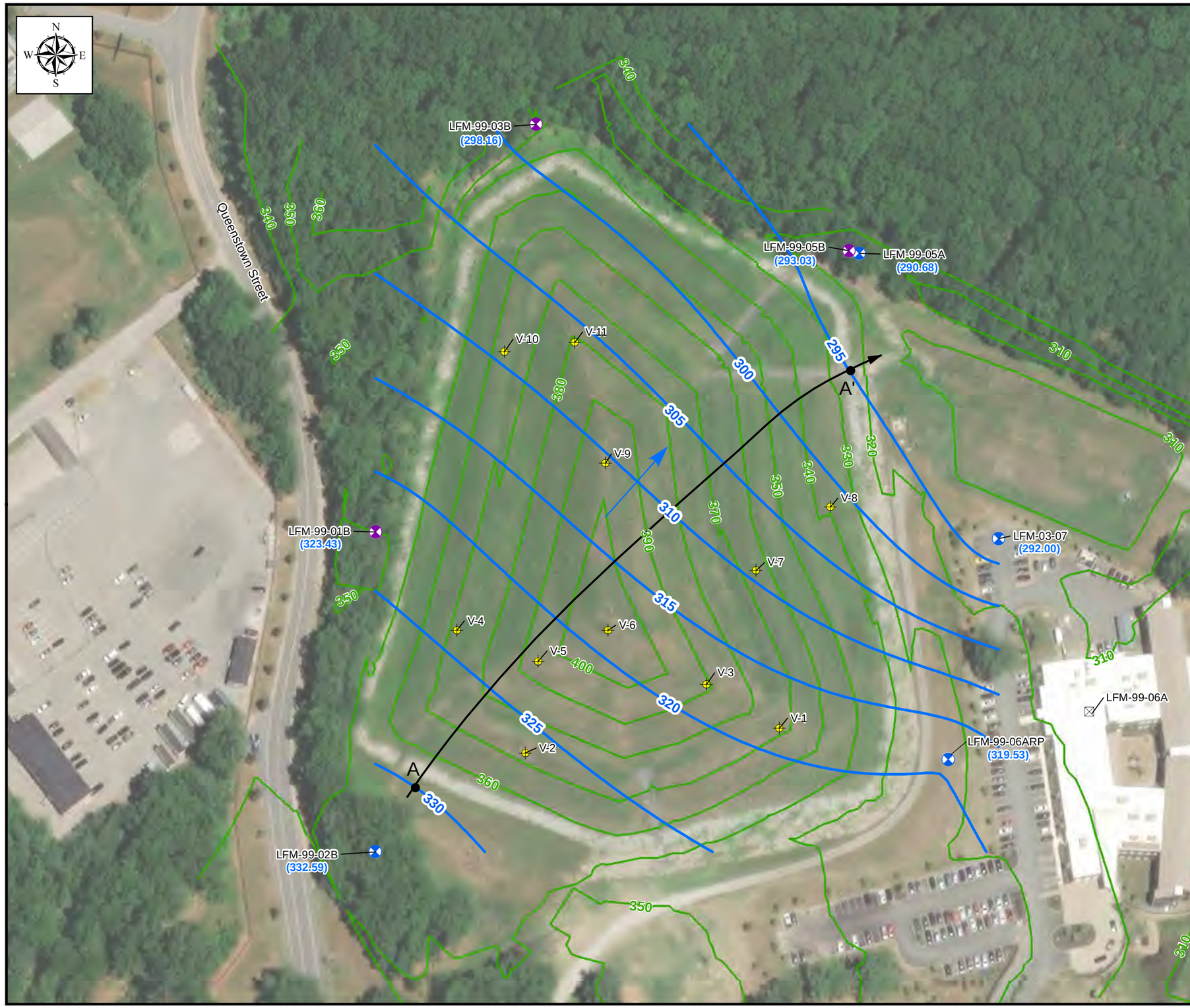


Figure D-4
Interpretive Water Table Elevation
Devens Consolidation Landfill
October 2019

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Gas Vent
- Monitoring Well - Destroyed
- Groundwater Flow Direction
- Groundwater Elevation Contour (ft NGVD88) (Contour Interval = 5 ft)
- (293.03) Groundwater Elevation (ft NGVD88)
- A——A' Groundwater Gradient Calculation Location
- LFM-03-07 Well/Vent Identification
- Topographic Contour (ft AMSL)

Notes:

LFM-03-07 was paved over with asphalt during parking lot construction for the neighboring building. In July 2017, LFM-03-07 was uncovered.

LFM-99-06A was replaced by LFM-99-06ARP in September 2015.

Gas vent locations were approximated based upon the locations displayed in Figure 2 of USACE New England District's Devens Consolidation Landfill 2004 Annual Report.

ft AMSL = Feet Above Mean Sea Level

LTM = Long-Term Monitoring

NGVD88 = National Geodetic Vertical Datum (1988)

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 Five Year Review
Devens Consolidation Landfill

Former Fort Devens Army Installation
Devens, Massachusetts

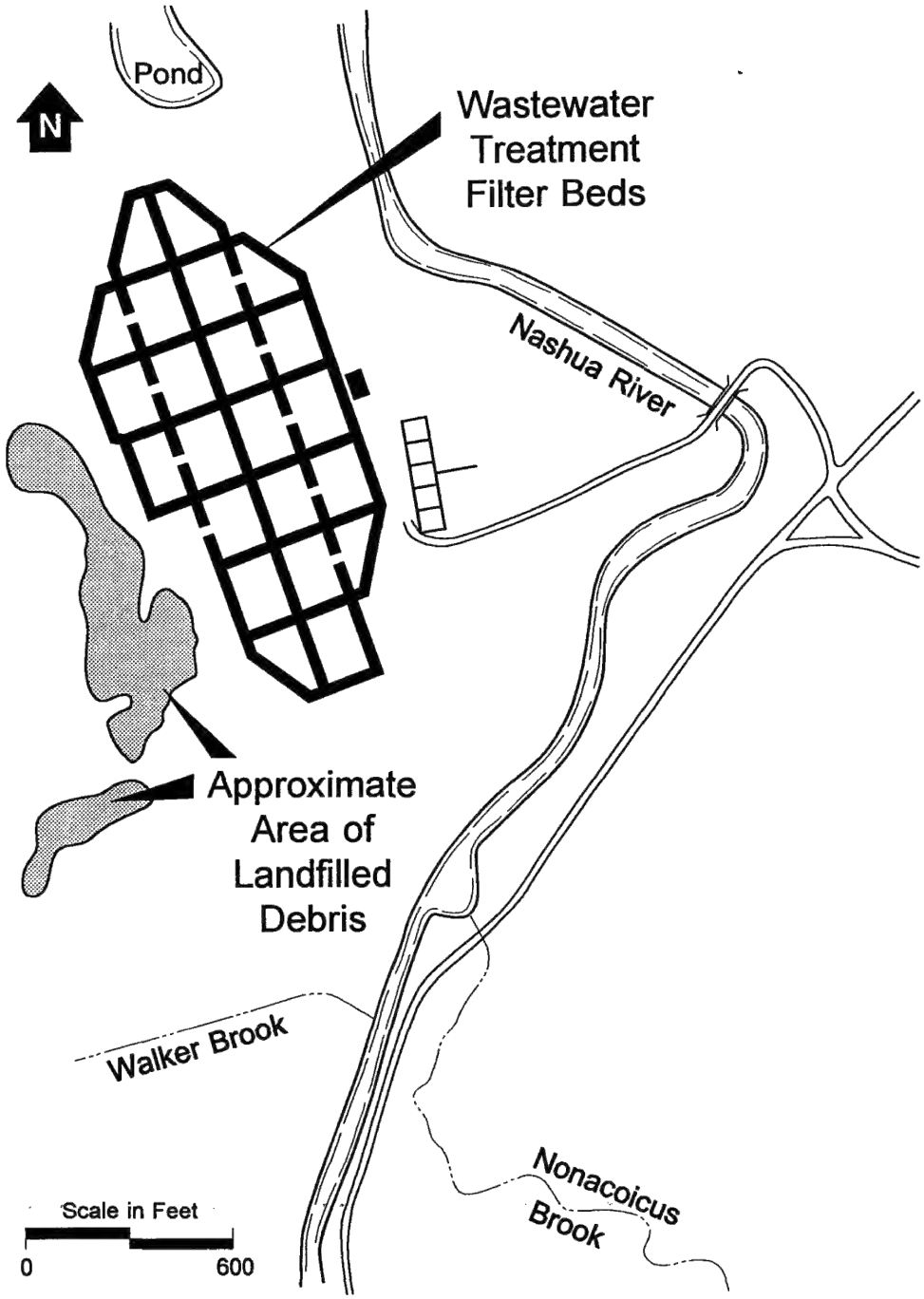
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 60 120
Feet

Date: 03/18/2020

Figure D-4

File: AR2019_MP_F6-3_DCL_GWC1019.mxd



AOC 9 Site Map

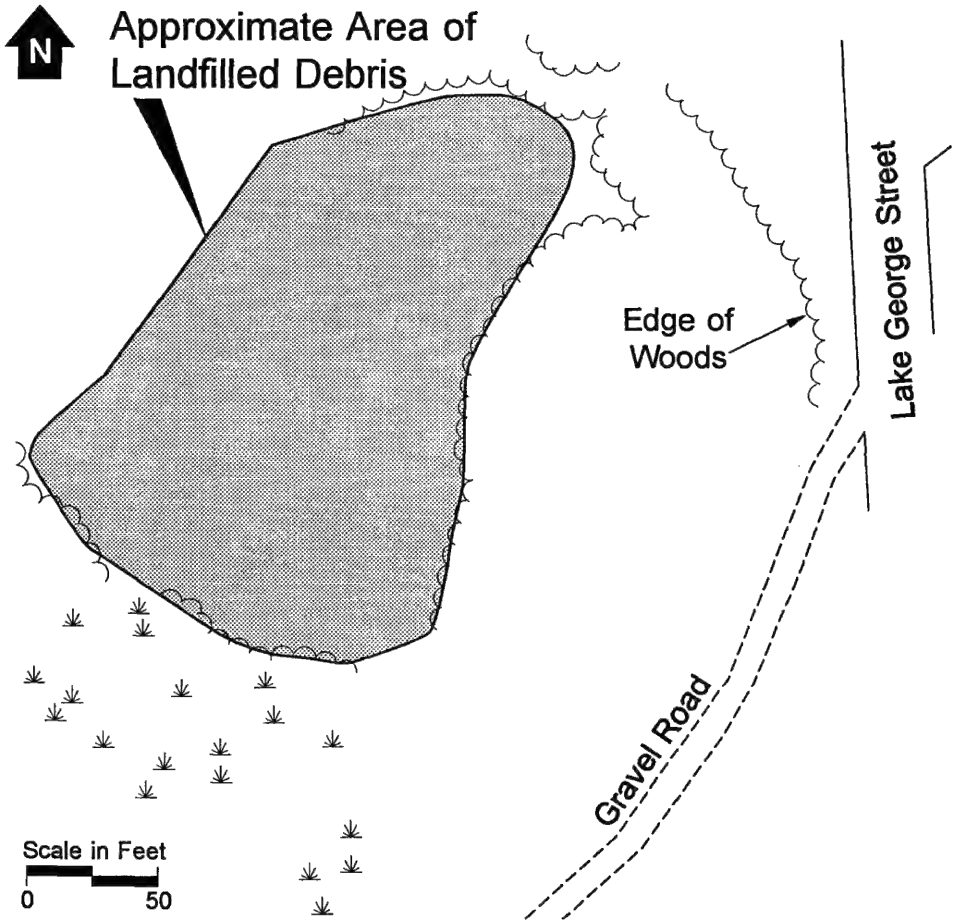
2020 Five Year Review
Devens, Massachusetts

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

Scale: As Noted	Date: 09/14/2016	Figure D-5	

Reference: Harding Lawson Associates - W9903001

File: FD_HLA_AOC.dwg



SA 13 Site Map

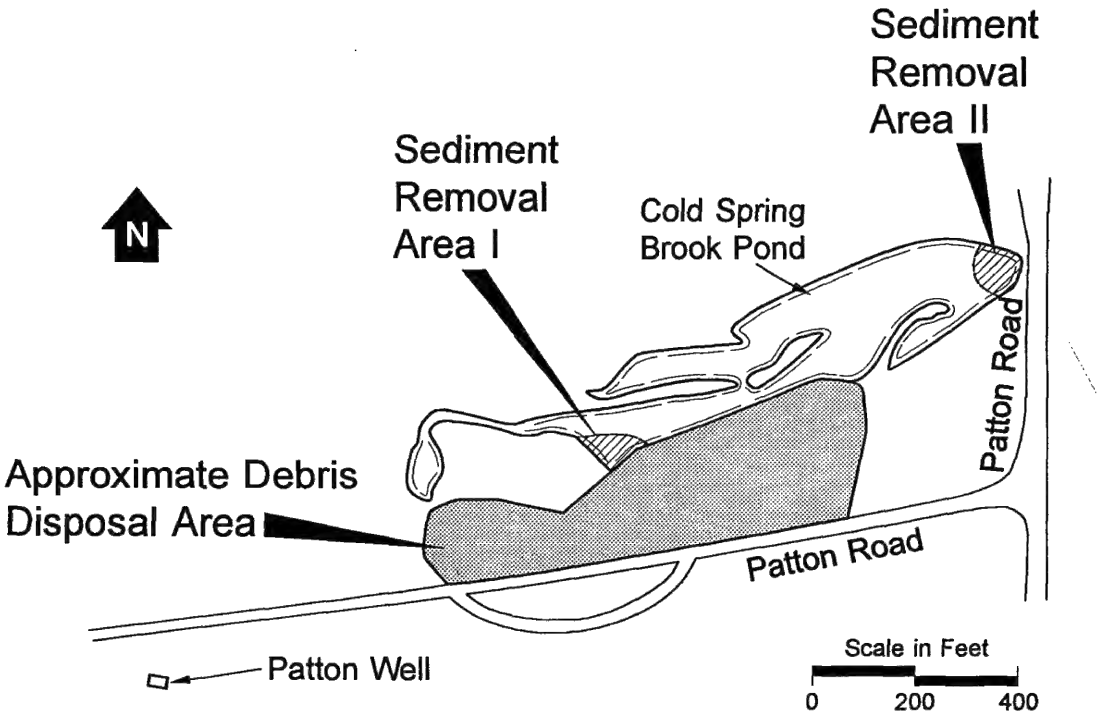
Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

Scale: As Noted	Date: 09/14/2016	Figure D-6	

Reference: Harding Lawson Associates - W9903001

File: FD_HLA_AOC.dwg



AOC 40 Site Map

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

Scale: As Noted	Date: 09/14/2016	Figure D-7	

Reference: Harding Lawson Associates - W9903001

File: FD_HLA_AOC.dwg

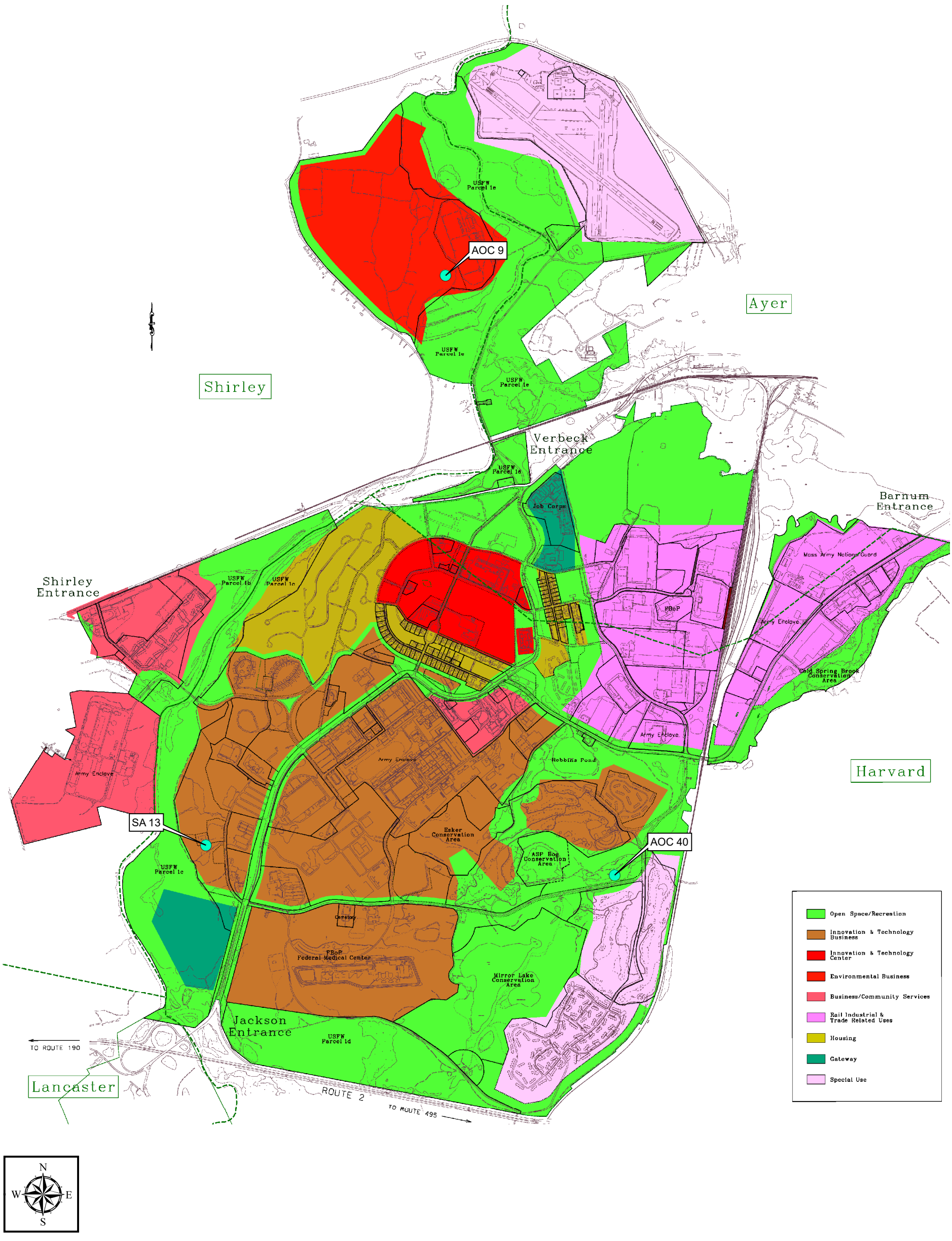


Figure D-7
Devens Zoning Districts
Former Fort Devens Army Installation and Fort Devens Reserve Forces Training Area

Source: Analysis of Parcels - Parcels Over Zoning - Devens Commerce Center, A Division of MassDevelopment
Product of DCC's Engineering Department's AM/FM System 3/18/2008

Legend

Area of Contamination (AOC)

Note:
Zoning and parcel boundaries are approximate. This map is for illustrative purposes only and is not the Official Zoning Map for the Devens Regional Enterprise Zone. For an official zoning map, please contact the Devens Enterprise Commission at 978.772.8831.

Former Fort Devens Army Installation and Fort Devens Reserve Forces Training Area, Devens MA

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

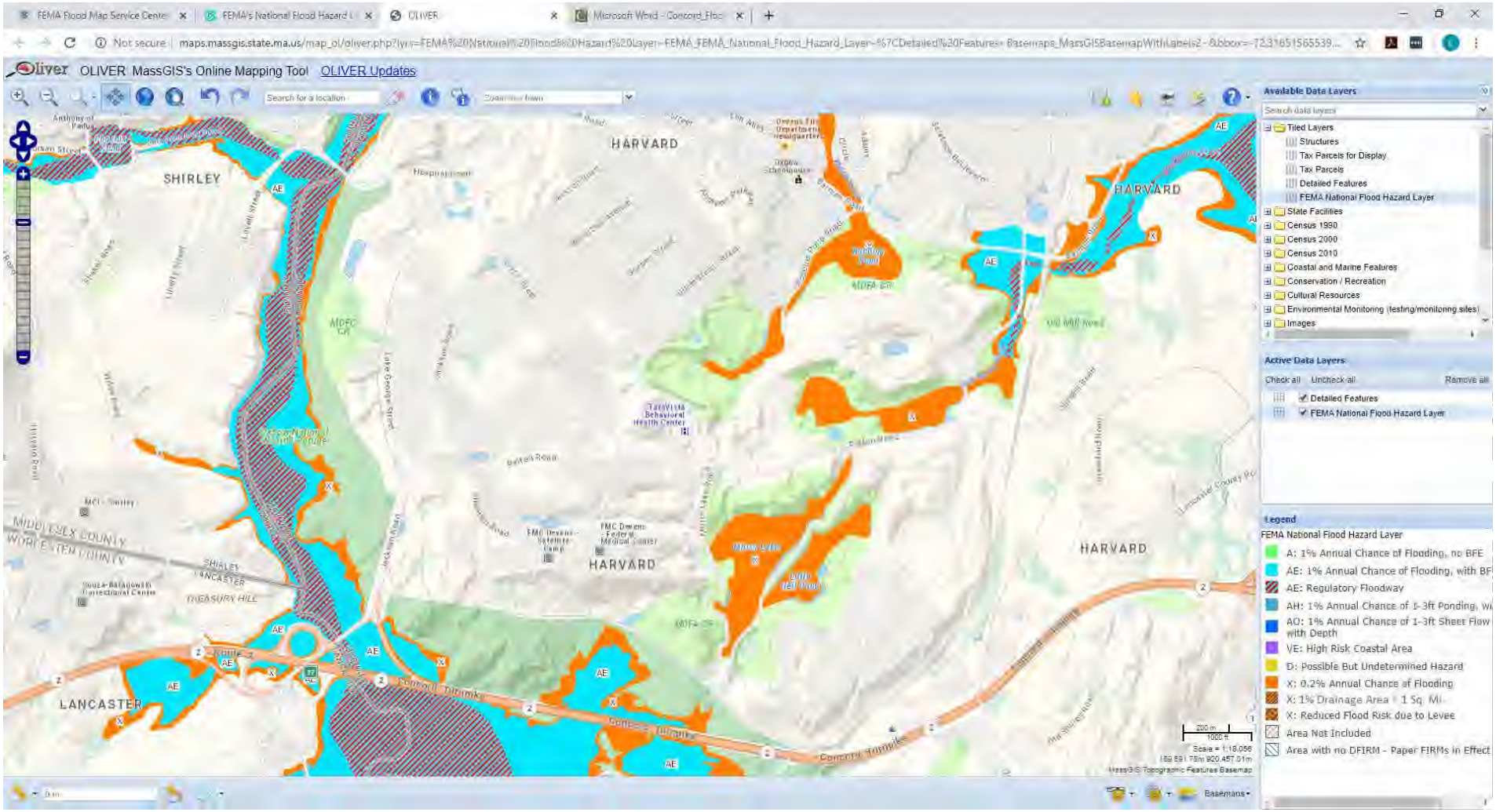
0 1,000 2,000
Feet

Date: 09/29/2016

Figure D-8

File: PA2016_Fig5_DevensZoning.mxd

Figure D-9 OLIVER
Screen Shot



D.2 Devens Consolidated Landfill

Tables

Table D-1
Groundwater Analytical Results
Devens Consolidation Landfill
June 2015
Former Devens Army Installation
Devens, MA

Client Sample ID:		MCP GW-1 Standard[1]	MCP GW-3 Standard[1]	LFM 99 02B	Q	LFM 99 05A	Q	LFM DUP1 (LFM 99 05A Duplicate)	Q	LFM 99 06A	Q	LFM 03 07	Q
Date Sampled:	Units			6/11/2015		6/11/015		6/11/2015		6/10/015		6/10/2015	
SIM													
Acenaphthene	ug/l	20	6,000	0.026	U	**0.025**	**J**	0.026	U	0.025	U	0.026	U
Acenaphthylene	ug/l	30	40	0.026	U	**0.026**	**J**	0.026	U	0.025	U	0.026	U
Anthracene	ug/l	60	30	0.026	U	0.025	U	0.026	U	0.025	U	0.026	U
Benzo(a)anthracene	ug/l	1	1,000	0.026	U	0.025	U	0.026	U	0.025	U	0.026	U
Benzo(a)pyrene	ug/l	0.2	500	0.051	U	0.051	U	0.051	U	0.051	U	53	U
Benzo(b)fluoranthene	ug/l	1	400	0.026	U	0.025 U	U	0.026	U	0.025	U	0.026	U
Benzo(g,h,i)perylene	ug/l	50	20	0.051	U	0.051	U	0.051	U	0.051	U	0.053	U
Benzo(k)fluoranthene	ug/l	1	100	0.026	U	0.025 U	U	0.026	U	0.025	U	0.026	U
Chrysene	ug/l	2	70	0.026	U	0.025 U	U	0.026	U	0.025	U	0.026	U
Dibenzo(a,h)anthracene	ug/l	0.5	40	0.051	U	0.051	U	0.051	U	0.051	U	0.053	U
Fluoranthene	ug/l	90	200	0.10	U	0.10	U	0.10	U	0.20	U	0.20	U
Fluorene	ug/l	30	40	0.10	U	0.10	U	0.10	U	0.20	U	0.20	U
Indeno(1,2,3-cd)pyrene	ug/l	0.5	100	0.051	U	0.051	U	0.051	U	0.051	U	0.053	U
2-Methylnaphthalene	ug/l	10	20,000	2.0	U	2.0	U	2.0	U	4.0	U	4.0	U
Naphthalene	ug/l	140	20,000	5.1	U	3.3	U	4.2	U	4.0	U	4.0	U
Phenanthrene	ug/l	40	10,000	0.12	U	0.09	U	0.096	U	0.1	U	0.1	U
Pyrene	ug/l	80	20	0.026	U	0.025	U	0.026	U	0.025	U	0.026	U
MADEP EPH													
C9 C18 Aliphatics	µg/L	700	50,000	82	U	81	U	82	U	81	U	84	U
C19 C36 Aliphatics	µg/L	14,000	50,000	82	U	81	U	82	U	81	U	84	U
C11 C22 Aromatics	µg/L	200	5,000	82	U	81	U	82	U	81	U	84	U
MADEP VPH													
C5 C8 Aliphatics	µg/L	300	50,000	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
C9 C12 Aliphatics	µg/L	700	50,000	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
C9 C10 Aromatics	µg/L	200	50,000	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
Methyl tert butyl ether	µg/L	70	50,000	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Benzene	µg/L	5	10,000	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Toluene	µg/L	1,000	40,000	2.0	U	2.0	U	2.0	U	2.0	U	**0.52**	**J**
Ethylbenzene	µg/L	700	5,000	2.0	U	2.0	U	2.0	U	2.0	U	**0.60**	**J**
m,p Xylenes	µg/L	10,000	5,000	2.0	U	2.0	U	2.0	U	2.0	U	**1.3**	**J**
o Xylene	µg/L	10,000	5,000	2.0	U	2.0	U	2.0	U	2.0	U	**0.67**	**J**
Naphthalene	µg/L	140	20,000	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U

Table D-1 (Continued)
Groundwater Analytical Results
Devens Consolidation Landfill
June 2015
Former Devens Army Installation
Devens, MA

Client Sample ID:		MCP GW-1 Standard[1]	MCP GW-3 Standard[1]	LFM 99 02B	Q	LFM 99 05A	Q	LFM DUP1 (LFM 99 05A Duplicate)	Q	LFM 99 06A	Q	LFM 03 07	Q
Date Sampled:	Units			6/11/2015		6/11/015		6/11/2015		6/10/015		6/10/2015	
Pesticides (SW846 8081B)													
4,4' DDD	µg/L	0.2	50	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
4,4' DDE	µg/L	0.05	400	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
4,4' DDT	µg/L	0.3	1	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Aldrin	µg/L	0.5	30	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
alpha BHC	µg/L	NS	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
beta BHC	µg/L	NS	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
delta BHC	µg/L	NS	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Dieldrin	µg/L	0.1	0.5	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endosulfan I	µg/L	NS	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endosulfan II[2]	µg/L	10	2	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endosulfan sulfate[3]	µg/L	0.1	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endrin	µg/L	2	5	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endrin aldehyde[4]	µg/L	100	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Endrin ketone[5]	µg/L	100	NS	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
gamma BHC	µg/L	0.2	4	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Heptachlor	µg/L	0.4	1	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Heptachlor epoxide	µg/L	0.2	2	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Methoxychlor	µg/L	40	10	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U
Total Chlordane	µg/L	2	2	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
Toxaphene[6]	µg/L	100	NS	0.26	U	0.26	U	0.26	U	0.26	U	0.26	U
Total Metals (Select List)													
Arsenic, Total	µg/L	10	900	2.0	U	**2.3**	**J**	**2.2**	**J**	**3.7**	**J**	**2.7**	**J**
Barium, Total	µg/L	2,000	50,000	25	U	25	U	25	U	25	U	25.0	U
Cadmium, Total	µg/L	5	4	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Chromium, Total	µg/L	100	300	5.0	U	5.0	U	5.0	U	**16.8**		5.0	U
Copper, Total	µg/L	NS	NS	13.0	U	13	U	13	U	13.0	U	13.0	U
Iron, Total	µg/L	NS	NS	50.0	U	**118**		**93.7**	**J**	**479**		50.0	U
Lead, Total	µg/L	15	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Manganese, Total	µg/L	NS	NS	7.5	U	7.5	U	7.5	U	**49.1**		7.5	U
Selenium, Total	µg/L	50	100	5.0	U	5.0	U	5.0	U	5.0	U	10.0	U
Silver, Total	µg/L	100	7	2.5	U	2.5	U	2.5	U	2.5	U	7.0	U
Mercury	µg/L	2	20	0.2	U	0.15	U	0.15	U	0.15	U	0.15	U

Table D-1 (Continued)
Groundwater Analytical Results
Devens Consolidation Landfill
June 2015
Former Devens Army Installation
Devens, MA

Client Sample ID:		MCP GW-1 Standard[1]	MCP GW-3 Standard[1]	LFM 99 02B	Q	LFM 99 05A	Q	LFM DUP1 (LFM 99 05A Duplicate)	Q	LFM 99 06A	Q	LFM 03 07	Q
Date Sampled:	Units			6/11/2015		6/11/015		6/11/2015		6/10/015		6/10/2015	
General Chemistry													
TDS	mg/L	NS	NS	512		501		514		461		760	
Chloride	mg/L	NS	NS	215		165		165		130		270	
Sulfate	mg/L	NS	NS	20.2		24.0		24.1		20.4		34.0	
Nitrate/Nitrite (as N)	mg/L	NS	NS	0.39		1.1		1.1		0.43		0.93	
Alkalinity as CaCO3	mg/L	NS	NS	69.4		89.4		89.4		153		90.5	
Cyanide, Total	mg/L	0.2	0.03	0.001	U	0.001	U	0.001	U	0.001	U	0.002	J
Chemical Oxygen Demand	mg/L	NS	NS	15.0	U	15	U	15	U	15	U	15	J
Water Quality Parameters													
Temperature	°Celcius	NS	NS	9.96		12.20		NA		9.32		12.79	
pH	Std units	NS	NS	6.07		6.21				4.91		6.16	
Specific Conductance	µS/cm	NS	NS	878		542				724		1094	
ORP	mV	NS	NS	248.5		218				187.5		134.5	
Dissolved Oxygen	mg/L	NS	NS	9.43		5.96				8.96		11.29	
Turbidity	NTU	NS	NS	1.65		131.0				113		0.94	

Notes:

[1] GW-1 or GW-3 standard effective June 2014

NA = Not Applicable (duplicate sample)

NS = no standard

U/UJ = non-detect

J = Estimated Result

Table D-2
Groundwater Analytical Results
Devens Consolidation Landfill
October 2015
Former Fort Devens Army Installation
Devens, Massachusetts

Client Sample ID:		**MCP GW-1 Standard[1]**	**MCP GW-3 Standard[1]**	LFM-99-06A-RP		LFM-99-05A		LFM-DUP-01 (LFM-99-05A)		LFM-99-02B	
Date Sampled:	Units			10/7/2015		10/6/2015		10/6/2015		10/6/2015	
GC/MS Semi-volatiles By SIM											
Acenaphthene	ug/l	20	6,000	5.1	U	**0.35**	**J**	0.2	UJ	0.22	U
Acenaphthylene	ug/l	30	40	5.1	U	**0.40**	**J**	0.2	UJ	0.22	U
Anthracene	ug/l	60	30	5.1	U	**0.077**	**J**	0.20	UJ	0.22	U
Benzo(a)anthracene	ug/l	1	1,000	5.1	U	0.11	U	0.10	U	0.11	U
Benzo(a)pyrene	ug/l	0.2	500	5.1	U	0.22	U	0.20	U	0.22	U
Benzo(b)fluoranthene	ug/l	1	400	5.1	U	0.11	U	0.10	U	0.11	U
Benzo(g,h,i)perylene	ug/l	50	20	5.1	U	0.22	U	0.20	U	0.22	U
Benzo(k)fluoranthene	ug/l	1	100	5.1	U	0.22	U	0.20	U	0.22	U
Chrysene	ug/l	2	70	5.1	U	0.22	U	0.20	U	0.22	U
Dibenzo(a,h)anthracene	ug/l	0.5	40	5.1	U	0.22	U	0.20	U	0.22	U
Fluoranthene	ug/l	90	200	5.1	U	0.22	U	0.20	U	0.22	U
Fluorene	ug/l	30	40	5.1	U	**0.15**	**J**	0.20	UJ	0.22	U
Indeno(1,2,3-cd)pyrene	ug/l	0.5	100	5.1	U	0.22	U	0.20	U	0.22	U
2-Methylnaphthalene	ug/l	10	20,000	5.1	U	4.3	**U**	4.0	**U**	4.30	U
Naphthalene	ug/l	140	20,000	5.1	U	4.3	**U**	4.0	**U**	4.30	**U**
Phenanthrene	ug/l	40	10,000	5.1	U	**0.12**	**J**	0.10	UJ	0.11	U
Pyrene	ug/l	80	20	5.1	U	0.22	U	0.20	U	0.22	U
MADEP EPH											
C9-C18 Aliphatics	ug/l	700	50,000	100	U	110	U	100	U	110	U
C19-C36 Aliphatics	ug/l	14,000	50,000	100	U	110	U	100	U	110	U
C11-C22 Aromatics	ug/l	200	5,000	100	U	110	U	100	U	110	U
MADEP VPH											
Benzene	ug/l	5	10,000	1.0	U	1.0	U	1.0	U	1.0	U
Ethylbenzene	ug/l	700	5,000	2.0	U	2.0	U	2.0	U	2.0	U
Methyl Tert Butyl Ether	ug/l	70	50,000	1.0	U	1.0	U	1.0	U	1.0	U
Naphthalene	ug/l	140	20,000	3.0	U	3.0	U	3.0	U	3.0	U
Toluene	ug/l	1,000	40,000	2.0	U	2.0	U	2.0	U	2.0	U
m,p-Xylene	ug/l	10,000	5,000	2.0	U	2.0	U	2.0	U	2.0	U
o-Xylene	ug/l	10,000	5,000	2.0	U	2.0	U	2.0	U	2.0	U
C5- C8 Aliphatics (Unadj.)	ug/l	300	50,000	50	U	50	U	50	U	50	U
C9- C12 Aliphatics (Unadj.)	ug/l	700	50,000	50	U	50	U	50	U	50	U
C9- C10 Aromatics (Unadj.)	ug/l	200	50,000	50	U	50	U	50	U	50	U

Table D-2 (Continued)
Groundwater Analytical Results
Devens Consolidation Landfill
October 2015
Former Fort Devens Army Installation
Devens, Massachusetts

Client Sample ID:		**MCP GW-1 Standard[1]**	**MCP GW-3 Standard[1]**	LFM-99-06A-RP		LFM-99-05A		LFM-DUP-01 (LFM-99-05A)		LFM-99-02B	
Date Sampled:	Units			10/7/2015		10/6/2015		10/6/2015		10/6/2015	
Pesticides (SW846 8081B)											
Aldrin	ug/l	0.5	30	0.054	U	0.053	U	0.050	U	0.051	U
alpha-BHC	ug/l	NS	NS	0.054	U	0.053	U	0.050	U	0.051	U
beta-BHC	ug/l	NS	NS	0.054	U	0.053	U	0.050	U	0.051	U
delta-BHC	ug/l	NS	NS	0.054	U	0.053	U	0.050	U	0.051	U
gamma-BHC (Lindane)	ug/l			0.054	U	0.053	U	0.050	U	0.051	U
Chlordane	ug/l	2	2	0.54	U	0.53	U	0.50	U	0.51	U
Dieldrin	ug/l	0.1	0.5	0.054	U	0.053	U	0.050	U	0.051	U
4,4'-DDD	ug/l	0.2	50	0.054	U	0.053	U	0.050	U	0.051	U
4,4'-DDE	ug/l	0.05	400	0.054	U	0.053	U	0.050	U	0.051	U
4,4'-DDT	ug/l	0.3	1	0.054	U	0.053	U	0.050	U	0.051	U
Endrin	ug/l	2	5	0.054	U	0.053	U	0.050	U	0.051	U
Endosulfan sulfate	ug/l	0.1	NS	0.054	U	0.053	U	0.050	U	0.051	U
Endrin aldehyde	ug/l	100	NS	0.054	U	0.053	U	0.050	U	0.051	U
Endosulfan-I	ug/l	NS	NS	0.054	U	0.053	U	0.050	U	0.051	U
Endosulfan-II	ug/l	10	2	0.054	U	0.053	U	0.050	U	0.051	U
Heptachlor	ug/l	0.4	1	0.054	U	0.053	U	0.050	U	0.051	U
Heptachlor epoxide	ug/l	0.2	2	0.054	U	0.053	U	0.050	U	0.051	U
Methoxychlor	ug/l	40	10	0.054	U	0.053	U	0.050	U	0.051	U
Toxaphene	ug/l	100	NS	2.7	U	2.7	U	2.5	U	2.6	U
Total Metals Analysis - Target Analytes											
Arsenic	ug/l	10	900	4.0	U	4.0	U	4.0	U	4.0	U
Barium	ug/l	2,000	50,000	50	U	50	U	50	U	50	U
Cadmium	ug/l	5	4	4.0	U	4.0	U	4.0	U	4.0	U
Chromium	ug/l	100	300	10	U	10	U	10	U	10	U
Copper	ug/l	NS	NS	25	U	25	U	25	U	25	U
Iron	ug/l	NS	NS	**326**		**378**		**353**		**50**	**U**
Lead	ug/l	15	10	5.0	U	5.0	U	5.0	U	5.0	U
Selenium	ug/l	50	100	10	U	10	U	10	U	10	U
Silver	ug/l	100	7	5.0	U	5.0	U	5.0	U	5.0	U

Table D-2 (Continued)
Groundwater Analytical Results
Devens Consolidation Landfill
October 2015
Former Fort Devens Army Installation
Devens, Massachusetts

Client Sample ID:		**MCP GW-1 Standard[1]**	**MCP GW-3 Standard[1]**	LFM-99-06A-RP		LFM-99-05A		LFM-DUP-01 (LFM-99-05A)		LFM-99-02B	
Date Sampled:	Units			10/7/2015		10/6/2015		10/6/2015		10/6/2015	
Total Metals Analysis - Non-Target Analytes											
Aluminum	ug/l			**200**		**234**		**213**		**100**	**U**
Antimony	ug/l			6.0	U	6.0	U	6.0	U	6.0	U
Beryllium	ug/l			4.0	U	4.0	U	4.0	U	4.0	U
Calcium	ug/l			**75700**		**70000**		**70400**		**69800**	
Cobalt	ug/l			50	U	50	U	50	U	50	U
Magnesium	ug/l			**8180**		**8750**		**8770**		**7540**	
Manganese	ug/l			**15.7**		**10.4**	**J**	**9.6**	**J**	7.5	**U**
Mercury	ug/l			0.20	U	0.20	U	0.20	U	0.20	U
Nickel	ug/l			40	U	40	U	40	U	40	U
Potassium	ug/l			5000	U	5000	U	5000	U	5000	U
Sodium	ug/l			**166000**		**76900**		**77400**		**128000**	
Thallium	ug/l			5.0	U	5.0	U	5.0	U	5.0	U
Vanadium	ug/l			10	U	10	U	10	U	10	U
Zinc	ug/l			20	U	20	U	20	U	20	U
General Chemistry											
Nitrogen, Nitrate	mg/l	NS	NS	**0.94**		**1.9**		**1.9**		**0.63**	
Nitrogen, Nitrate + Nitrite	mg/l	NS	NS	**0.94**		**1.9**		**1.9**		**0.63**	
Solids, Total Dissolved	mg/l	NS	NS	**708**		**487**		**486**		**575**	
Chloride	mg/l	NS	NS	**307**		**1350**	**J**	**197**	**J**	**270**	
Alkalinity, Total as CaCO3	mg/l	NS	NS	**113**		**85.5**		**84.5**		**84.5**	
Chemical Oxygen Demand	mg/l	NS	NS	20	U	20	U	20	U	20	U
Cyanide	mg/l	0.2	0.03	0.010	U	0.010	U	0.010	U	**0.0082**	**J**
Sulfate	mg/l	NS	NS	**29.9**		**23.3**		**23.4**		**21.1**	
Water Quality Parameters											
Temperature, Final	°Celcius			14.28		10.92		NA		9.96	
pH	Std units			6.24		6.40				6.07	
Specific Conductance	µS/cm			1128		882				878	
ORP/Eh	mV			80.1		133.5				248.5	
Dissolved Oxygen	mg/L			5.7		3.49				9.43	
Turbidity	NTU			27.97		14.5				1.65	

Notes:

[1] GW-1 or GW-3 standard effective June 2014

NA = Not Applicable (duplicate sample)

NS = no standard

U/UJ = non-detect

J = Estimated Result

Table D-3
DCL Leachate Analytical Results
October 2015
Former Fort Deven Army Installation
Devens, Massachusetts

MassDevelopment Industrial Wastewater Discharge Permit No. 017 (Summary)

Analytical Fraction	**Parameter**	**Limitations**	**Fall 2015 - Annual Sampling Event**
			Date Sampled: 11/11/2015
			Concentrations (mg/L or as stated):
Metals composite	Arsenic	0.20 mg/L	0.004 U
	Cadmium	0.045 mg/L	0.004 U
	Chromium	0.4 mg/L	0.010 U
	Copper	0.75 mg/L	0.025 U
	Lead	0.20 mg/L	0.005 U
	Nickel	0.60 mg/L	0.040 U
	Silver	0.30 mg/L	0.005 U
	Zinc	0.70 mg/L	0.020 U
	Mercury	0.001 mg/L	0.0002 UJ
TTO*	Total Toxic Organics	5.0 mg/L	All compounds are non-detect.
TSS	Total Suspended Solids	400 mg/L	17
Cyanide	Cyanide (total)	NL	0.025
TPH	TPH (DRO)	NL	0.378
Phenols	Phenols (total)	NL	0.062
pH *grab sample*	pH (units)	5.5 – 9.5	6.9

Notes:

mg/L = milligrams per liter

U/UJ: The target analyte was not detected at or above the laboratory reporting limit.

TTO = Total Toxic Organics (sum of VOCs, SVOCs, Pesticides and PCBs)

TSS = Total Suspended Solids

VOCs = Volatile Organic Compounds

SVOCs = SemiVolatile Organic Compounds

PCBs = Polychlorinated Biphenyls

TPH = Total Petroleum Hydrocarbons

Table D-4
Devens Consolidation Landfill Groundwater Analytical Results - June 2016
Main Post - Former Devens Army Installation - Devens, MA

Client Sample ID:		Monitoring Criteria	LFM-99-02B_SPR16	Q	DUP-1 (LFM-99-02B)	Q	LFM-99-05A_0616	Q	LFM-99-06RP_SPR16	Q	LFM-03-07	Q
Date Sampled:	Units		6/9/2016		6/9/2016		6/8/2016		6/9/2016		Not sampled*	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C9-C18 Aliphatic	µg/L	700.00	100.00	U	94.00	U	94.00	U	94.00	U		
C19-C36 Aliphatic	µg/L	14,000	100	U	94	U	94	U	94	U		
C11-C22 Aromatic	µg/L	200	100	U	94	U	94	U	94	U		
Naphthalene	µg/L	140	2.1	U	1.9	U	1.9	U	1.9	U		
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C5-C8 Aliphatics	µg/L	300	100	U	100	U	100	U	100	U		
C9-C12 Aliphatics	µg/L	700	100	U	100	U	100	U	100	U		
C9-C10 Aromatics	µg/L	200	100	U	100	U	100	U	100	U		
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U		
Benzene	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U		
Toluene	µg/L	1,000	5.0	U	5.0	U	5.0	U	5.0	U		
Ethylbenzene	µg/L	700	5.0	U	**0.82**	**J**	5.0	U	5.0	U		
m,p -Xylenes	µg/L	10,000	10.0	U	**1.8**	**J**	10.0	U	10.0	U		
o -Xylene	µg/L	10,000	5.0	U	**1.1**	**J**	5.0	U	5.0	U		
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U		
Pesticides (SW846 8081B)												
All Compounds			ND		ND		ND		ND			
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	U	**1.7**	**J**	**2.3**	**J**		
Barium, Total	µg/L	2,000	**7.2**	**J**	**7.1**	**J**	**14**		**9.1**	**J**		
Cadmium, Total	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U		
Chromium, Total	µg/L	100	4.0	U	4.0	U	4.0	U	**2.2**	J		
Copper, Total	µg/L	NS	5.0	U	5.0	U	5.0	U	5.0	U		
Iron, Total	µg/L	NS	50.0	U	50.0	U	**300**		**479**			
Lead, Total	µg/L	15	10.0	U	10.0	U	10.0	U	10.0	U		
Manganese, Total	µg/L	NS	3.0	U	3.0	U	**11**		**49.1**			
Selenium, Total	µg/L	50	20.0	U	20.0	U	20	U	20.0	U		
Silver, Total	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U		
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U		

* Location LFM-03-07 was inaccessible for sampling due to construction activities.
EPA and VPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table D-4 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results - June 2016
Main Post - Former Devens Army Installation - Devens, MA

Client Sample ID:		Monitoring Criteria	LFM-99-02B_SPR16	Q	DUP-1 (LFM-99-02B)	Q	LFM-99-05A_0616	Q	LFM-99-06RP_SPR16	Q	LFM-03-07	Q
Date Sampled:	Units		6/9/2016		6/9/2016		6/8/2016		6/9/2016		Not sampled*	
General Chemistry												
Cyanide, Total	mg/L	0.20	0.005	U	0.005	U	0.005	U	**0.003**	J		
Nitrate/Nitrite (as N)	mg/L	NS	**0.60**		**0.62**		**2.9**		**0.98**			
Chemical Oxygen Demand	mg/L	NS	10	U	10	U	10	U	10	U		
Chloride	mg/L	NS	**230**		**240**		**160**		**370**			
Sulfate	mg/L	NS	**17**		**17**		**22**		**29**			
Alkalinity as CaCO3	mg/L	NS	**71**		**71**		**100**		**88**			
TDS	mg/L	NS	**530**		**520**		**470**		**810**			
Water Quality Parameters												
Temperature	°Celcius	NS	10.95		NA		12.07		12.37			
ORP	mV	NS	197.0		NA		-173.9		121.6			
pH	Std units	NS	6.16		NA		8.11		6.59			
Specific Conductance	µS/cm	NS	895		NA		733		1443			
Dissolved Oxygen	mg/L	NS	8.82		NA		5.68		6.27			
Turbidity	NTU	NS	0.36		NA		7.40		6.30			

Notes:
µg/L = microgram per liter
mg/L = milligram per lter
NS = No Standard
ND/U = Non detect
J = Estimated Result
NA = Not Applicable

* Location LFM-03-07 was inaccessible for sampling due to construction activities.
EPA and VPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table D-5
Devens Consolidation Landfill Groundwater Analytical Results - October 2016
Main Post - Former Devens Army Installation - Devens, MA

Client Sample ID:		Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-99-06RP	Q	DUP-1 (LFM-99-06RP)	Q	LFM-03-07	Q
Date Sampled:	Units		10/12/2016		10/12/2016		10/13/2016		10/13/2016		Not sampled*	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C9-C18 Aliphatic Hydrocarbons	µg/L	700	110	U	110	U	100	U	100	U		
C19-C36 Aliphatic Hydrocarbons	µg/L	14,000	110	U	110	U	100	U	100	U		
C11-C22 Aromatic Hydrocarbons	µg/L	200	110	U	110	U	100	U	100	U		
Naphthalene	µg/L	140	2.3	U	**3.2**		2.0	U	2.1	U		
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C5-C8 Aliphatics	µg/L	300	100	U	100	U	100	U	100	U		
C9-C12 Aliphatics	µg/L	700	100	U	100	U	100	U	100	U		
C9-C10 Aromatics	µg/L	200	100	U	100	U	100	U	100	U		
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U		
Benzene	µg/L	5	3.0	U	3.0	U	3.0	U	3.0	U		
Toluene	µg/L	1,000	**0.40**	**J**	**1.0**	**J**	5.0	U	**0.41**	J		
Ethylbenzene	µg/L	700	5.0	U	5.0	U	5.0	U	5.0	U		
m,p -Xylenes	µg/L	10,000	10.0	U	10.0	U	10.0	U	10.0	U		
o -Xylene	µg/L	10,000	5.0	U	5.0	U	5.0	U	5.0	U		
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U		
Pesticides (SW846 8081B)												
All Compounds			ND		ND		ND		ND			
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	U	3.0	U	3.0	U		
Barium, Total	µg/L	2,000	**15**		**21**		**5.0**	J	**4.5**	J		
Cadmium, Total	µg/L	5	3.0	U	3.0	U	3.0	U	3.0	U		
Chromium, Total	µg/L	100	**6.0**	J	4.0	U	4.0	U	4.0	U		
Copper, Total	µg/L	NS	5.0	U	5.0	U	5.0	U	5.0	U		
Iron, Total	µg/L	NS	**27**	J	**94**		50	U	50	U		
Lead, Total	µg/L	15	10	U	10	U	10	U	10	U		
Manganese, Total	µg/L	NS	**2.0**	J	**5.1**	J	3.0	U	3.0	U		
Selenium, Total	µg/L	50	20	U	20	U	20	U	20	U		
Silver, Total	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U		
Mercury	µg/L	2	0.20	U	0.20	U	0.20	U	0.20	U		

* Location LFM-03-07 was inaccessible for sampling due to construction activities.
EPA and VPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table D-5 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results - October 2016
Main Post - Former Devens Army Installation - Devens, MA

Client Sample ID:		Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-99-06RP	Q	DUP-1 (LFM-99-06RP)	Q	LFM-03-07	Q
Date Sampled:	Units		10/12/2016		10/12/2016		10/13/2016		10/13/2016		Not sampled*	
General Chemistry												
Cyanide, Total	mg/L	0.20	0.005	U	0.005	U	0.005	U	0.005	U		
Nitrate/Nitrite (as N)	mg/L	NS	**0.81**		**3.8**		**1.10**		**1.10**			
Chemical Oxygen Demand	mg/L	NS	**5.0**	J	10	U	10	U	**5.4**	J		
Chloride	mg/L	NS	**360**		**260**		**300**		**300**			
Sulfate	mg/L	NS	**25**		**23**		**31**		**31**			
Alkalinity as CaCO3	mg/L	NS	**110**		**87**		**120**		**160**			
TDS	mg/L	NS	**730**		**560**		**690**		**660**			
Water Quality Parameters												
Temperature	°Celcius	NS	11.86		10.26		10.74		NA			
ORP	mV	NS	77.8		81.4		68.3		NA			
pH	Std units	NS	6.44		6.35		6.67		NA			
Specific Conductance	µS/cm	NS	937		645		819		NA			
Dissolved Oxygen	mg/L	NS	5.82		4.66		4.86		NA			
Turbidity	NTU	NS	1.73		8.50		9.20		NA			

Notes:
µg/L = microgram per liter
mg/L = milligram per lter
NS = No Standard
ND/U = Non detect
J = Estimated Result
NA = Not Applicable

* Location LFM-03-07 was inaccessible for sampling due to construction activities.
EPA and VPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table D-6
Devens Consolidation Landfill Leachate Analytical Results - December 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

MassDevelopment Industrial Wastewater Discharge Permit No. 017 (Summary)

Analytical Fraction	Parameter	Limitations (mg/L)	Fall 2016 - Annual Sampling
			Date Sampled: 12/08/2016
			Concentrations (mg/L)
Metals composite	Arsenic	0.20	0.003 U
	Cadmium	0.045	0.003 U
	Chromium	0.40	0.004 U
	Copper	0.75	0.005 U
	Lead	0.20	0.010 U
	Nickel	0.60	**0.0037 J**
	Silver	0.30	0.0015 U
	Zinc	0.70	0.0020 U
	Mercury	0.00	0.0002 U
TTO	Total Toxic Organics	5.00	**0.0038 J**
TSS	Total Suspended	400	**1.2 J**
Cyanide	Cyanide (total)	NL	0.005 U
TPH	TPH (DRO)	NL	**0.87**
Phenols	Phenols (total)	NL	0.05 U
pH *grab sample*	pH (units)	5.5 – 9.5	**7.7**

Notes:
mg/L = milligram per liter
NL = No limit
U = The target analyte was not detected at or above the laboratory reporting limit.
J = Estimated result
TTO = Total Toxic Organics (sum of VOCs, SVOCs, Pesticides and PCBs)
VOCs = Volatile Organic Compounds
SVOCs = SemiVolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
TSS = Total Suspended Solids
TPH = Total Petroleum Hydrocarbons

Table D-7
Devens Consolidation Landfill Groundwater Analytical Results, June/August 2017
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 (LFM-99-05A)	Q	LFM-99-06A RP	Q	LFM-03-07	Q
			6/22/2017		6/22/2017		6/22/2017		6/21/2017		8/1/2017	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C9-C18 Aliphatic	µg/L	700	96	U	94	U	94	U	94	U	94	U
C19-C36 Aliphatic	µg/L	14,000	96	U	94	U	94	U	94	U	94	U
C11-C22 Aromatic Hydrocarbons	µg/L	200	96	U	94	U	94	U	94	U	94	U
PAH Compounds	µg/L	NS	ND		ND		ND		ND		ND	
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C5-C8 Aliphatics	µg/L	300	100	U	100	U	100	U	100	U	100	U
C9-C12 Aliphatics	µg/L	700	100	U	100	U	100	U	100	U	100	U
C9-C10 Aromatics	µg/L	200	100	U	100	U	100	U	100	U	100	U
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzene	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Toluene	µg/L	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	µg/L	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylenes	µg/L	10,000	10	U	10	U	10	U	10	U	10	U
o -Xylene	µg/L	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pesticides (SW846 8081B)												
All Compounds			ND		ND		ND		ND		ND	
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Barium, Total	µg/L	2,000	**12**		**14**		**14**		**9.1**	**J**	**77**	
Cadmium, Total	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Chromium, Total	µg/L	100	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Copper, Total	µg/L	1,300	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Iron, Total	µg/L	NS	50	U	50	U	**23**	**J**	**82**	**J**	**1,900**	
Lead, Total	µg/L	15	10	U	10	U	10	U	10	U	10	U
Manganese, Total	µg/L	NS	3.0	U	3.0	U	3.0	U	**6.9**	**J**	**110**	
Selenium, Total	µg/L	50	20	U	20	U	20	U	20	U	20	U
Silver, Total	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U

TableD-7 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results, June/August 2017
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 (LFM-99-05A)	Q	LFM-99-06A RP	Q	LFM-03-07	Q
			6/22/2017		6/22/2017		6/22/2017		6/21/2017		8/1/2017	
General Chemistry												
Cyanide, Total	mg/L	0.20	0.005	U	0.005	U	0.005	U	0.005	U	**0.0033**	**J**
Nitrate/Nitrite (as N)	mg/L	NS	**0.47**		**2.1**		**2.10**		**0.95**		**1.7**	
Chemical Oxygen Demand	mg/L	NS	**5.4**	**J**	10	U	10	U	**5.7**	**J**	**7.5**	**J**
Chloride	mg/L	NS	**320**		**170**		**160**		**420**		**380**	
Sulfate	mg/L	NS	**16**		**20**		**20**		**24**		**22**	
Alkalinity as CaCO3	mg/L	NS	**60**		**82**		**82**		**74**		**96**	
TDS	mg/L	NS	**630**		**440**		**450**		**880**		**860**	
Water Quality Parameters												
Temperature	°Celcius	NS	**10.52**		**10.02**		**10.02**		**11.84**		**14.61**	
ORP	mV	NS	**172.6**		**209.7**		**209.7**		**172.3**		**57.9**	
pH	Std units	NS	**6.55**		**5.86**		**5.86**		**6.10**		**6.04**	
Specific Conductance	µS/cm	NS	**844**		**540**		**540**		**1,158**		**1,181**	
Dissolved Oxygen	mg/L	NS	**9.39**		**6.37**		**6.37**		**7.57**		**5.74**	
Turbidity	NTU	NS	**7.57**		**8.73**		**8.73**		**13.0**		**4.88**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = Non detect
µg/L = microgram per liter
mg/L = milligram per lter

Table D-8
Devens Consolidation Landfill Groundwater Analytical Results, October/December 2017
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 LFM-99-05A	Q	LFM-99-06RF	Q	LFM-03-07	Q
			10/26/2017		10/27/2017		10/13/2016		10/26/2017		12/4/2017	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C9-C18 Aliphatic Hydrocarbons	µg/L	700	96	U	100	U	110	U	95	U	95	U
C19-C36 Aliphatic Hydrocarbons	µg/L	14,000	96	U	100	U	110	U	95	U	95	U
C11-C22 Aromatic Hydrocarbons	µg/L	200	96	U	100	U	110	U	95	U	95	U
Naphthalene	µg/L	140	1.9	U	2.1	U	2.2	U	1.9	U	1.9	U
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C5-C8 Aliphatics	µg/L	300	100	U	100	U	100	U	100	U	100	U
C9-C12 Aliphatics	µg/L	700	100	U	100	U	100	U	100	U	100	U
C9-C10 Aromatics	µg/L	200	100	U	100	U	100	U	100	U	100	U
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzene	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Toluene	µg/L	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	µg/L	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylenes	µg/L	10,000	10	U	10	U	10	U	10	U	10	U
o -Xylene	µg/L	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pesticides (SW846 8081B)												
All Compounds			ND		ND		ND		ND		ND	
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	UJ	**4.3**	**J**	3.0	U	3.0	U
Barium, Total	µg/L	2,000	**19**		**24**	**J**	**31**	**J**	**10**		**18**	
Cadmium, Total	µg/L	5.0	0.4	U	0.4	UJ	0.4	UJ	0.4	U	0.4	U
Chromium, Total	µg/L	100	4.0	U	4.0	UJ	**3.5**	**J**	4.0	U	4.0	U
Copper, Total	µg/L	NS	4.0	U	4.0	UJ	4.0	UJ	4.0	U	4.0	U
Iron, Total	µg/L	NS	75	U	**64**	**J**	**1,500**	**J**	75	U	75	U

Table D-8 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results, October/December 2017
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 LFM-99-05A	Q	LFM-99-06RF	Q	LFM-03-07	Q
			10/26/2017		10/27/2017		10/13/2016		10/26/2017		12/4/2017	
Lead, Total	µg/L	15	2.5	U	2.5	UJ	**3.8**	**J**	2.5	U	2.5	U
Manganese, Total	µg/L	NS	5.0	U	**2.7**	**J**	**91**	**J**	**7.7**		**2.3**	J
Selenium, Total	µg/L	50	2.5	U	2.5	UJ	2.5	UJ	2.5	U	2.5	U
Silver, Total	µg/L	100	**0.56**	**J**	0.3	UJ	0.3	UJ	0.3	U	0.3	U
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
General Chemistry												
Cyanide, Total	mg/L	0.20	0.005	U	0.005	U	**0.0038**	**J**	0.005	U	0.005	U
Nitrate/Nitrite (as N)	mg/L	NS	**0.78**		**3.3**		**3.3**		**1.7**		**2.7**	
Chemical Oxygen Demand	mg/L	NS	10	U	10	U	10	U	10	U	**6.2**	J
Chloride	mg/L	NS	**440**		**270**		**270**		**390**		**250**	
Sulfate	mg/L	NS	**21**		**23**		**23**		**34**		**36**	
Alkalinity as CaCO3	mg/L	NS	**87**		**78**		**79**		**140**		**130**	
TDS	mg/L	NS	**790**		**550**		**550**		**810**		**600**	
Field Parameters												
Temperature	°Celcius	NS	**11.16**		**10.87**		**10.87**		**12.99**		**10.57**	
ORP	mV	NS	**111.1**		**138.9**		**138.9**		**105.9**		**115.0**	
pH	Std units	NS	**6.72**		**6.42**		**6.42**		**6.82**		**6.17**	
Specific Conductance	µS/cm	NS	**1,371**		**912**		**912**		**1,327**		**71**	
Dissolved Oxygen	mg/L	NS	**3.18**		**2.85**		**2.85**		**2.86**		**4.17**	
Turbidity	NTU	NS	**2.59**		**4.39**		**4.39**		**5.03**		**3.80**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = Non detect
µg/L = microgram per liter
mg/L = milligram per lter

Table D-9
Devens Consolidation Landfill Leachate Analytical Results, October 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

MassDevelopment Industrial Wastewater Discharge Permit No. 017 (Summary)

Analytical Fraction	Parameter	Limitations (mg/L)	Fall 2017 - Annual Sampling Event
			Date Sampled: 10/27/2017
			Concentrations (mg/L)
Metals composite	Arsenic	0.20	0.003 U
	Cadmium	0.045	0.0004 U
	Chromium	0.40	0.004 U
	Copper	0.75	**0.0021 J**
	Lead	0.20	0.0025 U
	Nickel	0.60	**0.0028 J**
	Silver	0.30	0.003 U
	Zinc	0.70	0.0020 U
	Mercury	0.001	0.0002 U
TTO	Total Toxic Organics	5.00	ND
TSS	Total Suspended Solids	400	**5.2**
Cyanide	Cyanide (total)	NL	0.005 UJ
TPH	TPH (DRO)	NL	**2.80**
Phenols	Phenols (total)	NL	0.05 U
pH *grab sample*	pH (units)	5.5 – 9.5	**7.7**

Notes:
Detections are bolded.
mg/L = milligram per liter
NL = No limit
U = The target analyte was not detected at or above the laboratory reporting limit.
J = Estimated result
TTO = Total Toxic Organics (sum of VOCs, SVOCs, Pesticides and PCBs)
VOCs = Volatile Organic Compounds
SVOCs = SemiVolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
TSS = Total Suspended Solids
TPH = Total Petroleum Hydrocarbons

Table D-10
Devens Consolidation Landfill Groundwater Analytical Results, April 2018
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 (LFM-99-05A)	Q	LFM-99-06A RP	Q	LFM-03-07	Q
			4/6/2018		4/5/2018		4/5/2018		4/5/2018		4/6/2018	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C_9-C_{18} Aliphatic Hydrocarbons	µg/L	700	99	U	110	U	97	U	96	U	95	U
C_{19}-C_{36} Aliphatic Hydrocarbons	µg/L	14,000	99	U	110	U	97	U	96	U	95	U
C_{11}-C_{22} Aromatic Hydrocarbons	µg/L	200	99	U	110	U	97	U	96	U	95	U
PAH All Compounds	µg/L		ND	U	ND	U	ND	U	ND	U	ND	U
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C_5-C_8 Aliphatics	µg/L	300	100	U	100	U	100	U	100	U	100	U
C_9-C_{12} Aliphatics	µg/L	700	100	U	100	U	100	U	100	U	100	U
C_9-C_{10} Aromatics	µg/L	200	100	U	100	U	100	U	100	U	100	U
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzene	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Toluene	µg/L	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	µg/L	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylenes	µg/L	10,000	10	U	10	U	10	U	10	U	10	U
o -Xylene	µg/L	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pesticides (SW846 8081B)												
All Compounds			ND	U	ND	U	ND	U	ND	U	ND	U
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Barium, Total	µg/L	2,000	**22**		**10**		**11**		**4.3**		**11**	
Cadmium, Total	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Chromium, Total	µg/L	100	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Copper, Total	µg/L	1,300	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Iron, Total	µg/L	NS	50	U	**25**	J	50	U	50	U	50	U
Lead, Total	µg/L	15	10	U	10	U	10	U	10	U	10	U
Manganese, Total	µg/L	NS	3.0	U	**2.2**	J	3.0	U	3.0	U	3.0	U
Selenium, Total	µg/L	50	20	U	20	U	20	U	20	U	20	U
Silver, Total	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U

Table D-10 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results, April 2018
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 (LFM-99-05A)	Q	LFM-99-06A RP	Q	LFM-03-07	Q
			4/6/2018		4/5/2018		4/5/2018		4/5/2018		4/6/2018	
General Chemistry												
Cyanide, Total	mg/L	0.20	**0.0048**	**J**	**0.0032**	**J**	0.020	J	0.005	U	**0.0048**	**J**
Nitrate/Nitrite (as N)	mg/L	NS	**0.60**		**1.3**		**1.3**		**1.1**		**1.8**	
Chemical Oxygen Demand	mg/L	NS	**10**	**J**	10	U	10	U	**7.0**	**J**	**5.0**	**J**
Chloride	mg/L	NS	**350**		**160**		**160**		**340**		**220**	
Sulfate	mg/L	NS	**20**		**19**		**19**		**27**		**28**	
Alkalinity as CaCO3	mg/L	NS	**48**		**79**		**86**		**75**		**76**	
TDS	mg/L	NS	**660**		**380**		**390**		**670**		**480**	
Water Quality Parameters												
Temperature	°Celcius	NS	**7.83**		**10.57**		**10.57**		**10.39**		**7.53**	
ORP	mV	NS	**80.9**		**74.7**		**74.7**		**82.3**		**68.0**	
pH	Std units	NS	**6.27**		**6.42**		**6.42**		**6.42**		**6.23**	
Specific Conductance	µS/cm	NS	**1,196**		**682**		**682**		**1,199**		**863**	
Dissolved Oxygen	mg/L	NS	**8.13**		**5.89**		**5.89**		**5.88**		**7.15**	
Turbidity	NTU	NS	**2.91**		**2.29**		**2.29**		**4.22**		**3.15**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above the laboratory reporting limit.
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per lter
mV = millivolts

Table D-11
Devens Consolidation Landfill Groundwater Analytical Results, October 2018
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 LFM-99-05A	Q	LFM-99-06RF	Q	LFM-03-07	Q
			10/12/2018		10/12/2018		10/12/2018		10/11/2018		10/11/2018	
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAHs												
C_9-C_{18} Aliphatic Hydrocarbons	µg/L	700	71	U	71	U	71	U	71	U	71	U
C_{19}-C_{36} Aliphatic Hydrocarbons	µg/L	14,000	71	U	71	U	71	U	71	U	71	U
C_{11}-C_{22} Aromatic Hydrocarbons	µg/L	200	71	U	71	U	71	U	71	U	71	U
PAH - All Compounds	µg/L		ND	U	ND	U	ND	U	ND	U	ND	U
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C_5-C_8 Aliphatics	µg/L	300	100	U	75	U	75	U	75	U	75	U
C_9-C_{12} Aliphatics	µg/L	700	100	U	75	U	75	U	75	U	75	U
C_9-C_{10} Aromatics	µg/L	200	100	U	75	U	75	U	75	U	75	U
Methyl tert-butyl ether	µg/L	70	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzene	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Toluene	µg/L	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	µg/L	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylenes	µg/L	10,000	10	U	10	U	10	U	10	U	10	U
o -Xylene	µg/L	10,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Naphthalene	µg/L	140	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pesticides (SW846 8081B)												
Pesticides - All Compounds	ND		ND	U	ND	U	ND	U	ND	U	ND	U
Metals (Select List)												
Arsenic, Dissolved	µg/L	10	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Barium, Dissolved	µg/L	2,000	5.0	U	**9.8**	**J**	**10**		5.0	U	**11**	
Cadmium, Dissolved	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Chromium, Dissolved	µg/L	100	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Copper, Dissolved	µg/L	NS	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Iron, Dissolved	µg/L	NS	50	U	50	U	50	U	50	U	50	U

Table D-11 (Continued)
Devens Consolidation Landfill Groundwater Analytical Results, October 2018
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B	Q	LFM-99-05A	Q	LFM-DUP01 LFM-99-05A	Q	LFM-99-06RP	Q	LFM-03-07	Q
			10/12/2018		10/12/2018		10/12/2018		10/11/2018		10/11/2018	
Lead, Dissolved	µg/L	15	10	U	10	U	10	U	10	U	10	U
Manganese, Dissolved	µg/L	NS	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Selenium, Dissolved	µg/L	50	20	U	20	U	20	U	20	U	20	U
Silver, Dissolved	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
General Chemistry												
Cyanide, Total	mg/L	0.20	**0.0044**	**J**	0.0050	U	**0.0029**	**J**	**0.0025**	**J**	0.0050	U
Nitrate/Nitrite (as N)	mg/L	NS	**0.69**		**0.92**		**0.92**		**1.1**		**1.3**	
Chemical Oxygen Demand	mg/L	NS	10	U	10	U	10	U	10	U	10	U
Chloride	mg/L	NS	**250**		**180**		**180**		**310**		**260**	
Sulfate	mg/L	NS	**25**		**25**		**25**		**34**		**34**	
Alkalinity as CaCO3	mg/L	NS	**87**		**99**		**96**		**100**		**110**	
TDS	mg/L	NS	**540**		**420**		**410**		**630**		**560**	
Field Parameters												
Temperature	°Celcius	NS	**12.1**		**11.4**		**11.4**		**12.6**		**16.3**	
ORP	mV	NS	**1040**		**776**		**776**		**1240**		**1090**	
pH	Std units	NS	**5.95**		**6.38**		**6.38**		**5.96**		**5.71**	
Specific Conductance	µS/cm	NS	**226**		**213**		**213**		**173**		**182**	
Dissolved Oxygen	mg/L	NS	**3.89**		**1.41**		**1.41**		**5.18**		**2.82**	
Turbidity	NTU	NS	**2.47**		**12.9**		**12.9**		**1.21**		**1.95**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above the laboratory reporting limit.
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per lter
mV = millivolts

Table D-12
Devens Consolidation Landfill Leachate Analytical Results, December 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

MassDevelopment Industrial Wastewater Discharge Permit No. 017 (Summary)

Analytical Fraction	Parameter	Limitations (mg/L)	Fall 2018 - Annual Sampling Event
			Date Sampled: 12/07/2018
			Concentrations (mg/L)
Metals composite	Arsenic	0.20	**0.0044**
	Cadmium	0.045	0.003 U
	Chromium	0.40	0.004 U
	Copper	0.75	0.005 U
	Lead	0.20	0.010 U
	Nickel	0.60	**0.0026 J**
	Silver	0.30	0.015 U
	Zinc	0.70	0.020 U
	Mercury	0.001	0.0002 U
TTO	Total Toxic Organics	5.00	ND
TSS	Total Suspended Solids	400	**19**
Cyanide	Cyanide (total)	NL	0.005 U
TPH	TPH (DRO)	NL	**0.37 J**
Phenols	Phenols (total)	NL	0.05 U
pH *grab sample*	pH (units)	5.5 – 9.5	**8.2**

Notes:
Detections are bolded.
mg/L = milligram per liter
ND = non-detect
NL = No limit
U = The target analyte was not detected at or above the laboratory reporting limit.
J = Estimated result
TTO = Total Toxic Organics (sum of VOCs, SVOCs, Pesticides and PCBs)
VOCs = Volatile Organic Compounds
SVOCs = SemiVolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
TSS = Total Suspended Solids
TPH = Total Petroleum Hydrocarbons

Table D-13
Devens Consolidation Landfill Leachate Annual Discharge Quantities
Main Post, Former Fort Devens Army Installation, Massachusetts

Period	Discharge Quantities (Gallons)																	
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Annual Total	1,259,866	960,394	473,802	414,858	390,085	277,626	304,547	237,983	217,155	353,618	204,483	225,768	237,752	190,403	209,849	261,989	320,357	193,649
Total Leachate Discharge Quantity (2002-2019) =																		**6,734,184**

Notes:
In 2002, startup was during the April to June period.
During 2003, the April to June period is estimated due to a broken flow meter.

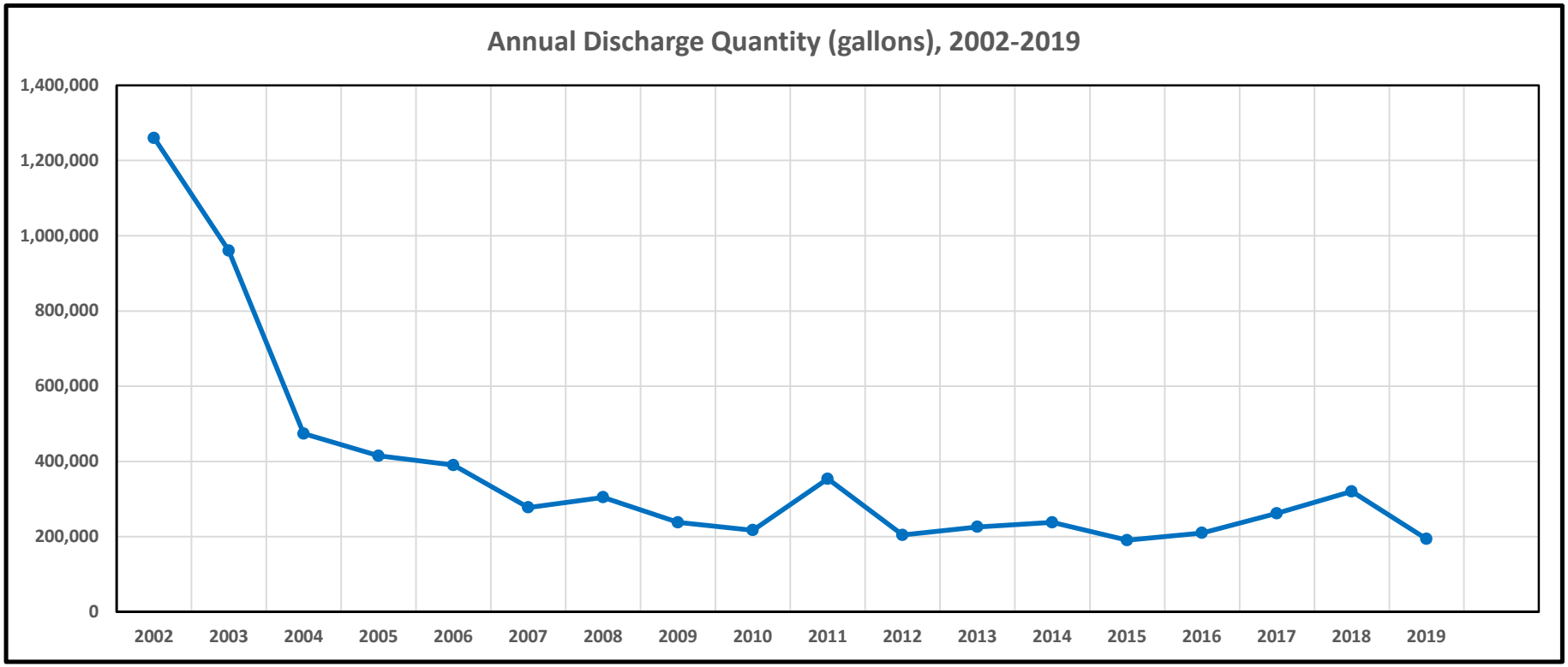


Table D-14
Devens Consolidation Landfill Groundwater Analytical Results, Spring 2019
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B		LFM-99-05A		LFM-DUP01 (LFM-99-05A)		LFM-99-06ARP		LFM-03-07	
			4/10/2019	Q	4/9/2019	Q	4/9/2019	Q	4/10/2019	Q	4/10/2019	Q
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAH												
C_9-C_{18} Aliphatic Hydrocarbons	µg/L	700	80	U	80	U	76	U	76	U	82	U
C_{19}-C_{36} Aliphatic Hydrocarbons	µg/L	14,000	80	U	80	U	76	U	76	U	82	U
C_{11}-C_{22} Aromatic Hydrocarbons	µg/L	200	80	U	80	U	76	U	76	U	82	U
PAH All Compounds	µg/L		ND	U	ND	U	ND	U	ND	U	ND	U
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C_5-C_8 Aliphatics	µg/L	300	75	U	75	U	75	UJ	75	U	75	UJ
C_9-C_{12} Aliphatics	µg/L	700	75	U	75	U	75	UJ	75	U	75	UJ
C_9-C_{10} Aromatics	µg/L	200	75	U	75	U	75	UJ	75	U	75	UJ
Methyl tert-butyl ether	µg/L	70	3.8	U	3.8	U	3.8	UJ	3.8	U	3.8	UJ
Benzene	µg/L	5.0	2.0	U	2.0	U	2.0	UJ	2.0	U	2.0	UJ
Toluene	µg/L	1,000	3.8	U	3.8	U	3.8	UJ	3.8	U	3.8	UJ
Ethylbenzene	µg/L	700	3.8	U	3.8	U	3.8	UJ	3.8	U	3.8	UJ
m,p -Xylenes	µg/L	10,000	7.5	U	7.5	U	7.5	UJ	7.5	U	7.5	UJ
o -Xylene	µg/L	10,000	3.8	U	3.8	U	3.8	UJ	3.8	U	3.8	UJ
Naphthalene	µg/L	140	3.8	U	3.8	U	3.8	UJ	3.8	U	3.8	UJ
Pesticides (SW846 8081B)												
p,p'-DDT	µg/L	0.30	ND	UJ	ND	UJ	ND	UJ	ND	UJ	**0.010**	J
All other Pesticide compounds	µg/L		ND	UJ	ND	UJ	ND	UJ	ND	UJ	ND	UJ
Total Metals (Select List)												
Arsenic, Total	µg/L	10	3.0	U	3.0	U	**1.8**	J	3.0	U	3.0	U
Barium, Total	µg/L	2,000	**5.8**	J	**6.7**	J	**8.0**	J	**3.4**	J	**21**	
Cadmium, Total	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Chromium, Total	µg/L	100	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Copper, Total	µg/L	1,300	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Iron, Total	µg/L	NS	50	U	**130**	J	**490**	J	50	U	50	U
Lead, Total	µg/L	15	10	U	10	U	10	U	10	U	10	U
Manganese, Total	µg/L	NS	3.0	U	**4.9**	J	**14**		3.0	U	**1.8**	J
Selenium, Total	µg/L	50	20	U	20	U	20	U	20	U	**14**	J
Silver, Total	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U

Table D-14
Devens Consolidation Landfill Groundwater Analytical Results, Spring 2019
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B		LFM-99-05A		LFM-DUP01 (LFM-99-05A)		LFM-99-06ARP		LFM-03-07	
			4/10/2019	Q	4/9/2019	Q	4/9/2019	Q	4/10/2019	Q	4/10/2019	Q
General Chemistry												
Cyanide, Total	mg/L	0.20	0.0050	U	0.0050	U	0.0050	U	**0.0050**	J	0.0050	U
Nitrate/Nitrite (as N)	mg/L	NS	**0.28**		**0.47**		**0.49**		**0.81**		**1.2**	
Chemical Oxygen Demand	mg/L	NS	20	U	20	U	20	U	20	U	20	U
Chloride	mg/L	NS	**180**	J	**98**		**97**		**250**		**250**	
Sulfate	mg/L	NS	**20**		**20**		**20**		**27**		**28**	
Alkalinity as CaCO3	mg/L	NS	**65**		**90**		**89**		**100**		**95**	
TDS	mg/L	NS	**390**		**290**		**290**		**550**		**580**	
Water Quality Parameters												
Temperature	°Celsius	NS	**8.3**		**9.6**		**9.6**		**9.8**		**6.8**	
ORP	mV	NS	**210**		**89**		**89**		**140**		**200**	
pH	Std units	NS	**6.4**		**6.5**		**6.5**		**6.4**		**6.3**	
Specific Conductance	µS/cm	NS	**820**		**540**		**540**		**1,100**		**1,200**	
Dissolved Oxygen	mg/L	NS	**6.7**		**7.1**		**7.1**		**5.2**		**9.4**	
Turbidity	NTU	NS	**0.75**		**12**		**12**		**3.1**		**11**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above the laboratory reporting limit.
UJ = Estimated non-detect because of QC outliers.
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per lter
mV = millivolts
µS/cm = microsiemens per centimeter
NTU - nephelometric turbidity units

Table D-15
Devens Consolidation Landfill Groundwater Analytical Results, Fall 2019
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B		LFM-99-05A		LFM-DUP01 LFM-99-05A		LFM-99-06ARP		LFM-03-07	
			10/4/2019	Q	10/8/2019	Q	10/8/2019	Q	10/8/2019	Q	10/8/2019	Q
MADEP Extractable Petroleum Hydrocarbons (EPH) and Target PAHs												
C_9-C_{18} Aliphatic Hydrocarbons	µg/L	700	74	U	78	U	74	U	71	U	NS / Dry	
C_{19}-C_{36} Aliphatic Hydrocarbons	µg/L	14,000	74	U	78	U	74	U	71	U	NS / Dry	
C_{11}-C_{22} Aromatic Hydrocarbons	µg/L	200	74	U	78	U	74	U	71	U	NS / Dry	
PAH - All Compounds	µg/L		ND	U	ND	U	ND	U	ND	U	NS / Dry	
MADEP Volatile Petroleum Hydrocarbons (VPH) and BTEX												
C_5-C_8 Aliphatics	µg/L	300	75	U	75	U	75	U	75	U	NS / Dry	
C_9-C_{12} Aliphatics	µg/L	700	75	U	75	U	75	U	75	U	NS / Dry	
C_9-C_{10} Aromatics	µg/L	200	75	U	75	U	75	U	75	U	NS / Dry	
Methyl tert-butyl ether	µg/L	70	3.8	U	3.8	U	3.8	U	3.8	U	NS / Dry	
Benzene	µg/L	5.0	2.0	U	2.0	U	2.0	U	2.0	U	NS / Dry	
Toluene	µg/L	1,000	3.8	U	3.8	U	3.8	U	3.8	U	NS / Dry	
Ethylbenzene	µg/L	700	3.8	U	3.8	U	3.8	U	3.8	U	NS / Dry	
m,p -Xylenes	µg/L	10,000	7.5	U	7.5	U	7.5	U	7.5	U	NS / Dry	
o -Xylene	µg/L	10,000	3.8	U	3.8	U	3.8	U	3.8	U	NS / Dry	
Naphthalene	µg/L	140	3.8	U	3.8	U	3.8	U	3.8	U	NS / Dry	
Pesticides (SW846 8081B)												
Pesticides - All Compounds	µg/L		ND	U	ND	U	ND	U	ND	U	NS / Dry	
Metals (Select List)												
Arsenic, Dissolved	µg/L	10	3.0	U	3.0	U	3.0	U	3.0	U	NS / Dry	
Barium, Dissolved	µg/L	2,000	**24**		**22**		**24**		**9.5**	J	NS / Dry	
Cadmium, Dissolved	µg/L	5.0	3.0	U	3.0	U	3.0	U	3.0	U	NS / Dry	
Chromium, Dissolved	µg/L	100	4.0	U	4.0	U	4.0	U	4.0	U	NS / Dry	
Copper, Dissolved	µg/L	NS	5.0	U	5.0	U	5.0	U	5.0	U	NS / Dry	
Iron, Dissolved	µg/L	NS	50	U	**34**	J	50	U	50	U	NS / Dry	
Lead, Dissolved	µg/L	15	10	U	10	U	10	U	10	U	NS / Dry	
Manganese, Dissolved	µg/L	NS	3.0	U	3.0	U	3.0	U	3.0	U	NS / Dry	
Selenium, Dissolved	µg/L	50	20	U	20	U	20	U	**12**	J	NS / Dry	
Silver, Dissolved	µg/L	100	1.5	U	1.5	U	1.5	U	1.5	U	NS / Dry	
Mercury	µg/L	2.0	0.20	U	0.20	U	0.20	U	0.20	U	NS / Dry	

Table D-15
Devens Consolidation Landfill Groundwater Analytical Results, Fall 2019
Main Post, Former Devens Army Installation, Massachusetts

	Units	Monitoring Criteria	LFM-99-02B		LFM-99-05A		LFM-DUP01 LFM-99-05A		LFM-99-06ARP		LFM-03-07	
			10/4/2019	Q	10/8/2019	Q	10/8/2019	Q	10/8/2019	Q	10/8/2019	Q
General Chemistry												
Cyanide, Total	mg/L	0.20	**0.0026**	J	0.0050	U	0.0050	U	0.0050	U	NS / Dry	
Nitrate/Nitrite (as N)	mg/L	NS	**0.55**	J	**0.82**		**0.92**		**1.3**		NS / Dry	
Chemical Oxygen Demand	mg/L	NS	40	UJ	20	U	20	U	**9.8**	J	NS / Dry	
Chloride	mg/L	NS	**420**		**220**		**220**		**340**		NS / Dry	
Sulfate	mg/L	NS	**19**		**21**		**21**		**26**		NS / Dry	
Alkalinity as CaCO3	mg/L	NS	**89**		**88**		**89**		**130**		NS / Dry	
TDS	mg/L	NS	**850**		**540**		**530**		**850**		NS / Dry	
Field Parameters												
Temperature	°Celcius	NS	**11**		**11**		**11**		**13**		NS / Dry	
ORP	mV	NS	**190**		**190**		**190**		**160**		NS / Dry	
pH	Std units	NS	**6.4**		**6.3**		**6.3**		**6.5**		NS / Dry	
Specific Conductance	µS/cm	NS	**1,600**		**920**		**920**		**1,400**		NS / Dry	
Dissolved Oxygen	mg/L	NS	**8.7**		**5.6**		**5.6**		**5.2**		NS / Dry	
Turbidity	NTU	NS	**0.52**		**7.6**		**7.6**		**2.0**		NS / Dry	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria

J = Estimated Result
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above the laboratory reporting limit.
UJ = Estimated non-detect because of QC outliers.
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per lter
mV = millivolts
µS/cm = microSiemens per centimeter
NTU - nephelometric turbidity units

Table D-16
Devens Consolidation Landfill Leachate Analytical Results, Fall 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

MassDevelopment Industrial Wastewater Discharge Permit No. 017 (Summary)

Analytical Fraction	Parameter	Limitations (mg/L)	Fall 2019 - Annual Sampling Event	
			Date Sampled: 10/23/2019	
			Concentrations (mg/L)	
Metals composite	Arsenic	0.20	**0.0015**	J
	Cadmium	0.045	0.003	U
	Chromium	0.40	0.004	U
	Copper	0.75	0.005	U
	Lead	0.20	0.01	U
	Nickel	0.60	**0.0031**	J
	Silver	0.30	0.0015	U
	Zinc	0.70	0.02	U
	Mercury	0.001	0.0002	U
TTO	Total Toxic Organics	5.00	**0.016**	J
TSS	Total Suspended Solids	400	**12**	
Cyanide	Cyanide (total)	NL	0.0050	U
TPH	TPH (DRO)	NL	**2.6**	
Phenols	Phenols (total)	NL	0.050	U
pH *grab sample*	pH (units)	5.5 – 9.5	**7.7**	

Notes:
Detections are bolded.
mg/L = milligram per liter
ND = non-detect
NL = No limit
U = The target analyte was not detected at or above the laboratory reporting limit.
J = Estimated result
TTO = Total Toxic Organics (sum of VOCs, SVOCs, Pesticides and PCBs)
VOCs = Volatile Organic Compounds
SVOCs = SemiVolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
TSS = Total Suspended Solids
TPH = Total Petroleum Hydrocarbons

Table D-17
Devens Consolidation Landfill Historical Groundwater Data, LFM-99-02B
Main Post, Former Devens Army Installation, Massachusetts

LFM-99-02B	Units	Monitoring Criteria	Spring 2003	Q	Fall 2003	Q	Spring 2004	Q	Fall 2004	Q	Spring 2005	Q	Fall 2005	Q	Spring 2006	Q	Spring 2007	Q	Spring 2008	Q	Fall 2008	Q	Spring 2009	Q	Fall 2009	Q	Spring 2010	Q	Fall 2010	Q	Spring 2011	Q	Fall 2011	Q
Extractable Petroleum Hydrocarbons (EPH)																																		
Naphthalene	µg/L	140	1.0	U	5.1	U	2.4	U	2.1	U	10.0	U	0.400	U	0.2	U	0.46	U	0.412	U	0.430	U	10	U	NA		0.419	U	0.400	U	0.400	U	0.400	U
Pesticides																																		
Aldrin	µg/L	0.50	0.0064	U	0.0067	U	0.0076	U	0.0076	U	0.05	UJ	0.200	UJ	0.05	U	0.0217	U	0.021	UJ	0.021	UJ	0.200	UJ	NA		0.020	U	0.020	U	0.020	U	0.020	U
Dieldrin	µg/L	0.10	0.013	U	0.0013	U	0.015	U	0.014	U	0.1	U	0.040	UJ	0.05	U	0.0435	U	0.043	UJ	0.042	UJ	0.040	UJ	NA		0.040	U	0.040	U	0.040	U	0.040	U
alpha-Chlordane	µg/L	2.0	0.0064	U	0.0067	U	0.0076	U	0.071	U	0.05	U	0.020	UJ	0.05	U	0.0217	U	0.021	UJ	0.021	UJ	0.020	UJ	NA		0.020	U	0.020	U	0.020	U	0.020	U
gamma-Chlordane	µg/L	2.0	0.0064	U	**0.0053**	**J**	0.0076	U	0.071	U	0.05	U	0.020	UJ	0.05	U	0.0217	U	0.021	UJ	0.021	UJ	0.020	UJ	NA		0.020	U	0.020	U	0.020	U	0.020	U
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
gamma-BHC (Lindane)	µg/L	0.20	0.0064	U	0.0067	U	0.0076	U	0.0076	U	0.05	U	0.020	UJ	0.05	U	0.0217	U	0.021	UJ	0.021	UJ	0.020	UJ	NA		0.020	U	0.020	U	0.020	U	0.020	U
Dissolved Metals																																		
Arsenic	µg/L	10	5.0	U	50.0	U	5.0	U	5.0	U	4.2	U	**5.0**	**J**	2.5	U	5.0	U	5.0	U	5.0	U	5	U	5	U	5	U	5	U	5	U	**2**	J
Chromium	µg/L	100	**28**		**1.7**	**J**	**0.96**	**J**	**1.07**	**J**	12.0	U	NA		10.0	U	10.0	U	10	U	10	U	5	U	**40**		10	U	10	U	10	U	10	U
Iron	µg/L	NS	NA		100	U	**17**	**J**	100	U	38.0	U	**32**	**J**	50.0	U	50.0	U	50	U	**28**	**J**	50	U	**380**		50	U	50	U	50	U	50	U
Lead	µg/L	15	5.0	U	**8.5**	**J**	5.0	U	5.0	U	**3.1**		10	U	2.5	U	10.0	U	10	U	10	U	**10**	**J**	10	U	10	U	10	U	10	U	**3**	J
Manganese	µg/L	NS	NA		**2.4**	**J**	**1.5**	**J**	**12.7**	**J**	**5.2**	**J**	10	U	10.0	U	**1.1**	**J**	10	U	10	U	10	U	**9.1**	**J**	10	U	10	U	10	U	10	U
General Chemistry																																		
Total Cyanide	mg/L	0.20	0.01	U	**0.004**	**J**	0.01	U	**0.005**	**J**	0.01	U	0.005	U	0.05	U	0.01	UJ	0.005	U	0.005	U	0.005	U	NA		**0.0011**	**J**	0.005	U	0.005	U	0.005	U
Nitrate/Nitrite (as N)	mg/L	NS	**0.21**		**1.4**		**0.66**		**0.796**		**0.36**	**J**	0.64	U	**0.45**		**0.5**		**0.43**	**J**	**1.9**		**0.92**		NA		**0.41**		**0.54**		**0.43**		**0.76**	
Chemical Oxygen Demand	mg/L	NS	**170**		50.0	U	**15**	**J**	50.0	U	20.0	U	20	U	10.0	U	20.0	U	20	U	**12**	**J**	20	U	NA		**20**		20	U	**8**	**J**	20	**U**
Water Quality Parameters																																		
pH	std	NS	**6.20**		**6.38**		**6.09**		**6.38**		**5.97**		**6.17**		**6.32**		**6.15**		**6.32**		**7.00**		**5.57**		**6.22**		**6.71**		**6.35**		**6.10**		**6.03**	
Oxidation-Reduction Potential	mV	NS	NA		**204.7**		**243.3**		**308.4**		**266.3**		**311.3**		**223.6**		**200.8**		**160.7**		**55.2**		**215.4**		**113**		**-232.2**		**163.6**		**150.1**		**142.2**	
Turbidity	NTU	NS	NA		**0.40**		**0.80**		**0.55**		**0.37**		**3.8**		**0.18**		**0.00**		**2.80**		**2.0**		**0.0**		**0.0**		**2.2**		**0.39**		**0.00**		**2.57**	

Notes:

0.333 = Detection

0.333 = Above monitoring criteria

J = Estimated result
NA = Not analyzed
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above the laboratory reporting limit.
UJ = Estimated non-detect
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per liter
mV = millivolts
µS/cm = microsiemens per centimeter
NTU - nephelometric turbidity units

Table D-17
Devens Consolidation Landfill Historical Groundwater Data, LFM-99-02B
Main Post, Former Devens Army Installation, Massachusetts

LFM-99-02B	Units	Monitoring Criteria	Spring 2012	Q	Fall 2012	Q	Spring 2013	Q	Fall 2013	Q	Spring 2014	Q	Fall 2014	Q	Spring 2015	Q	Fall 2015	Q	Spring 2016	Q	Fall 2016	Q	Spring 2017	Q	Fall 2017	Q	Spring 2018	Q	Fall 2018	Q	Spring 2019	Q	Fall 2019	Q
Extractable Petroleum Hydrocarbons (EPH)																																		
Naphthalene	µg/L	140	0.400	U	**0.148**	**J**	0.400	U	0.400	U	0.400	U	1.0	U	5.100	U	4.300	U	2.0	U	2.3	U	1.9	U	1.9	U	1.9	U	1.4	U	1.6	U	1.5	U
Pesticides																																		
Aldrin	µg/L	0.50	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.010	U	0.026	U	0.051	U	0.013	U	0.019	U	0.017	U	0.017	U	0.019	UJ	0.017	UJ	0.0086	UJ	0.0089	U
Dieldrin	µg/L	0.10	0.040	U	0.040	U	0.040	U	0.040	U	0.040	U	0.010	U	0.026	U	0.051	U	0.007	U	0.010	U	0.0096	U	0.0096	U	0.0110	UJ	0.0096	UJ	0.0048	U	0.0049	U
alpha-Chlordane	µg/L	2.0	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.054	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
gamma-Chlordane	µg/L	2.0	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.054	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		0.130	U	0.530	U	0.16	U	0.31	U	0.29	U	0.29	U	0.32	UJ	0.29	UJ	0.14	U	0.15	U
gamma-BHC (Lindane)	µg/L	0.20	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.011	U	0.026	U	0.051	U	0.007	U	0.010	U	0.0096	U	0.0096	U	0.0110	UJ	0.0096	UJ	0.0048	U	0.0049	U
Dissolved Metals																																		
Arsenic	µg/L	10	5	U	5	U	5	U	5	U	3	U	3	U	2.0	U	4.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Chromium	µg/L	100	10	U	10	U	10	U	10	U	10	U	10	U	5.0	U	10	U	4.0	U	**6.0**	**J**	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Iron	µg/L	NS	50	U	50	U	50	U	50	U	50	U	50	U	50	U	100	U	50	U	**28**		50	U	75	U	50	U	50	U	50	U	50	U
Lead	µg/L	15	10	U	10	U	10	U	10	U	10	U	10	U	2.5	U	5.0	U	10	U	10	U	10	U	2.5	U	10	U	15	U	10	U	10	U
Manganese	µg/L	NS	10	U	10	U	10	U	10	U	10	U	10	U	7.5	U	15	U	3.0	U	**2.0**	**J**	3.0	U	5.0	U	3.0	U	3.0	U	3.0	U	3.0	U
General Chemistry																																		
Total Cyanide	mg/L	0.20	**0.002**	**J**	**0.0020**	**J**	0.005	U	0.005	U	**0.0001**	**J**	0.004	U	0.0011	U	**0.0082**	**J**	0.005	U	**0.0082**	**J**	0.005	U	0.005	U	**0.0048**	**J**	**0.0044**	**J**	0.0050	U	**0.0026**	**J**
Nitrate/Nitrite (as N)	mg/L	NS	0.22	U	**0.49**		**0.069**	**J**	**0.51**		**0.52**		**0.36**		**0.390**		**0.630**		**0.60**		**0.630**		**0.47**		**0.78**		**0.60**		**0.69**		**0.28**		**0.55**	**J**
Chemical Oxygen Demand	mg/L	NS	20	U	20	U	**15**	**J**	20	U	**4.1**	**J**	10	U	15	U	20	U	10	U	20	U	**5.4**	**J**	10	U	**10**	**J**	10	U	20	U	40	UJ
Water Quality Parameters																																		
pH	std	NS	**6.25**		**6.29**		**5.87**		**6.45**		**6.00**		**6.51**		**6.07**		**---**		**6.16**		**6.44**		**6.55**		**6.72**		**6.27**		**5.95**		**6.4**		**6.4**	
Oxidation-Reduction Potential	mV	NS	**135.5**		**196.3**		**303.3**		**101.8**		**200.3**		**113.3**		**248.5**		**---**		**197.0**		**77.8**		**172.6**		**111.1**		**80.9**		**226**		**210**		**190**	
Turbidity	NTU	NS	**0.33**		**0.00**		**0.00**		**0.79**		**0.69**		**0.88**		**1.65**		**---**		**0.36**		**1.73**		**7.57**		**2.59**		**2.91**		**2.47**		**0.75**		**0.52**	

Notes:

0.333 = Detection

0.333 = Above monitoring

J = Estimated result
NA = Not analyzed
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U = The target analyte was not detected at or above the
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ND = non-detect
µg/L = microgram per liter
mg/L = milligram per liter
mV = millivolts
µS/cm = microsiemens per centimeter
NTU - nephelometric turbidity units

Table D-18
Devens Consolidation Landfill Historical Groundwater Data, LFM-99-05A
Main Post, Former Fort Devens Army Installation, Massachusetts

LFM-99-05A	Units	Monitoring Criteria	Spring 2003	Q	Fall 2003	Q	Spring 2004	Q	Fall 2004	Q	Spring 2005	Q	Spring 2006	Q	Spring 2007	Q	Spring 2008	Q	Fall 2008	Q	Spring 2009	Q	Fall 2009	Q	Winter 2010	Q	Spring 2010	Q	Fall 2010	Q	Spring 2011	Q	Fall 2011	Q
Extractable Petroleum Hydrocarbons (EPH)																																		
Naphthalene	µg/L	140	1.0	U	5.1	U	2.4	U	2.1	U	10.0	U	0.2	BJ	0.421	U	0.408	U	0.430	U	0.4	U	0.421	U	NA		0.426	U	0.400	U	0.400	U	0.400	U
Pesticides																																		
Aldrin	µg/L	0.50	0.0064	U	0.0067	U	0.0072	U	0.0072	U	0.05	U	0.05	U	0.0215	U	0.020	UJ	0.021	U	0.022	U	0.022	U	NA		0.021	U	0.021	U	0.020	U	0.020	U
Dieldrin	µg/L	0.10	0.013	U	0.013	U	0.014	U	0.014	U	0.1	U	0.05	U	0.043	U	0.040	UJ	0.042	U	0.044	U	0.044	U	NA		0.043	U	0.041	U	0.040	U	0.040	U
alpha-Chlordane	µg/L	2.0	0.0064	U	0.0067	U	0.0072	U	0.0072	U	0.05	U	0.05	U	0.0215	U	0.020	UJ	0.021	U	0.022	UJ	0.022	UJ	NA		0.021	U	0.021	U	0.020	U	0.020	U
gamma-Chlordane	µg/L	2.0	0.0064	U	0.0067	U	0.0072	U	0.0072	U	0.05	U	0.05	U	0.0215	U	0.020	UJ	0.021	U	0.022	U	0.022	U	NA		0.021	U	0.021	U	0.020	U	0.020	U
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
gamma BHC (Lindane)	µg/L	0.20	0.0064	U	0.0067	U	0.0072	U	0.0072	U	0.05	U	0.05	U	0.0215	U	0.020	UJ	0.021	U	0.022	U	0.022	U	NA		0.021	U	0.021	U	0.020	U	0.020	U
Metals (Total)																																		
Arsenic	µg/L	10	**7.5**		**6.9**	**J**	5.0	U	5.0	U	**4.2**	**J**	2.5	U	**2.4**	**J**	5.0	U	5.0	U	**2**	**J**	5.0	U	5	U	5	U	**4.6**	**J**	5	U	**3**	**J**
Chromium	µg/L	100	10.0	U	**1.6**	**J**	**7.7**	**J**	**1.37**	**J**	**6**	**J**	10.0	U	10.0	U	10	U	10	U	**20**		NA		**40**		10	U	10	U	10	U	10	U
Iron	µg/L	NS	NA		**96**	**J**	**130**		**33.3**	**J**	**666**		**93.2**		**70**		50	U	**70**		**510**		**20**	**J**	**380**		**70**		**480**		**50**	**J**	**20**	**J**
Lead	µg/L	15	**9.3**		**9.5**	**J**	5.0	U	5.0	U	2.9	U	2.5	U	10.0	U	10	U	10	U	**2**	**J**	10	U	10	U	10	U	10	U	10	U	**2**	**J**
Manganese	µg/L	NS	NA		**3.6**	**J**	**8.5**	**J**	**2.1**	**J**	**33.9**		10.0	U	**3.9**	**J**	10	U	**2.4**	**J**	**21**		10	U	**9.1**	**J**	10	U	**12.0**		10	U	10	U
General Chemistry																																		
Total Cyanide	mg/L	0.20	0.01	U	**0.004**	**J**	0.01	U	**0.009**	**J**	0.01	U	0.05	U	0.01	UJ	0.005	U	0.005	UJ	**0.002**	**J**	0.005	U	NA		0.005	U	0.005	U	0.005	U	0.005	U
Nitrate/Nitrite (as N)	mg/L	NS	**1.6**		**1.4**		**1.4**		**1.34**		**1**		**0.4**		**0.46**		**0.60**	**J**	**0.57**		**0.55**		**0.46**	**J**	NA		**0.64**		**0.49**	**J**	**0.51**		**0.42**	
Chemical Oxygen Demand	mg/L	NS	**100**		50.0	U	**13**	**J**	**12**	**J**	20.0	U	10.0	U	11.0	U	20	U	20	U	**8.1**	**J**	20	U	NA		20	U	24	U	**34**		20	U
Water Quality Parameters																																		
pH	std units	NS	**6.10**		**6.11**		**5.97**		**5.84**		**6.17**		**6.24**		**5.81**		**6.09**		**6.93**		**6.08**		**5.89**		**6.37**		**6.23**		**6.05**		**5.56**		**6.16**	
Oxidation-Reduction Potential	mV	NS	NA		**231.2**		**199.2**		**154.7**		**141.3**		**205.9**		**220.0**		**116.1**		**61.8**		**122**		**173.7**		**68.7**		**-223**		**180.6**		**238**		**-255.1**	
Turbidity	NTU	NS	NA		**4.43**		**2.59**		**2.50**		**26.2**		**2.51**		**3.60**		**0.58**		**2.33**		**4.1**		**4.67**		**6.2**		**1.7**		**2.8**		**3.1**		**2.40**	

Notes:

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µg/L = microgram per liter
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mV = millivolts
µS/cm = microsiemens per centimeter
NTU - nephelometric turbidity units

Table D-18
Devens Consolidation Landfill Historical Groundwater Data, LFM-99-05A
Main Post, Former Fort Devens Army Installation, Massachusetts

LFM-99-05A	Units	Monitoring Criteria	Spring 2012	Q	Fall 2012	Q	Spring 2013	Q	Fall 2013	Q	Spring 2014	Q	Fall 2014	Q	Spring 2015	Q	Fall 2015	Q	Spring 2016	Q	Fall 2016	Q	Spring 2017	Q	Fall 2017	Q	Spring 2018	Q	Fall 2018	Q	Spring 2019	Q	Fall 2019	Q
Extractable Petroleum Hydrocarbons (EPH)																																		
Naphthalene	µg/L	140	0.400	U	0.400	U	0.400	U	0.400	U	4.000	U	1.000	U	3.300	U	4.00	U	1.9	U	**3.20**		1.9	U	2.1	U	2.1	U	5.0	U	1.6	U	1.6	U
Pesticides																																		
Aldrin	µg/L	0.50	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.010	U	0.026	U	0.050	U	0.012	U	0.019	U	0.017	U	0.018	U	0.017	U	0.017	U	0.0093	UJ	0.0091	U
Dieldrin	µg/L	0.10	0.040	U	0.040	U	0.040	U	0.040	U	0.040	U	0.010	U	0.026	U	0.050	U	0.007	U	0.011	U	0.0096	U	0.010	U	0.0095	U	0.0096	U	0.0051	U	0.0051	U
alpha-Chlordane	µg/L	2.0	0.200	U	0.200	U	0.200	U	0.020	U	0.020	U	0.051	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
gamma-Chlordane	µg/L	2.0	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.051	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		0.130	U	0.500	U	0.15	U	0.32	U	0.29	U	0.30	U	0.29	U	0.29	U	0.15	U	0.15	U
gamma BHC (Lindane)	µg/L	0.20	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U	0.010	U	0.026	U	0.050	U	0.007	U	0.011	U	0.0096	U	0.010	U	0.0095	U	0.0096	U	0.0051	U	0.0051	U
Metals (Total)																																		
Arsenic	µg/L	10	5	U	5.0	U	5	U	5.0	U	5	U	3	U	**2.3**	J	4.0	U	**1.7**	**J**	3.0	U	3.0	U	3.0	UJ	3.0	U	3.0	U	3.0	U	3.0	U
Chromium	µg/L	100	10	U	10	U	10	U	10	U	10	U	5	U	5.0	U	10.0	U	4.0	U	4.0	U	4.0	U	4.0	UJ	4.0	U	4.0	U	4.0	U	4.0	U
Iron	µg/L	NS	50	U	**110**		50	U	**80**		**260**	**J**	50	U	**118**		**378**		**300**		**94**		50	U	**64**	**J**	**25**	**J**	50	U	**130**	**J**	**34**	**J**
Lead	µg/L	15	10	U	10	U	10	U	10	U	**2**	**J**	2.5	U	2.5	U	5.0	U	10	U	10.0	U	10	U	2.5	UJ	10	U	10.0	U	10	U	10	U
Manganese	µg/L	NS	10	U	**6.0**	**J**	10	U	**3.0**	**J**	**20**		7.5	U	7.5	U	**10.4**	**J**	**11**		**5.1**	**J**	3.0	U	**2.7**	**J**	**2.2**	**J**	3.0	U	**4.9**	**J**	3.0	U
General Chemistry																																		
Total Cyanide	mg/L	0.20	**0.002**	**J**	**0.004**	**J**	0.005	U	0.005	U	**0.0020**	**J**	0.0041	U	0.0011	U	0.0100	U	0.005	U	0.0050	U	0.0050	U	0.0050	U	**0.0032**	**J**	0.0050	U	0.0050	U	0.0050	U
Nitrate/Nitrite (as N)	mg/L	NS	**0.38**		**0.38**		**0.43**		**0.47**		**0.6**		**0.46**		**1.1**		**1.9**		**2.9**		**3.8**		**2.1**		**3.3**		**1.3**		**0.92**		**0.47**		**0.82**	
Chemical Oxygen Demand	mg/L	NS	20	U	**11**	**J**	**13**	**J**	20	U	20	U	10	U	15	U	20	U	10	U	10	U	10	U	10	U	10	U	10	U	20	U	20	U
Water Quality Parameters																																		
pH	std units	NS	**6.51**		**6.44**		**6.3**		**6.46**		**4.83**		**6.43**		**6.21**		**6.40**		**8.11**		**6.35**		**5.86**		**6.42**		**6.42**		**6.38**		**6.5**		**6.3**	
Oxidation-Reduction Potential	mV	NS	**106.4**		**195.9**		**219.6**		**145.4**		**235.6**		**181**		**218**		**134**		**-173.9**		**81.4**		**209.7**		**138.9**		**74.7**		**213.1**		**89**		**190**	
Turbidity	NTU	NS	**3.02**		**3.90**		**2.4**		**3.70**		**18.90**		**3.21**		**131**		**15**		**7.4**		**8.5**		**8.7**		**4.4**		**2.29**		**12.9**		**12**		**7.6**	

Notes:

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NTU - nephelometric turbidity units

Table D-19
Devens Consolidation Landfill Historical Groundwater Data - LFM-03-07
Main Post, Former Fort Devens Army Installation, Massachusetts

LFM-99-07/ LFM-03-07 (5/22/06)	Units	Monitoring Criteria	Spring 2003	Q	Fall 2003	Q	Spring 2004	Q	Fall 2004	Q	Spring 2005	Q	Spring 2006	Q	Spring 2007	Q	Spring 2008	Q	Fall 2008	Q	Spring 2009	Q	Fall 2009	Q	Spring 2010	Q	Fall 2010	Q	Spring 2011	Q	Fall 2011	Q
Extractable Petroleum Hydrocarbons (EPH)																																
Naphthalene	µg/L	140	1.0	U	5.4	U	2.4	U	2.1	U	10.0	U	0.2	BJ	0.46	U	0.417	U	0.426	U	10	U	NA		0.412	U	0.400	U	0.400	U	0.400	U
Pesticides																																
Aldrin	µg/L	0.50	0.0064	U	0.0067	U	0.0067	U	0.0070	U	0.05	UJ	0.05	U	0.020	U	0.024	UJ	0.021	U	0.023	U	NA		0.021	U	0.020	U	0.020	U	0.020	U
Dieldrin	µg/L	0.10	0.013	U	0.0013	U	0.015	U	0.014	U	0.1	U	0.05	U	0.040	U	0.048	UJ	0.043	U	0.046	U	NA		0.042	U	0.040	U	0.040	U	0.040	U
alpha-Chlordane	µg/L	2.0	0.0064	U	0.0067	U	0.0067	U	0.0070	U	0.05	U	0.05	U	0.020	U	0.024	UJ	0.021	U	0.023	U	NA		0.021	U	0.020	U	0.020	U	0.020	U
gamma-Chlordane	µg/L	2.0	0.0064	U	**0.0053**	**J**	0.0067	U	0.0070	U	0.05	U	0.05	U	0.020	U	0.024	UJ	0.021	U	0.023	U	NA		0.021	U	0.020	U	0.020	U	0.020	U
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
gamma-BHC (Lindane)	µg/L	0.20	0.0064	U	0.0067	U	0.0067	U	0.0070	U	0.05	U	0.05	U	0.020	U	0.024	UJ	0.021	U	0.023	U	NA		0.021	U	0.020	U	0.020	U	0.020	U
Metals (Total)																																
Arsenic	µg/L	10	**7.9**		***29.0***	***J***	5.0	U	**1.7**	**J**	4.2	U	2.5	U	**2.3**	**J**	5.0	U	5.0	U	5.0	U	NA		**3.3**	**J**	**2.5**	**J**	5	U	**4.0**	**J**
Chromium	µg/L	100	10	U	**35.0**		**8.10**	**J**	**5.38**	**J**	**7.4**	**J**	10.0	U	10.0	U	10	U	10	U	**2**	**J**	NA		**4.0**	**J**	**2.0**		10	U	10	U
Iron	µg/L	NS	NA		**17000**	**J**	**620**		25	U	**630.0**		50.0	U	50.0	U	50	U	50	U	50	U	NA		**230**		**730**		**20**	**J**	50	U
Lead	µg/L	15	13.0	U	***17.0***	***J***	5.0	U	5.0	U	2.9	U	2.5	U	10.0	U	10	U	10	U	**1.9**	**J**	NA		10	U	10	U	10	U	**3.0**	**J**
Manganese	µg/L	NS	NA		**200.0**	**J**	**14.0**	**J**	**10.0**	**J**	**22.8**		**0.7**	**J**	**0.7**	**J**	10	U	10	U	10	U	NA		**4.4**	**J**	**10**		10	U	10	U
General Chemistry																																
Total Cyanide	mg/L	0.20	0.01	U	**0.004**	**J**	0.01	U	0.010	B	0.01	U	0.05	U	0.01	UJ	0.005	U	0.005	U	0.005	U	NA		**0.0001**	**J**	0.005	U	0.005	U	0.005	U
Nitrate/Nitrite (as N)	mg/L	NS	**1.30**		**2.0**		**0.90**		**1.80**		**1.20**	**J**	**1.47**		**0.9**		**1.30**	**J**	**0.9**		**1.00**		NA		**1.10**		**0.98**		**0.96**		**0.93**	
Chemical Oxygen Demand	mg/L	NS	**86**		**26.0**	**J**	**18**	**J**	50.0	U	31.0	U	10.0	U	18.0	UJ	12	J	20	U	20	U	NA		**9.2**	**J**	20	U	20	U	26	U
Water Quality Parameters																																
pH	std units	NS	**6.00**		**6.27**		**5.54**		**6.15**		**6.15**		**6.22**		**6.06**		**8.14**		**5.95**		**5.96**		NA		**6.37**		**6.38**		**5.84**		**6.14**	
Oxidation-Reduction Potential	mV	NS	NA		**365.5**		**345.3**		**279.0**		**237.5**		**230.3**		**169.0**		**130.0**		**146.0**		**125.1**		NA		**-249.8**		**109.0**		**372.9**		**121.5**	
Turbidity	NTU	NS	NA		**10.90**		**3.52**		**11.70**		**0.25**		**0.49**		**0.50**		**2.00**		**3.4**		**3.2**		NA		**2.0**		**13.90**		**0.59**		**0.46**	

Notes:

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NTU - nephelometric turbidity units

Table D-19
Devens Consolidation Landfill Historical Groundwater Data - LFM-03-07
Main Post, Former Fort Devens Army Installation, Massachusetts

LFM-99-07/ LFM-03-07 (5/22/06)	Units	Monitoring Criteria	Spring 2012	Q	Fall 2012	Q	Spring 2013	Q	Fall 2013	Q	Spring 2014	Q	Fall 2014	Q	Spring 2015	Q	Fall 2015	Q	Spring 2016	Q	Fall 2016	Q	Spring 2017	Q	Fall 2017	Q	Spring 2018	Q	Fall 2018	Q	Spring 2019	Q	Fall 2019	Q
Extractable Petroleum Hydrocarbons (EPH)																																		
Naphthalene	µg/L	140	0.400	U	NA		0.400	U	NA		0.400	U	NA		5.1	U	NA/Dry		NA/Dry		NA/Dry		1.9	U	1.9	U	1.9	U	5.0	U	1.6	U	NA/Dry	
Pesticides																																		
Aldrin	µg/L	0.50	0.020	U	NA		0.020	U	NA		0.020	U	NA		0.026	U	NA/Dry		NA/Dry		NA/Dry		0.017	U	0.017	U	0.019	U	0.017	U	0.0092	UJ	NA/Dry	
Dieldrin	µg/L	0.10	0.040	U	NA		0.040	U	NA		0.040	U	NA		0.026	U	NA/Dry		NA/Dry		NA/Dry		0.0096	U	0.0096	U	0.0110	U	0.0096	U	0.0051	UJ	NA/Dry	
alpha-Chlordane	µg/L	2.0	0.020	U	NA		0.020	U	NA		0.020	U	NA		NA		NA/Dry		NA/Dry		NA/Dry		NA		NA		NA		NA		NA		NA/Dry	
gamma-Chlordane	µg/L	2.0	0.020	U	NA		0.020	U	NA		0.020	U	NA		NA		NA/Dry		NA/Dry		NA/Dry		NA		NA		NA		NA		NA		NA/Dry	
Chlordane	µg/L	2.0	NA		NA		NA		NA		NA		NA		0.130	U	NA/Dry		NA/Dry		NA/Dry		0.29	U	0.29	U	0.32	U	0.29	U	0.15	UJ	NA/Dry	
gamma-BHC (Lindane)	µg/L	0.20	0.020	U	NA		0.020	U	NA		0.020	U	NA		0.026	U	NA/Dry		NA/Dry		NA/Dry		0.0096	U	0.0096	U	0.0110	U	0.0096	U	0.0051	UJ	NA/Dry	
Metals (Total)																																		
Arsenic	µg/L	10	5	U	NA		5	U	NA		3	U	NA		**2.7**	**J**	NA/Dry		NA/Dry		NA/Dry		3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	NA/Dry	
Chromium	µg/L	100	10	U	NA		10	U	NA		10	U	NA		5.0	U	NA/Dry		NA/Dry		NA/Dry		4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	NA/Dry	
Iron	µg/L	NS	50	U	NA		50	U	NA		**20**	**J**	NA		50	U	NA/Dry		NA/Dry		NA/Dry		**1,900**		75	U	50	U	50	U	50	U	NA/Dry	
Lead	µg/L	15	10	U	NA		10	U	NA		10	U	NA		2.5	U	NA/Dry		NA/Dry		NA/Dry		10	U	2.5	U	10	U	10.0	U	10	U	NA/Dry	
Manganese	µg/L	NS	10	U	NA		10	U	NA		10	U	NA		7.5	U	NA/Dry		NA/Dry		NA/Dry		**110**		**2.3**	J	3.0	U	3.0	U	**1.8**	**J**	NA/Dry	
General Chemistry																																		
Total Cyanide	mg/L	0.20	0.005	U	NA		0.005	U	NA		**0.0001**	**J**	NA		**0.0018**	**J**	NA/Dry		NA/Dry		NA/Dry		**0.0033**	**J**	0.0050	U	**0.0048**	**J**	0.0050	U	0.0050	U	NA/Dry	
Nitrate/Nitrite (as N)	mg/L	NS	**1.0**		NA		**0.87**		NA		**0.99**		NA		**0.930**		NA/Dry		NA/Dry		NA/Dry		**1.7**		**2.7**		**1.8**		**1.3**		**1.2**		NA/Dry	
Chemical Oxygen Demand	mg/L	NS	20	U	NA		**18**	**J**	NA		**11**		NA		15	U	NA/Dry		NA/Dry		NA/Dry		**7.5**	**J**	**6.2**	**J**	**5.0**	**J**	10	U	20	U	NA/Dry	
Water Quality Parameters																																		
pH	std units	NS	**6.52**		NA		**5.76**		NA		**6.27**		NA		**6.16**		NA/Dry		NA/Dry		NA/Dry		**6.04**		**6.17**		**6.23**		**5.71**		**6.3**		NA/Dry	
Oxidation-Reduction Potential	mV	NS	**105.6**		NA		**284.3**		NA		**198.7**		NA		**135.5**		NA/Dry		NA/Dry		NA/Dry		**57.9**		**115.0**		**68.0**		**181.5**		**200**		NA/Dry	
Turbidity	NTU	NS	**0.00**		NA		**0.25**		NA		**0.80**		NA		**0.94**		NA/Dry		NA/Dry		NA/Dry		**4.88**		**3.80**		**3.15**		**1.95**		**11**		NA/Dry	

Notes:

0.333	= Detection
0.333	= Above monitoring (

J = Estimated result
NA = Not analyzed
NS = No Standard
Q = Qualifier
U = The target analyte was not detected at or above tl
UJ = Estimated non-detect
ND = non-detect
µg/L = microgram per liter
mg/L = milligram per liter
mV = millivolts
NTU - nephelometric turbidity units

Table D-20
Devens Consolidatoin Landfill Groundwater Analytical Results for PCBs, Fall 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

Analyte	Units	Monitoring Criteria	LFM-99-02B		LFM-99-05A		LFM-99-05A (FD)		LFM-99-06ARP	
			10/04/2019		10/08/2019		10/08/2019		10/08/2019	
PCB-1016 (Aroclor 1016)	µg/L	0.5	0.180	U	0.180	U	0.190	U	0.180	U
PCB-1221 (Aroclor 1221)	µg/L	0.5	0.160	U	0.170	U	0.170	U	0.170	U
PCB-1232 (Aroclor 1232)	µg/L	0.5	0.220	U	0.230	U	0.230	U	0.230	U
PCB-1248 (Aroclor 1248)	µg/L	0.5	0.220	U	0.230	U	0.230	U	0.230	U
PCB-1254 (Aroclor 1254)	µg/L	0.5	0.160	U	0.170	U	0.170	U	0.170	U
PCB-1260 (Aroclor 1260)	µg/L	0.5	0.180	U	0.180	U	0.190	U	0.180	U

Notes:
FD = field duplicate
U = The target analyte was not detected at or above the laboratory reporting limit.
µg/L = microgram per

D.4 Devens Consolidated Landfill Site

Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

+ contributor sites	I. SITE INFORMATION
Site name: Devens Consolidation Landfill	**Date of inspection:** 02/05/20
Location and Region: Devens, MA	**EPA ID:** MA 7210025 15
Agency, office, or company leading the five-year review: Koman Government Solutions	**Weather/temperature:** 35°F, Cloudy / Cold

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other leachate collection + transfer to POTW
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____

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

4. **Other interviews** (optional) ☐ Report attached.

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

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

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
☐ Other _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) [illegible] Interview
Frequency [illegible]
Responsible party/agency [illegible]
Contact _____ _____ _____ _____
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

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

D. General

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

2. **Land use changes on site** ☒ N/A
Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 Vegetation on [illegible] is managed by [illegible] vegetation removal Activities

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 except [illegible] Transfer Station

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

Leachate Train

C. ~~Treatment System~~ ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   - ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   - ☐ Air stripping ☐ Carbon adsorbers
   - ☐ 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~~ leachate transferred annually 200,000 to 375,000 gallons
   - ☐ Quantity of surface water treated annually
   - Remarks Collection sump for transfer to PATW

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 Fiber glass enclosure

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

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

2. Monitoring data suggests: N/A leachate is within PATW standards, the volume of leachate is decreasing over time.
   - ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

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.

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 is to contain waste within a landfill and cover system. In addition transfer leachate to the local POTW. Remedy is effective and operating as designed.

B. Adequacy of O&M

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

No issues noted in O&M procedures that affect the short and long term protectiveness observed.

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. NA - see 2014 AR for any

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. NA

View of the southern gated access to the DCL

View of the gravel access road to the DCL Pump house

Southern view of the landfill cap at the DCL

View of retention pond in the northeast portion of the DCL

View of pumphouse in the northeast portion of the DCL

View of a monitoring wells observed throughout the DCL

View of the northeastern corner of the DCL Cap

View of the northern edge of the DCL Cap

View of the northwestern corner of the DCL Cap

View of the southwestern corner of the DCL Cap

View of the western edge of the DCL Cap

View of the southern edge of the DCL Cap

View of a typical gas vent with protective screen observed throughout the DCL

View of grassy area in the southwestern portion of the DCL

View of southeastern wooded area of DCL Contributor site SA 40 along Patton Rd

View of the eastern portion of the pond located within SA 40

View of southwestern wooded area of SA 40 along Patton Rd

View of wooded area along the northern edge of the pond in SA 40

View of parking area along Patton Road SA 40

View of the southern edge of the pond located within SA

View of the western portion of the pond located within SA 40

View of the wooded area west of the pond located within SA 40

Southeastern view of overgrown area of DCL Contributor site SA 13

View of southwestern paved area entrance SA 13

Southwestern view of overgrown area of SA 13

View of southern paved/overgrown area of SA 13

View of western wooded area of SA 13

View of northwestern paved/overgrown area of SA 13

View of southwestern paved/overgrown area of SA 13

View of northeastern paved/overgrown area of SA 13

View of dirt road access to DCL Contributor site SA 9

Western view of SA 9 grassy area

Eastern view of SA 9 grassy area

Central view of SA 9 grassy area

D.5 Devens Consolidated Landfill

ARARs

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Floodplains	Floodplain Management Executive Order 11988 [40 CFR Part 6, Appendix A]	Applicable AOC 9 AOC 11 AOC 40	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modifiation/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Drum removal and hot-spot sediment removal will be designed to minimize alteration/destruction of floodplain area. If this alternative is chosen, wetlands adversely affected by remedial action will be restored to the extent necessary.
	Wetlands	Protection of Wetlands Executive Order 11990 [40 CFR Part 6, Appendix A]	Applicable AOC 9 AOC 11 AOC 40	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	Drum removal and hot-spot sediment removal will be designed to minimize alteration/destruction of floodplain area. If this alternative is chosen, wetlands adversely affected by remedial action will be restored to the extent necessary.
	Wetlands, Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [40 CFR Part 230]	Relevant and Appropriate AOC 9 AOC 11 AOC 40	Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a discharge of fill materials. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under Clean Water Act Section 404(b)(1), maintain that no discharge of dredged or fill material will be permitted if there is a practical alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be taken to restore, or create alternative wetlands.	The removal of drums/sediments will be designed to minimize placement or fill in wetland areas. If this alternative is chosen, the affected areas will be restored to the extent necessary.

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Surface Waters, Endangered Species, Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et. seq.]	Relevant and Appropriate AOC 9 AOC 11 AOC 40 SA 13	Actions that affect species/habitat require consultation with U.S. Department of Interior, U.S. Fish and Wildfire Service, National Marine Fisheries Service, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the National Contingency Plan.	To the extent necessary, action will be taken to develop measures to prevent, mitigate, or compensate for project related impacts to habitat and wildlife. The U.S. Fish and Wildlife Service, acting as a review agency for the USEPA, will be kept informed of proposed remedial actions.
	Endangered Species	Endangered Species Act [50 CFR Parts 17.11-17.12]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	This act requires action to avoid jeopardizing the continued existence of listed endangered or threaten species or modification of their habitat.	The protection of endangered species and their habitats will be considered during excavation activities and cover installation.
	Atlantic Flyway, Wetlands, Surface Waters	Migratory Bird Treaty Act [16 USC 703 et seq.]	Relevant and Appropriate AOC 11	The Migratory Bird Treaty Act protects migratory birds, their nests, and eggs. A depredation permit is required to take, possess, or transport migratory birds or disturb their nests, eggs, or young.	Remedial actions will be performed to protect migratory birds, their nests, and eggs.

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Floodplains, Wetlands, Surface Waters	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as areas within the 100-year floodplain). A Notice of Intent (NOI) must be filed with the municipal conservation commission and a Final Order of Conditions obtained before proceeding with the activity. A Determination of Applicability or NOI must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.
	Endangered Species	Massachusetts Endangered Species Regulations [321 CMR 8.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	Actions must be conducted in a manner that minimizes the impact to Massachusetts-listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	The protection of state listed endangered species (in particular the Grasshopper Sparrow at the Consolidation Facility) will be considered during the design and implementation of this alternative.

Notes:

AWQC = Ambient Water Quality Criteria
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
DOI = Department of the Interior
FWS = Fish and Wildlife Services
MEPA = Massachusetts Environmental Policy Act
MGL = Massachusetts General Laws
NMFS = National Marine Fisheries Service
USC = United States Code

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

TABLE B.2
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Surface water	Clean Water Act, Ambient Water Quality Criteria [40 CFR 131; Quality Criteria for Water 1986]	Relevant and Appropriate AOC 11 AOC 40	Federal Ambient Water Quality Criteria (AWQC) include (1) health-based criteria development for 95 carcinogenic and noncarcinogenic compounds and (2) acute and chronic toxicity values for the protection of aquatic life. AWQC for the protection of human health provide protective concentratons for exposure from ingesting contaminated water and contaminated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminants to surface water must consider the uses of the water and the circumstances of the release or threatened release.	Remedial actions will be performed in a manner to prevent AWQC exceedances in surface water. Activities at AOC 11 will be performed to prevent AWQC exceedances in the Nashua River. Removal of sediment at AOC 40 will be performed in a manner to prevent AWQC exceedances in Cold Spring Brook Pond. Supernatant from dredged spoil will be monitored to prevent AWQC exceedances in Cold Spring Brook Pond.
	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs and MCLGs (40 CFR Parts 141.60 - 141.63 and 141.50 - 141.52]	Relevant and Appropriate AOC 40	The National Primary Drinking Water Regulations establish Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations if contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCGLs are non-enforceable health based goals set equal to or lower than MCLs.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.

TABLE B.2
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Relevant and Appropriate AOC 11 AOC 40	Massachusetts Surface Water Quality Standards designate the most sensitive uses for which surface waters of the Commonwealth are to be enhanced, maintained, and protected, and designate minimum water quality criteria for sustaining the designated uses. Surface waters at Fort Devens are classified as Class B. Surface waters assigned to this class are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. These criteria supersede federal AWQC only when they are more stringent (more protective) than the AWQC.	At AOC 11 activities will be performed in a manner to prevent exceedances of surface water quality in the Nashua River. At AOC 40 sediment removal will be performed in a manner to prevent exceedances of Surface Water Quality Standards in Cold Spring Brook Pond. Supernatant from dredged spoil dewatering will be monitored to prevent exceedances in the pond. To the extent necessary, Surface Water Quality Standards will be used to develop discharge limitations.
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Relevant and Appropriate AOC 40	These standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I, fresh groundwaters designated as a source of potable water supply.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.
	Groundwater	Massachusetts Drinking Water Regulations [310 CMR 22.00]	Relevant and Appropriate AOC 40	These regulations list Massachusetts MCLs which apply to drinking water distributed through a public water system.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.

Notes:

AWQC = Ambient Water Quality Criteria
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
MCL = Maximum Contaminant Rules
MCLG = Maximum Contaminant Level Goal
MMCL = Massachusetts Maximum Contaminant Level
NPDWR = National Primary Drinking Water Regulations
SDWA = Safe Drinking Water Act
SMCL = Secondary Maximum Contaminant Level

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

TABLE B.3
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Construction over/in navigable waters	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Relevant and Appropriate AOC 40 AOC 11	Section 10 of the Rivers and Harbors Act of 1899 requires an authorization from the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE), for the construction of any structure in or over any "navigable water of the U.S."; the excavation from or deposition of material in such waters, or any obstruction of alteration in such waters.	Excavating, filling, and disposal activities will be conducted to meet the substantive criteria and standards of these regulations.
	Control of surface water runoff, Direct discharge to surface water	Clean Water Act NPDES Permit Program [40 CFR 122, 125]	Relevant and Appropriate AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	The National Pollutant Discharge Elimination System (NPDES) permit program specifies the permissible concentration or level of contaminants in the discharge from any point source, including surface runoff, to waters of the United States.	Construction activities will be controlled to meet USEPA discharge requirements. On-site discharge will meet the substantive requirements of these regulations.
	Land Disposal of Hazardous Wastes	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Applicable AOC 9 AOC 11 AOC 40 SA 13	Land disposal of RCRA hazardous wastes without specified treatment is restricted. Remedial actions must be evaluated to determined if they constitute "placement" and if LDRs are applicable. The LDRs requie that wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	If it is determined that materials excavated from AOCs 9, 11, 40, or SA 13 are hazardous materials subject to LDRs, the materials will be handled and disposed of in compliance with these regulations.
	Disposal of PCB-contaminated wastes	Toxic Substance Control act Regulations [40 CFR Part 761]	Applicable AOC 9 AOC 11 AOC 40 SA 13	Establish prohibitions of and requirements for the manufacturing, processing, distribution in commerce, use, disposal, storage and marking of PCB items. Sets forth the "PCB Spill Cleanup Policy."	If it is determined that materials excavated from AOCs 9, 11, 40 or SA 13 are contaminated with PCBs at concentrations of 50 ppm or greater, the materials will be handled and disposed of in compliance with these regulations.
State	Solid Waste Landfill Siting	Massachusetts Solid Waste Facilities Site Regulations [310 CMR 16.00]	Applicable Consolidation Facility	These regulations outline the requirements for selecting the site of a new solid waste landfill for the Commonwealth of Massachusetts.	The consolidation facility will be sited in accordance with these regulations.

TABLE B.3
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care	Massachusetts Solid Waste Management Regulations [310 CMR 19.000]	Relevant and Appropriate AOC 9, AOC 11, SA 12, SA 13 Consolidation Facility	These regulations outline the requirements for construction, operation, closure, and post closure at solid waste management facilities in the Commonwealth of Massachusetts.	Final closure and post-closure plans will be prepared and submitted to satisfy the requirements of 310 CMR 19.021 for AOCs 9, 11, and 40, and SAs 12 and 13. The consolidation landfill will be constructed, operated, and closed in conformance with the regulations at 310 CMR 19.000. A Record Notice of Landfill Operation will be filed for AOC 11 in accordance with 310 CMR 19.141.
	Activities that potentially affect surface water quality	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]	Relevant and Appropriate AOC 40	For activities that require a MADEP Wetlands Order of Conditions to dredge or fill navigable waters or wetlands, a Chapter 91 Waterways License, a USACE permit or any major permit issued by USEPA (e.g., Clean Water Act NPDES permit), a Massachusetts Division of Water Pollution Control Water Quality Certification is required pursuant to 314 CMR 9.00.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations. Remedial activities will be designed to attain and maintain Massachusetts Water Quality Standards in affected waters.
	Activities that affect ambient air quality	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	These regulations pertain to the prevention of emissions in excess of Massachusetts ambient air quality standards.	Remedial activities will be conducted to meet the standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).

Notes:

CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
MADEP = Massachusetts Department of Environmental Protection
MGL = Massachusetts General Laws
NPEDES = National Pollutant Discharge Elimination System
RCLA = Comprehensive Environmental Response, Compensation, and Liability Act
USACE = U.S. Army Corps of Engineers
USC = United States Code

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

D.6 Devens Consolidated Landfill

Tables from *Remedial Action Operable Unit Completion Report for the Remediation of Barnum Road Maintenance Yards, AOCs 44 & 52, Fort Devens, Massachusetts*. 1996, Weston.

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
VOCs		
Acetone	0.130	1600
Benzene	0.025	0.67
Bromobenzene	0.025	280
Bromodichloromethane	0.025	1
Bromoform	0.025	62
Bromomethane	0.063	3.9
2-Butanone (MEK)	0.130	7300
n-Butylbenzene	0.025	140
Carbon Disulfide	0.063	360
Carbon Tetrachloride	0.025	0.24
Chlorobenzene	0.025	150
Chloroethane	0.063	3
Chloroform	0.025	0.24
Chloromethane	0.063	1.2
2-Chloroethylvinylether	0.130	N/A
2-Chlorotoluene	0.025	N/A
4-Chlorotoluene	0.025	N/A
cis-1,2-Dichloroethene	0.025	0.35
cis-1,2-Dichloropropene	0.025	0.0082
Dibromochloromethane	0.025	1.1
Dibromomethane	0.025	N/A
1,2-Dibromo-3-chloropropane	0.063	0.45
1,2-Dibromoethane (EDB)	0.025	0.0069
1,2-Dichlorobenzene	0.025	370
1,3-Dichlorobenzene	0.025	13
1,4-Dichlorobenzene	0.025	3.4
Dichlorodifluoromethane	0.063	94
1,1-Dichloroethane	0.025	590
1,2-Dichloroethane	0.025	0.35
1,1-Dichloroethene	0.025	0.054
1,2-Dichloroethene (cis)	0.025	43
1,2-Dichloroethene (trans)	0.025	63
1,1-Dichloropropene	0.025	N/A
1,2-Dichloropropane	0.025	0.35

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
VOCs (Continued)		
1,3-Dichloropropene	0.025	0.082
2,2-Dichloropropane	0.025	N/A
Diethyl Ether	0.063	N/A
Ethylbenzene	0.025	230
Hexachlorobutadiene	0.025	6.2
2-Hexanone	0.130	N/A
Isopropylbenzene	0.025	160
4-Isopropyltoluene	0.025	N/A
Methyl Ethyl Ketone	0.130	7300
Methyl Isobutyl Ketone	0.130	790
Methyl-tert-butyl ether (MTBE)	0.025	0.3*
Methylene Chloride	0.063	8.9
4-Methyl-2-Pentanone (MIBK)	0.130	N/A
Naphthalene	0.025	56
n-Propylbenzen	0.025	140
sec-Butylbenzene	0.025	110
Styrene	0.025	1700
tert-Butylbenzene	0.025	130
Tetrachloroethene	0.025	5.7
1,1,1,2-Tetrachloroethane	0.025	3
1,1,2,2-Tetrachloroethane	0.025	0.38
Tetrachloroethylene	0.025	5.7
Tetrahydrofuran	0.130	64
Toluene	0.025	520
Trichloroethene	0.025	2.8
Trichlorofluoromethane	0.025	390
1,2,3-Trichlorobenzene	0.025	N/A
1,2,3-Trichloropropane	0.025	0.0014
1,2,4-Trichlorobenzene	0.025	650
1,1,1-Trichloroethane	0.025	770
1,1,2-Trichloroethane	0.025	0.84
Trichloroethylene	0.025	2.8
1,2,4-Trimethylbenzene	0.025	5.7
1,3,5-Trimethylbenzene	0.025	21

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
VOCs (Continued)		
Vinyl Acetate	0.130	430
Vinyl Chloride	0.025	0.022
Xylenes (mixed isomers)	0.025	210
SVOCs		
1,2,4-Trichlorobenzene	0.25	650
1,2-Dichlorobenzene	0.25	370
1,3-Dichlorobenzene	0.25	13
1,4-Dichlorobenzene	0.25	3.4
2,4,5-Trichlorophenol	0.25	6100
2,4,6-Trichlorophenol	0.25	44
2,4-Dichlorophenol	0.25	180
2,4-Dimethylphenol	0.25	1200
2,4-Dinitrophenol	0.25	120
2,4-Dinitrotoluene	0.25	120
2,6-Dinitrotoluene	0.25	61
2-Chloronaphthalene	0.25	1000*
2-Chlorophenol	0.25	63
2-Methylnaphthalene	0.25	4*
2-Methylphenol	0.25	3100
2-Nitroaniline	0.25	3.5
2-Nitrophenol	0.25	100*
3,3-Dichlorobenzidine	0.25	1.1
3-Nitroaniline	0.50	1000*
4,6-Dinitro-2-methylphenol	0.50	N/A
4-Bromophenyl phenyl ether	0.25	100*
4-Chloro-3-methylphenol	0.50	100*
4-Chloroaniline	0.25	240
4-chlorophenyl phenyl ether	0.25	1000*
4-methylphenol	0.25	310
4-Nitroaniline	0.50	1000*
4-Nitrophenol	0.50	490
Acenaphthene	0.25	3700
Acenaphthylene	0.25	100*
Anthracene	0.25	22000
Azobenzene	0.25	4.4

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
SVOCs (Continued)		
Benzidine	0.50	0.0021
Benz(a)anthracene	0.25	0.62
Benzo(a)pyrene	0.25	0.062
Benzo(b)fluoranthene	0.25	0.62
Benzo(g,h,i)perylene	0.25	1000*
Benzo(k)fluoranthene	0.25	6.2
Benzoic acid	0.50	100000
Benzyl Alcohol	0.50	18000
bis (2-Chloroethoxy) methane	0.25	500*
bis(2-chloroethyl)Ether	0.25	0.21
bis (2-Chloroisopropyl)Ether	0.25	2.9
bis(2-ethylhexyl)phthalate	0.25	35
butyl benzylphthalate	0.25	12000
Carbazole	0.25	24
Chrysene	0.25	62
Dibenz(a,h)anthracene	0.25	0.062
Dibenzofuran	0.25	290
Diethyl phthalate	0.25	49000
Dimethyl phthalate	0.25	100000
Di-n-butylphthalate	0.25	30*
Di-n-octylphthalate	0.25	1200
Fluoranthene	0.25	2300
Fluorene	0.25	2600
Hexachlorobenzene	0.25	0.3
Hexachlorobutadiene	0.25	6.2
Hexachlorocyclopentadiene	0.25	420
Hexachloroethane	0.25	35
Indeno(1,2,3-cd)pyrene	0.25	0.62
Isophorone	0.25	510
Naphthalene	0.25	56
Nitrobenzene	0.25	20
N-nitrosodimethylamine	0.25	0.0095
n-Nitrosodi-n-propylamine	0.25	0.069
n-Nitrosodiphenylamine	0.25	99
Pentachlorophenol	0.25	3

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
SVOCs (Continued)		
Phenanthrene	0.25	100*
Phenol	0.25	37000
Pyrene	0.25	2300
Pyridine	0.50	61
Pesticides		
Aldrin	0.0008	0.029
Alpha-BHC	0.0008	0.09
Beta-BHC	0.0008	0.32
Delta-BHC	0.0008	N/A
Gamma-BHC (Lindane)	0.0008	0.44
Alpha-Chlordane	0.0008	N/A
Gamma-Chlordane	0.0008	N/A
Dieldrin	0.0016	0.03
4,4'-DDD	0.0016	2.4
4,4'-DDE	0.0016	1.7
4,4'-DDT	0.0016	1.7
Endosulfan I	0.0008	370
Endosulfan II	0.0016	370
Endosulfan sulfate	0.0016	N/A
Endrin	0.0016	18
Endrin aldehyde	0.0016	N/A
Endrin ketone	0.0016	N/A
Heptachlor	0.0008	0.11
Heptachlor epoxide	0.0008	0.053
Methoxychlor	0.0080	310
Toxaphene	0.025	0.44
PCBs		
PCB-1016	0.025	3.9
PCB-1221	0.025	0.22
PCB-1232	0.025	0.22
PCB-1242	0.025	0.22
PCB-1248	0.025	0.22
PCB-1254	0.025	0.22
PCB-1260	0.025	0.22

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
Inorganics		
Arsenic	3.9	22
Barium	31	5400
Cadmium	0.78	37
Chromium (total)	1.6	210
Lead	3.9	400
Mercury	0.78	23
Selenium	6.3	390
Silver	1.1	390
VPH		
C5-C8 Aliphatics	2.5	100*
C9-C10 Aromatics	0.62	100*
C9-C12 Aliphatics	0.62	1000*
Benzene	0.050	0.67
Toluene	0.050	520
Ethylbenzene	0.050	230
o-Xylene	0.050	500*
p/m Xylene	0.050	500*
Xylene (total)	0.050	210
Methyl tert butylether	0.050	0.3*
Naphthalene	0.050	56
EPH		
C_9-C_{18} Aromatics	50	1000*
C_{19}-C_{36} Aliphatics	50	2500*
C_{10}-C_{22} Aliphatics	50	200*
2-Methylnaphthalene	0.25	
Acenaphthene	0.25	3700
Acenaphthylene	0.25	100
Anthracene	0.25	22000
Benzo(a)anthracene	0.25	0.62
Benzo(a)pyrene	0.25	0.062
Benzo(b)fluoranthene	0.25	0.62
Benzo(ghi)perylene	0.25	1000*
Benzo(k)fluoranthene	0.25	6.2
Chrysene	0.25	62
Dibenzo(a,h)anthracene	0.25	0.062

TABLE 2-4 PRGs for Confirmatory Samples		
Parameter/Method	**Laboratory PQLs (ppm)**	**USEPA Region 9 PRGs for Residential Soil (ppm)**
EPH (Continued)		
Fluoranthene	0.25	2300
Fluorene	0.25	2600
Indeno(1,2,3-c,d)pyrene	0.25	0.62
Naphthalene	0.25	56
Phenanthrene	0.25	100*
Pyrene	0.25	2300

Notes:

PRG = Preliminary Remediation Goal

PPM = Parts Per Million

PQL = Practical Quantification Limit

USEPA = United States Environmental Protection Agency

* = No USEPA Region 9 Residential Soil PRG. MCP S-1 Soil Standard was used.

N/A = No available USEPA Region 9 Residential Soil PRG or MCP S-1 Soil Standard.

TABLE 3-3
AOC 9 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-001	05/16/2001	01-161	0105189	Fail
DLRP-CO-001A	05/29/2001	01-161	0105297	Fail
DLRP-CO-001B	05/29/2001	01-161	0105297	Fail
DLRP-CO-001C	05/18/2001	01-161	0106235	Pass
DLRP-CO-002	05/16/2001	01-161	0105189	Pass
DLRP-CO-003*	05/17/2001	01-161	0105218	Pass
DLRP-CO-004	05/17/2001	01-161	0105218	Pass
DLRP-CO-008	05/18/2001	01-161	0106235	Fail
DLRP-CO-008A	06/26/2001	01-161	0106328	Pass
DLRP-CO-009	05/18/2001	01-161	0106235	Pass
DLRP-CO-010	06/19/2001	01-161	0106253	Pass
DLRP-CO-011*	06/19/2001	01-161	0106253	Pass
DLRP-CO-012	06/25/2001	01-161	0106328	Pass
DLRP-CO-013	07/10/2001	01-161	0107070	Pass
DLRP-CO-020	09/23/2001	02-056	0109169	Pass
DLRP-CO-020QA*	09/23/2001			Pass
DLRP-CO-021*	09/23/2001	02-056	0109169	Pass
DLRP-CO-022	09/23/2001	02-056	0109169	Pass
DLRP-CO-023	09/23/2001	02-056	0109169	Pass
DLRP-CO-024	09/23/2001	02-056	0109169	Pass
DLRP-CO-025	09/23/2001	02-056	0107070	Pass
DLRP-CO-032	03/08/2002	02-198	0203083	Pass
DLRP-CO-033	03/08/2002	02-198	0203083	Pass
DLRP-CO-034	03/08/2002	02-198	0203083	Pass
DLRP-CO-035	03/08/2002	02-198	0203083	Pass
DLRP-CO-036	03/08/2002	02-198	0203083	Pass
DLRP-CO-038	03/20/2002	02-198	0203166	Pass
DLRP-CO-039	03/20/2002	02-198	0203166	Pass
DLRP-CO-040*	03/20/2002	02-198	0203166	Pass
DLRP-CO-041	03/20/2002	02-198	0203166	Pass
DLRP-CO-042	03/20/2002	02-198	0203166	Pass
DLRP-CO-043	04/18/2002	02-198	0204215	Pass
DLRP-CO-044	04/18/2002	02-198	0204215	Pass
DLRP-CO-045	04/18/2002	02-198	0204215	Pass
DLRP-CO-046	04/18/2002	02-198	0204215	Pass
DLRP-CO-047	04/19/2002	02-198	0204229	Pass
DLRP-CO-048	05/01/2002	02-198	0205025	Fail

TABLE 3-3 AOC 9 Confirmatory Sample Summary				
Sample ID	**Date Collected**	**USACE Transmittal Number**	**AMRO Work Order Number**	**Sample Pass/Fail**
DLRP-CO-048A	05/10/2002	02-198	0205112	Pass
DLRP-CO-049	05/06/2002	02-198	0205060	Pass
DLRP-CO-050	05/06/2002	02-198	0205060	Pass
DLRP-CO-051*	05/06/2002	02-198	0205060	Pass
DLRP-CO-052	05/06/2002	02-198	0205060	Pass
DLRP-CO-053	05/06/2002	02-198	0205072	Pass

Notes:

Sample DLRP-CO-020QA was shipped to Severn-Trent Laboratories for analysis and results were sent directly to USACE.

* = Denotes Quality Assurance / Quality Control Sample

TABLE 3-4
AOC 9 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-001			
	EPH (MAEPH)	Acenaphthene	0.35
	EPH (MAEPH)	Anthracene	0.98
	EPH (MAEPH)	Benz(a)anthracene	2.3
	EPH (MAEPH)	Benzo(a)pyrene	1.9
	EPH (MAEPH)	Benzo(b)fluoranthene	2.6
	EPH (MAEPH)	Benzo(g,h,i)perylene	1.3
	EPH (MAEPH)	Benzo(k)fluoranthene	0.97
	EPH (MAEPH)	Chrysene	2.1
	EPH (MAEPH)	Dibenz(a,h)anthracene	0.29
	EPH (MAEPH)	Fluoranthene	5.8
	EPH (MAEPH)	Fluorene	0.49
	EPH (MAEPH)	Indeno(1,2,3-cd)pyrene	1.3
	EPH (MAEPH)	Phenanthrene	4.6
	EPH (MAEPH)	Pyrene	4.2
	SVOCs (SW8270C)	Anthracene	0.66
	SVOCs (SW8270C)	Benz(a)anthracene	1.5
	SVOCs (SW8270C)	Benzo(a)pyrene	1.2
	SVOCs (SW8270C)	Benzo(b)fluoranthene	1.6
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.87
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.52
	SVOCs (SW8270C)	Carbazole	0.37
	SVOCs (SW8270C)	Chrysene	1.2
	SVOCs (SW8270C)	Fluoranthene	3.3
	SVOCs (SW8270C)	Fluorene	0.34
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.88
	SVOCs (SW8270C)	Phenanthrene	2.7
	SVOCs (SW8270C)	Pyrene	2.6
	Total Mercury (SW7471A)	Mercury	0.037
	Total Metals (SW-846-3051/6010B)	Arsenic	6.7
	Total Metals (SW-846-3051/6010B)	Chromium	6.1
	Total Metals (SW-846-3051/6010B)	Lead	15
	VOCs (SW8260B)	Naphthalene	0.13
	VPH (MAVPH)	Naphthalene	0.14
DLRP-CO-001B			
	SVOCs (SW8270C)	Benz(a)anthracene	0.61
	SVOCs (SW8270C)	Benzo(a)pyrene	0.51
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.7
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.33
	SVOCs (SW8270C)	Chrysene	0.6
	SVOCs (SW8270C)	Fluoranthene	1.5
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.35
	SVOCs (SW8270C)	Phenanthrene	1.1
	SVOCs (SW8270C)	Pyrene	1.2

TABLE 3-4
AOC 9 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-001C			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	1.1
DLRP-CO-002			
	Total Metals (SW-846-3051/6010B)	Chromium	7.9
	Total Metals (SW-846-3051/6010B)	Lead	5.8
DLRP-CO-003*			
	Total Metals (SW-846-3051/6010B)	Chromium	5.5
DLRP-CO-004			
	Total Metals (SW-846-3051/6010B)	Chromium	6.3
	Total Metals (SW-846-3051/6010B)	Lead	7
DLRP-CO-008			
	EPH (MAEPH)	Anthracene	0.29
	EPH (MAEPH)	Benz(a)anthracene	0.63
	EPH (MAEPH)	Benzo(a)pyrene	0.51
	EPH (MAEPH)	Benzo(b)fluoranthene	0.72
	EPH (MAEPH)	Benzo(g,h,i)perylene	0.29
	EPH (MAEPH)	Chrysene	0.6
	EPH (MAEPH)	Fluoranthene	1.6
	EPH (MAEPH)	Indeno(1,2,3-cd)pyrene	0.32
	EPH (MAEPH)	Phenanthrene	1.1
	EPH (MAEPH)	Pyrene	1.3
	Pesticides (SW8081A)	4,4'-DDD	0.0018
	Pesticides (SW8081A)	4,4'-DDE	0.003
	Pesticides (SW8081A)	4,4'-DDT	0.0022
	SVOCs (SW8270C)	Anthracene	0.37
	SVOCs (SW8270C)	Benz(a)anthracene	0.93
	SVOCs (SW8270C)	Benzo(a)pyrene	0.77
	SVOCs (SW8270C)	Benzo(b)fluoranthene	1
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.5
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.37
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	1
	SVOCs (SW8270C)	Chrysene	0.88
	SVOCs (SW8270C)	Fluoranthene	2.1
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.54
	SVOCs (SW8270C)	Phenanthrene	1.6
	SVOCs (SW8270C)	Pyrene	1.7
	Total Metals (SW-846-3051/6010B)	Arsenic	7.5
	Total Metals (SW-846-3051/6010B)	Chromium	8.6
	Total Metals (SW-846-3051/6010B)	Lead	10
	VOCs (SW8260B)	Naphthalene	0.071
DLRP-CO-008A			
	Pesticides (SW8081A)	delta-BHC	0.0028
	Pesticides (SW8081A)	Heptachlor epoxide	0.0014
	Total Metals (SW-846-3051/6010B)	Lead	6

TABLE 3-4
AOC 9 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-008A (cont.)			
	Total Metals (SW-846-3051/6010B)	Arsenic	8.1
	Total Metals (SW-846-3051/6010B)	Chromium	8.4
	VOCs (SW8260B)	Carbon disulfide	0.19
DLRP-CO-009			
	Pesticides (SW8081A)	4,4'-DDD	0.012
	Pesticides (SW8081A)	4,4'-DDE	0.0093
	Pesticides (SW8081A)	4,4'-DDT	0.0022
	SVOCs (SW8270C)	Fluoranthene	0.29
	Total Metals (SW-846-3051/6010B)	Chromium	3.1
	VOCs (SW8260B)	Naphthalene	0.051
DLRP-CO-010			
	Pesticides (SW8081A)	4,4'-DDD	0.004
	Total Metals (SW-846-3051/6010B)	Chromium	8.9
DLRP-CO-011*			
	Pesticides (SW8081A)	4,4'-DDD	0.0041
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.44
	Total Metals (SW-846-3051/6010B)	Chromium	8.6
DLRP-CO-012			
	Total Metals (SW-846-3051/6010B)	Chromium	6.5
	Total Metals (SW-846-3051/6010B)	Lead	4.4
	Pesticides (SW8081A)	4,4'-DDD	0.0055
DLRP-CO-013			
	EPH (MAEPH)	Benzo(a)pyrene	0.31
	EPH (MAEPH)	Benzo(b)fluoranthene	0.45
	EPH (MAEPH)	Chrysene	0.35
	EPH (MAEPH)	Fluoranthene	0.55
	EPH (MAEPH)	Pyrene	0.44
	SW6010B	Chromium	5.6
	SW7471A	Mercury	0.052
	SW8270C	Fluoranthene	0.34
	Total Metals (SW-846-3051/6010B)	Lead	8.1
DLRP-CO-020			
	Total Metals (SW-846-3051/6010B)	Chromium	6
	Total Metals (SW-846-3051/6010B)	Lead	13
DLRP-CO-021*			
	Pesticides (SW8081A)	4,4'-DDT	0.031
	Total Metals (SW-846-3051/6010B)	Chromium	6.9
	Total Metals (SW-846-3051/6010B)	Lead	18
DLRP-CO-022			
	Total Metals (SW-846-3051/6010B)	Chromium	4.9
	Total Metals (SW-846-3051/6010B)	Lead	15

TABLE 3-4
AOC 9 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-023			
	Total Metals (SW-846-3051/6010B)	Chromium	5
	Total Metals (SW-846-3051/6010B)	Lead	5
DLRP-CO-024			
	Total Metals (SW-846-3051/6010B)	Chromium	6.3
	Total Metals (SW-846-3051/6010B)	Lead	11
DLRP-CO-025			
	Total Metals (SW-846-3051/6010B)	Chromium	4.5
DLRP-CO-032			
	EPH (MAEPH)	Benzo(b)fluoranthene	0.33
	EPH (MAEPH)	Chrysene	0.33
	EPH (MAEPH)	Fluoranthene	0.79
	EPH (MAEPH)	Phenanthrene	0.34
	EPH (MAEPH)	Pyrene	0.62
	SVOCs (SW8270C)	Fluoranthene	0.47
	SVOCs (SW8270C)	Pyrene	0.39
	Total Metals (SW-846-3051/6010B)	Arsenic	11
	Total Metals (SW-846-3051/6010B)	Chromium	8.9
	Total Metals (SW-846-3051/6010B)	Lead	18
	VOCs (SW8260B)	Methylene chloride	0.056
DLRP-CO-033			
	Total Metals (SW-846-3051/6010B)	Chromium	3.8
	Total Metals (SW-846-3051/6010B)	Lead	3.5
	VOCs (SW8260B)	Methylene chloride	0.042
DLRP-CO-034			
	EPH (MAEPH)	Fluoranthene	0.41
	EPH (MAEPH)	Pyrene	0.31
	SVOCs (SW8270C)	Fluoranthene	0.29
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	10
	Total Metals (SW-846-3051/6010B)	Lead	18
DLRP-CO-035			
	Total Metals (SW-846-3051/6010B)	Lead	15
	Total Metals (SW-846-3051/6010B)	Chromium	5
DLRP-CO-036			
	Total Metals (SW-846-3051/6010B)	Lead	8.1
	Total Metals (SW-846-3051/6010B)	Chromium	5.1
DLRP-CO-038			
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	6
	Total Metals (SW-846-3051/6010B)	Lead	7.1
	VOCs (SW8260B)	Naphthalene	0.04
	VOCs (SW8260B)	Trichlorofluoromethane	0.08

TABLE 3-4
AOC 9 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-039			
	Total Metals (SW-846-3051/6010B)	Arsenic	6.6
	Total Metals (SW-846-3051/6010B)	Chromium	4.6
	Total Metals (SW-846-3051/6010B)	Lead	5.5
DLRP-CO-040			
	Total Metals (SW-846-3051/6010B)	Arsenic	7.5
	Total Metals (SW-846-3051/6010B)	Chromium	4.9
	Total Metals (SW-846-3051/6010B)	Lead	6.2
DLRP-CO-041			
	Total Metals (SW-846-3051/6010B)	Arsenic	6.4
	Total Metals (SW-846-3051/6010B)	Chromium	5.1
	Total Metals (SW-846-3051/6010B)	Lead	27
DLRP-CO-042			
	Total Metals (SW-846-3051/6010B)	Arsenic	7.6
	Total Metals (SW-846-3051/6010B)	Chromium	3.6
	Total Metals (SW-846-3051/6010B)	Lead	6.2
DLRP-CO-043			
	Totals Metals (SW-846-3051/6010B)	Arsenic	7.6
	Totals Metals (SW-846-3051/6010B)	Chromium	6.7
	Totals Metals (SW-846-3051/6010B)	Lead	17
DLRP-CO-044			
	Totals Metals (SW-846-3051/6010B)	Chromium	7.7
	Totals Metals (SW-846-3051/6010B)	Lead	18
DLRP-CO-045			
	Totals Metals (SW-846-3051/6010B)	Arsenic	8.4
	Totals Metals (SW-846-3051/6010B)	Chromium	8
	Totals Metals (SW-846-3051/6010B)	Lead	8.9
DLRP-CO-046			
	Totals Metals (SW-846-3051/6010B)	Arsenic	6.2
	Totals Metals (SW-846-3051/6010B)	Chromium	5.9
	Totals Metals (SW-846-3051/6010B)	Lead	15
DLRP-CO-047			
	Total Metals (SW-846-3051/6010B)	Chromium	5.8
	Total Metals (SW-846-3051/6010B)	Lead	3.7
	VOCs (SW8260B)	Naphthalene	0.11
DLRP-CO-048			
	Pesticides (SW8081A)	4,4'-DDT	0.35
	SVOCs (SW8270C)	Benz(a)anthracene	0.45
	SVOCs (SW8270C)	Benzo(a)pyrene	0.37
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.48
	SVOCs (SW8270C)	Chrysene	0.4
	SVOCs (SW8270C)	Fluoranthene	0.9
	SVOCs (SW8270C)	Phenanthrene	0.65

TABLE 3-4 AOC 9 Confirmatory Sample Results			
Sample ID	**Analysis (Test Method)**	**Parameter**	**Concentration (ppm)**
DLRP-CO-048 (cont.)			
	EPH (MAEPH)	Fluoranthene	0.55
	EPH (MAEPH)	Pyrene	0.45
	Pesticides (SW8081A)	4,4'-DDD	0.1
	Pesticides (SW8081A)	4,4'-DDE	0.02
	SVOCs (SW8270C)	Pyrene	0.84
	Total Metals (SW-846-3051/6010B)	Arsenic	8.8
	Total Metals (SW-846-3051/6010B)	Chromium	8.5
	Total Metals (SW-846-3051/6010B)	Lead	71
DLRP-CO-049			
	Total Metals (SW-846-3051/6010B)	Chromium	7.5
	Total Metals (SW-846-3051/6010B)	Lead	7.6
DLRP-CO-050			
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	13
	Total Metals (SW-846-3051/6010B)	Lead	13
DLRP-CO-051			
	Total Metals (SW-846-3051/6010B)	Chromium	6.8
	Total Metals (SW-846-3051/6010B)	Lead	6.5
DLRP-CO-052			
	Pesticides (SW8081A)	4,4'-DDT	0.017
	Total Metals (SW-846-3051/6010B)	Arsenic	12
	Total Metals (SW-846-3051/6010B)	Chromium	16
	Total Metals (SW-846-3051/6010B)	Lead	17
	VOCs (SW8260B)	Methylene chloride	0.2
DLRP-CO-053			
	Pesticides (SW8081A)	4,4'-DDD	0.045
	Pesticides (SW8081A)	4,4'-DDE	0.019
	Total Metals (SW-846-3051/6010B)	Chromium	4.9
	Total Metals (SW-846-3051/6010B)	Lead	140

Notes:

PPM = Parts Per Million

* = Denotes Quality Assurance / Quality Control Sample

TABLE 3-5 AOC 9 Other Sample Summary			
Sample ID	**Date Collected**	**USACE Transmittal Number**	**AMRO Work Order Number**
BACKGROUND SAMPLES			
DLRP-BG-005	01/16/2001	01-023	0101131
DLRP-BG-010	01/28/2002	02-083	0201222
DLRP-BG-011	01/28/2002	02-083	0201222
DLRP-BG-012	01/28/2002	02-083	0201222
DLRP-BG-013	01/28/2002	02-083	0201222
DLRP-BG-016	04/09/2002		0204104
CONCRETE SAMPLES			
DLRP-CP-007	08/22/2002		0208176
DLRP-CP-008	08/22/2002		0208176
DLRP-CP-009	09/23/2002		0209158
DLRP-CP-010	09/23/2002		0209159
DLRP-CP-011	09/24/2002		0209192
DLRP-CP-012	09/24/2002		0209191
DLRP-CP-013	10/07/2002		0210059
DLRP-CP-014	10/07/2002		0210060
DLRP-CP-015	10/08/2002		0210083
DLRP-CP-016	10/08/2002		0210082
DLRP-CP-017	10/08/2002		0210076
DLRP-CP-018	10/08/2002		0210075

TABLE 3-6
AOC 9 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
BACKGROUND SAMPLES			
DLRP-BG-005			
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Chromium	7.6
	Total Metals (SW-846-3051/6010B)	Lead	12
DLRP-BG-010			
	Total Mercury (SW7471A)	Mercury	0.054
	Total Metals (SW-846-3051/6010B)	Chromium	6
	Total Metals (SW-846-3051/6010B)	Lead	5.6
	VOCs (SW8260B)	2-Butanone	0.22
DLRP-BG-011			
	Total Metals (SW-846-3051/6010B)	Arsenic	11
	Total Metals (SW-846-3051/6010B)	Chromium	9
	Total Metals (SW-846-3051/6010B)	Lead	5.6
DLRP-BG-012			
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	7.9
DLRP-BG-013			
	Total Metals (SW-846-3051/6010B)	Chromium	7.4
DLRP-BG-016			
	EPH (MAEPH)	Benz(a)anthracene	0.3
	EPH (MAEPH)	Benzo(a)pyrene	0.31
	EPH (MAEPH)	Benzo(b)fluoranthene	0.36
	EPH (MAEPH)	Chrysene	0.35
	EPH (MAEPH)	Fluoranthene	0.97
	EPH (MAEPH)	Phenanthrene	0.5
	EPH (MAEPH)	Pyrene	0.74
	PCBs (SW8082)	Aroclor 1254	0.063
	SVOCs (SW8270C)	Anthracene	0.3
	SVOCs (SW8270C)	Benz(a)anthracene	0.67
	SVOCs (SW8270C)	Benzo(a)pyrene	0.56
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.67
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.38
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.26
	SVOCs (SW8270C)	Chrysene	0.63
	SVOCs (SW8270C)	Fluoranthene	1.5
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.41
	SVOCs (SW8270C)	Phenanthrene	1.4
	SVOCs (SW8270C)	Pyrene	1.3
	Total Metals (SW-846-3051/6010B)	Arsenic	8.6
	Total Metals (SW-846-3051/6010B)	Chromium	8.5
	Total Metals (SW-846-3051/6010B)	Lead	12

TABLE 3-6
AOC 9 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
CONCRETE SAMPLES			
DLRP-CP-007			
	Pesticides (SW8081A)	4,4'-DDT	0.025
	SVOCs (SW8270C)	Anthracene	0.29
	SVOCs (SW8270C)	Benz(a)anthracene	0.58
	SVOCs (SW8270C)	Benzo(a)pyrene	0.56
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.7
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.36
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.25
	SVOCs (SW8270C)	Chrysene	0.53
	SVOCs (SW8270C)	Fluoranthene	1.3
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.39
	SVOCs (SW8270C)	Phenanthrene	1.1
	SVOCs (SW8270C)	Pyrene	1.2
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Barium	42
	Total Metals (SW-846-3051/6010B)	Chromium	23
	Total Metals (SW-846-3051/6010B)	Lead	20
	Total Metals (SW-846-3051/6010B)	Selenium	19
	VOCs (SW8260B)	Naphthalene	0.11
DLRP-CP-008			
	SVOCs (SW8270C)	Fluoranthene	0.31
	SVOCs (SW8270C)	Phenanthrene	0.27
	SVOCs (SW8270C)	Pyrene	0.32
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Barium	47
	Total Metals (SW-846-3051/6010B)	Chromium	23
	Total Metals (SW-846-3051/6010B)	Lead	10
	Total Metals (SW-846-3051/6010B)	Selenium	20
DLRP-CP-009			
	PCBs (SW8082)	Aroclor 1254	0.071
	SVOCs (SW8270C)	Benz(a)anthracene	0.54
	SVOCs (SW8270C)	Benzo(a)pyrene	0.51
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.66
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.33
	SVOCs (SW8270C)	Chrysene	0.53
	SVOCs (SW8270C)	Fluoranthene	1.2
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.36
	SVOCs (SW8270C)	Phenanthrene	0.99
	SVOCs (SW8270C)	Pyrene	1.1
	Total Metals (SW-845-3051/6010B)	Arsenic	19
	Total Metals (SW-845-3051/6010B)	Barium	38
	Total Metals (SW-845-3051/6010B)	Chromium	18
	Total Metals (SW-845-3051/6010B)	Lead	9.2
	Total Metals (SW-845-3051/6010B)	Selenium	14

TABLE 3-6
AOC 9 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CP-010			
	Pesticides (SW8081A)	4,4'-DDT	0.023
	SVOCs (SW8270C)	Anthracene	0.31
	SVOCs (SW8270C)	Benz(a)anthracene	0.69
	SVOCs (SW8270C)	Benzo(a)pyrene	0.67
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.83
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.44
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.31
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.41
	SVOCs (SW8270C)	Chrysene	0.66
	SVOCs (SW8270C)	Fluoranthene	1.6
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.48
	SVOCs (SW8270C)	Phenanthrene	1.5
	SVOCs (SW8270C)	Pyrene	1.4
	Total Metals (SW-846-3051/6010B)	Arsenic	21
	Total Metals (SW-846-3051/6010B)	Barium	46
	Total Metals (SW-846-3051/6010B)	Chromium	21
	Total Metals (SW-846-3051/6010B)	Lead	14
	Total Metals (SW-846-3051/6010B)	Selenium	12
DLRP-CP-011			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.32
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Barium	33
	Total Metals (SW-846-3051/6010B)	Chromium	21
	Total Metals (SW-846-3051/6010B)	Lead	11
DLRP-CP-012			
	SVOCs (SW8270C)	Benz(a)anthracene	0.36
	SVOCs (SW8270C)	Benzo(a)pyrene	0.3
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.37
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.29
	SVOCs (SW8270C)	Chrysene	0.37
	SVOCs (SW8270C)	Fluoranthene	0.75
	SVOCs (SW8270C)	Phenanthrene	0.72
	SVOCs (SW8270C)	Pyrene	0.66
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Barium	31
	Total Metals (SW-846-3051/6010B)	Chromium	15
	Total Metals (SW-846-3051/6010B)	Lead	26
DLRP-CP-013			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.77
	Total Metals (SW-846-3051/6010B)	Arsenic	20
	Total Metals (SW-846-3051/6010B)	Chromium	9.8
	Total Metals (SW-846-3051/6010B)	Lead	7.3
DLRP-CP-014			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.59

TABLE 3-6
AOC 9 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CP-014 (cont.)			
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	7.9
	Total Metals (SW-846-3051/6010B)	Lead	4.3
DLRP-CP-015			
	Pesticides (SW8081A)	4,4'-DDD	0.017
	Pesticides (SW8081A)	4,4'-DDT	0.028
	SVOCs (SW8270C)	Acenaphthylene	0.37
	SVOCs (SW8270C)	Anthracene	1.2
	SVOCs (SW8270C)	Benz(a)anthracene	2.5
	SVOCs (SW8270C)	Benzo(a)pyrene	2.5
	SVOCs (SW8270C)	Benzo(b)fluoranthene	3.2
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	1.5
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.99
	SVOCs (SW8270C)	Carbazole	1
	SVOCs (SW8270C)	Chrysene	2.4
	SVOCs (SW8270C)	Dibenz(a,h)anthracene	0.43
	SVOCs (SW8270C)	Fluoranthene	6
	SVOCs (SW8270C)	Fluorene	0.5
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	1.7
	SVOCs (SW8270C)	Naphthalene	0.26
	SVOCs (SW8270C)	Phenanthrene	4.4
	SVOCs (SW8270C)	Pyrene	4.9
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Barium	40
	Total Metals (SW-846-3051/6010B)	Chromium	27
	Total Metals (SW-846-3051/6010B)	Lead	15
	VOCs (SW8260B)	cis-1,2-Dichloroethene	0.13
DLRP-CP-016			
	Pesticides (SW8081A)	4,4'-DDD	0.026
	Pesticides (SW8081A)	4,4'-DDE	0.021
	Pesticides (SW8081A)	4,4'-DDT	0.042
	SVOCs (SW8270C)	Anthracene	0.31
	SVOCs (SW8270C)	Benz(a)anthracene	0.64
	SVOCs (SW8270C)	Benzo(a)pyrene	0.57
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.74
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.41
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.3
	SVOCs (SW8270C)	Chrysene	0.62
	SVOCs (SW8270C)	Fluoranthene	1.3
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.42
	SVOCs (SW8270C)	Phenanthrene	0.87
	SVOCs (SW8270C)	Pyrene	1.2
	Total Metals (SW-846-3051/6010B)	Arsenic	19
	Total Metals (SW-846-3051/6010B)	Barium	39

TABLE 3-6
AOC 9 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CP-015 (cont)			
	Total Metals (SW-846-3051/6010B)	Chromium	24
	Total Metals (SW-846-3051/6010B)	Lead	19
DLRP-CP-017			
	Pesticides (SW8081A)	4,4'-DDT	0.031
	SVOCs (SW8270C)	Acenaphthylene	0.26
	SVOCs (SW8270C)	Anthracene	0.61
	SVOCs (SW8270C)	Benz(a)anthracene	1.4
	SVOCs (SW8270C)	Benzo(a)pyrene	1.3
	SVOCs (SW8270C)	Benzo(b)fluoranthene	1.7
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.89
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.56
	SVOCs (SW8270C)	Carbazole	0.35
	SVOCs (SW8270C)	Chrysene	1.4
	SVOCs (SW8270C)	Fluoranthene	3.2
	SVOCs (SW8270C)	Fluorene	0.3
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.97
	SVOCs (SW8270C)	Phenanthrene	2.1
	SVOCs (SW8270C)	Pyrene	2.7
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Barium	44
	Total Metals (SW-846-3051/6010B)	Chromium	23
	Total Metals (SW-846-3051/6010B)	Lead	24
	VOCs (SW8260B)	Naphthalene	0.071
DLRP-CP-018			
	PCBs (SW8082)	Aroclor 1254	0.15
	Pesticides (SW8081A)	4,4'-DDD	0.023
	Pesticides (SW8081A)	4,4'-DDT	0.046
	SVOCs (SW8270C)	Anthracene	0.45
	SVOCs (SW8270C)	Benz(a)anthracene	1.1
	SVOCs (SW8270C)	Benzo(a)pyrene	1.1
	SVOCs (SW8270C)	Benzo(b)fluoranthene	1.4
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.73
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.51
	SVOCs (SW8270C)	Chrysene	1.1
	SVOCs (SW8270C)	Fluoranthene	2.2
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.79
	SVOCs (SW8270C)	Phenanthrene	1.4
	SVOCs (SW8270C)	Pyrene	1.9
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Barium	39
	Total Metals (SW-846-3051/6010B)	Chromium	22
	Total Metals (SW-846-3051/6010B)	Lead	19

Notes:

PPM = Parts Per Million

TABLE 4-3
AOC 11 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-014	08/03/2001	01-161	0108046	Pass
DLRP-CO-015	08/03/2001	01-161	0108046	Pass
DLRP-CO-016	08/15/2001	01-161	0108147	Fail
DLRP-CO-016A	10/04/2001	02-056	0110065	Pass
DLRP-CO-016B	10/04/2001	02-056	0110065	Pass
DLRP-CO-017	09/18/2001	02-056	0109125	Pass
DLRP-CO-018	09/18/2001	02-056	0109125	Pass
DLRP-CO-019	09/18/2001	02-056	0109125	Fail
DLRP-CO-019A	11/15/2001	02-056	0111166	Pass
DLRP-CO-026	09/28/2001	02-056	0110007	Pass
DLRP-CO-027	09/28/2001	02-056	0110007	Pass

TABLE 4-4
AOC 11 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-014			
	Pesticides (SW8081A)	4,4'-DDD	0.13
	Pesticides (SW8081A)	4,4'-DDE	0.029
	Pesticides (SW8081A)	4,4'-DDT	0.12
	Pesticides (SW8081A)	alpha-Chlordane	0.004
	Pesticides (SW8081A)	gamma-Chlordane	0.0078
	Total Mercury (SW7471A)	Mercury	0.46
	Total Metals (SW-846-3051/6010B)	Arsenic	20
	Total Metals (SW-846-3051/6010B)	Chromium	24
	Total Metals (SW-846-3051/6010B)	Lead	130
DLRP-CO-015			
	Pesticides (SW8081A)	4,4'-DDD	0.13
	Pesticides (SW8081A)	4,4'-DDE	0.037
	Pesticides (SW8081A)	4,4'-DDT	0.018
	Pesticides (SW8081A)	alpha-BHC	0.0032
	Pesticides (SW8081A)	gamma-Chlordane	0.004
	Total Mercury (SW7471A)	Mercury	0.19
	Total Metals (SW-846-3051/6010B)	Arsenic	11
	Total Metals (SW-846-3051/6010B)	Cadmium	1.8
	Total Metals (SW-846-3051/6010B)	Chromium	24
	Total Metals (SW-846-3051/6010B)	Lead	310
DLRP-CO-016			
	Pesticides (SW8081A)	4,4'-DDD	0.6
	Pesticides (SW8081A)	4,4'-DDE	0.19
	Pesticides (SW8081A)	4,4'-DDT	0.043
	Pesticides (SW8081A)	alpha-Chlordane	0.028
	Pesticides (SW8081A)	Dieldrin	0.064
	Pesticides (SW8081A)	gamma-Chlordane	0.025
	SVOCs (SW8270C)	Benz(a)anthracene	0.75
	SVOCs (SW8270C)	Benzo(a)pyrene	0.68
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.95
	SVOCs (SW8270C)	Chrysene	0.84
	SVOCs (SW8270C)	Fluoranthene	1.6
	SVOCs (SW8270C)	Phenanthrene	0.8
	SVOCs (SW8270C)	Pyrene	1.4
	Total Mercury (SW7471A)	Mercury	1.5
	Total Metals (SW-846-3051/6010B)	Arsenic	23
	Total Metals (SW-846-3051/6010B)	Barium	150
	Total Metals (SW-846-3051/6010B)	Cadmium	4.5
	Total Metals (SW-846-3051/6010B)	Chromium	38
	Total Metals (SW-846-3051/6010B)	Lead	390
DLRP-CO-016A			
	All parameters below laboratory PQLs.		
DLRP-CO-016B			
	All parameters below laboratory PQLs.		

TABLE 4-4
AOC 11 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-017			
	Pesticides (SW8081A)	4,4'-DDD	0.99
	Pesticides (SW8081A)	4,4'-DDE	0.34
	Pesticides (SW8081A)	4,4'-DDT	0.25
	SVOCs (SW8270C)	Fluoranthene	0.6
	Total Mercury (SW7471A)	Mercury	0.64
	Total Metals (SW-846-3051/6010B)	Arsenic	23
	Total Metals (SW-846-3051/6010B)	Cadmium	1.4
	Total Metals (SW-846-3051/6010B)	Chromium	28
	Total Metals (SW-846-3051/6010B)	Lead	250
DLRP-CO-018			
	Pesticides (SW8081A)	4,4'-DDD	0.71
	Pesticides (SW8081A)	4,4'-DDE	0.17
	Pesticides (SW8081A)	4,4'-DDT	0.11
	SVOCs (SW8270C)	Fluoranthene	0.59
	SVOCs (SW8270C)	Pyrene	0.53
	Total Mercury (SW7471A)	Mercury	0.92
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Barium	69
	Total Metals (SW-846-3051/6010B)	Chromium	35
	Total Metals (SW-846-3051/6010B)	Lead	250
DLRP-CO-019			
	EPH (MAEPH)	Fluoranthene	0.64
	EPH (MAEPH)	Pyrene	0.46
	Pesticides (SW8081A)	4,4'-DDD	0.052
	Pesticides (SW8081A)	4,4'-DDE	0.037
	Pesticides (SW8081A)	4,4'-DDT	0.073
	SVOCs (SW8270C)	Benz(a)anthracene	0.37
	SVOCs (SW8270C)	Benzo(a)pyrene	0.33
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.45
	SVOCs (SW8270C)	Chrysene	0.36
	SVOCs (SW8270C)	Fluoranthene	0.7
	SVOCs (SW8270C)	Pyrene	0.58
	Total Mercury (SW7471A)	Mercury	0.082
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Barium	82
	Total Metals (SW-846-3051/6010B)	Chromium	21
	Total Metals (SW-846-3051/6010B)	Lead	190
DLRP-CO-019A			
	All parameters below laboratory PQLs.		
DLRP-CO-026			
	Pesticides (SW8081A)	4,4'-DDT	0.03
	Total Mercury (SW7471A)	Mercury	0.033
	Total Metals (SW6010B)	Arsenic	9.7
	Total Metals (SW6010B)	Chromium	12

TABLE 4-4
AOC 11 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-026 (cont.)			
	Total Metals (SW6010B)	Lead	25
DERP-CO-027			
	Pesticides (SW8081A)	4,4'-DDD	0.12
	Pesticides (SW8081A)	4,4'-DDE	0.089
	Pesticides (SW8081A)	4,4'-DDT	0.11
	Pesticides (SW8081A)	alpha-Chlordane	0.022
	Pesticides (SW8081A)	gamma-Chlordane	0.027
	Total Mercury (SW7471A)	Mercury	0.14
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Chromium	16
	Total Metals (SW-846-3051/6010B)	Lead	38

Notes:

PPM = Parts Per Million

TABLE 4-5 AOC 11 Other Sample Summary			
Sample ID	**Date Collected**	**USACE Transmittal Number**	**AMRO Work Order Number**
BACKGROUND SAMPLES			
DLRP-BG-003	11/30/2000	01-014	0011310
DLRP-BG-004	11/30/2000	01-014	0011310
CONCRETE SAMPLES			
DLRP-CP-001	04/11/2001		0104123

TABLE 4-6
AOC 11 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
BACKGROUND SAMPLES			
DLRP-BG-003			
	Pesticides (SW8081A)	4,4'-DDD	0.0072
	Pesticides (SW8081A)	4,4'-DDE	0.05
	Pesticides (SW8081A)	4,4'-DDT	0.08
	SVOCs (SW8270C)	Benzo(a)pyrene	0.28
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.37
	SVOCs (SW8270C)	Fluoranthene	0.44
	SVOCs (SW8270C)	Pyrene	0.4
	Total Mercury (SW7471A)	Mercury	0.031
	Total Metals (SW-846-3051/6010B)	Arsenic	10
	Total Metals (SW-846-3051/6010B)	Chromium	11
	Total Metals (SW-846-3051/6010B)	Lead	20
	TPH (SW8015B)	Diesel Range Organics	76
DLRP-BG-004			
	Pesticides (SW8081A)	4,4'-DDD	0.011
	Pesticides (SW8081A)	4,4'-DDE	0.18
	Pesticides (SW8081A)	4,4'-DDT	0.29
	SVOCs (SW8270C)	Benz(a)anthracene	0.34
	SVOCs (SW8270C)	Fluoranthene	0.57
	SVOCs (SW8270C)	Pyrene	0.43
	Total Mercury (SW7471A)	Mercury	0.067
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Chromium	14
	Total Metals (SW-846-3051/6010B)	Lead	25
CONCRETE SAMPLES			
DLRP-CP-001			
	Pesticides (SW8081A)	4,4'-DDD	0.094
	Pesticides (SW8081A)	4,4'-DDE	1.7
	Pesticides (SW8081A)	4,4'-DDT	3.6
	Pesticides (SW8081A)	alpha-Chlordane	0.052
	Pesticides (SW8081A)	gamma-Chlordane	0.059
	Total Mercury (SW7471A)	Mercury	0.046
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Barium	57
	Total Metals (SW-846-3051/6010B)	Chromium	23
	Total Metals (SW-846-3051/6010B)	Lead	60

Notes:

PPM = Parts Per Million

TABLE 5-3
AOC 40 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-028	12/17/2001	0112159	02-356	Fail
DLRP-CO-028A	12/26/2001	0112203	02-356	Fail
DLRP-CO-029	01/08/2002	0201056	02-356	Fail
DLRP-CO-030	01/15/2002	0201121	02-356	Pass
DLRP-CO-031	01/15/2002	0201121	02-356	Pass
DLRP-CO-037	03/12/2002	0203109	02-356	Pass
DLRP-CO-055	05/30/2002	0205286	02-356	Fail
DLRP-CO-055A	06/06/2002	0206039	02-356	Pass
DLRP-CO-055B	06/06/2002	0206039	02-356	Pass
DLRP-CO-056	05/30/2002	0205286	02-356	Pass
DLRP-CO-057	06/03/2002	0206015	02-356	Pass
DLRP-CO-059	06/11/2002	0206076	02-356	Pass
DLRP-CO-060	06/25/2002	0206249	02-356	Fail
DLRP-CO-060A	07/02/2002	0207015	02-356	Pass
DLRP-CO-061	06/25/2002	0206249	02-356	Fail
DLRP-CO-061A	07/02/2002	0207015	02-356	Pass
DLRP-CO-062	07/16/2002	0207141	02-356	Pass
DLRP-CO-063*	07/16/2002	0207141	02-356	Pass
DLRP-CO-063QA*	07/16/2002			
DLRP-CO-065	07/19/2002	0207177	02-356	Fail
DLRP-CO-065A	07/25/2002	0207223	02-356	Pass
DLRP-CO-071	08/06/2002	0208057	02-356	Pass
DLRP-CO-072	08/06/2002	0208057	02-356	Pass
DLRP-CO-073	08/20/2002	0208157	02-356	Pass
DLRP-CO-074	08/21/2002	0208168	02-356	Pass
DLRP-CO-075	08/21/2002	0208168	02-356	Pass
DLRP-CO-076	08/21/2002	0208168	02-356	Pass
DLRP-CO-077	08/22/2002	0208175	02-356	Pass
DLRP-CO-077A	08/26/2002	0208207	02-356	Pass
DLRP-CO-077B	08/26/2002	0208207	02-356	Pass
DLRP-CO-077C	08/26/2002	0208207	02-356	Pass
DLRP-CO-077D	08/26/2002	0208207	02-356	Fail
DLRP-CO-078	09/05/2002	0209034	02-356	Pass
DLRP-CO-078A	09/06/2002	0209033	02-356	Pass
DLRP-CO-079	09/09/2002	0209055	02-356	Pass
DLRP-CO-080	09/09/2002	0209055	02-356	Pass

Notes:

Sample DLRP-CO-063QA was shipped to Severn-Trent Laboratories for analysis and results were sent directly to USACE.

* = Denotes Quality Assurance / Quality Control Sample

TABLE 5-4
AOC 40 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-028			
	EPH (MAEPH)	Fluoranthene	0.44
	EPH (MAEPH)	Phenanthrene	0.39
	EPH (MAEPH)	Pyrene	0.35
	Pesticides (SW8081A)	4,4´-DDT	0.045
	SVOCs (SW8270C)	Benz(a)anthracene	0.44
	SVOCs (SW8270C)	Benzo(a)pyrene	0.41
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.58
	SVOCs (SW8270C)	Chrysene	0.44
	SVOCs (SW8270C)	Fluoranthene	0.68
	SVOCs (SW8270C)	Pyrene	0.66
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Chromium	15
	Total Metals (SW-846-3051/6010B)	Lead	31
	TPH (SW8015B)	Diesel Range Organics	62
DLRP-CO-028A			
	SVOCs (SW8270C)	Anthracene	0.37
	SVOCs (SW8270C)	Benz(a)anthracene	0.85
	SVOCs (SW8270C)	Benzo(a)pyrene	0.74
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.98
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.46
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.31
	SVOCs (SW8270C)	Chrysene	0.83
	SVOCs (SW8270C)	Fluoranthene	1.9
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.51
	SVOCs (SW8270C)	Phenanthrene	1.5
	SVOCs (SW8270C)	Pyrene	1.5
DLRP-CO-029			
	Total Metals (SW-846-3051/6010B)	Arsenic	38
	Total Metals (SW-846-3051/6010B)	Chromium	8.5
	VOCs (SW8260B)	Methylene chloride	0.2
DLRP-CO-030			
	Pesticides (SW8081A)	4,4´-DDD	0.029
	Total Metals (SW-846-3051/6010B)	Arsenic	20
	Total Metals (SW-846-3051/6010B)	Chromium	7.8
	Total Metals (SW-846-3051/6010B)	Lead	4.9
DLRP-CO-031			
	EPH (MAEPH)	Benz(a)anthracene	0.41
	EPH (MAEPH)	Benzo(a)pyrene	0.33
	EPH (MAEPH)	Benzo(b)fluoranthene	0.42
	EPH (MAEPH)	Chrysene	0.42
	EPH (MAEPH)	Fluoranthene	1.2
	EPH (MAEPH)	Phenanthrene	0.91
	EPH (MAEPH)	Pyrene	0.82
	Pesticides (SW8081A)	alpha-Chlordane	0.011

TABLE 5-4
AOC 40 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-031 (cont.)			
	Pesticides (SW8081A)	gamma-Chlordane	0.026
	SVOCs (SW8270C)	Benz(a)anthracene	0.3
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.31
	SVOCs (SW8270C)	Fluoranthene	0.67
	SVOCs (SW8270C)	Phenanthrene	0.59
	SVOCs (SW8270C)	Pyrene	0.53
	Total Metals (SW-846-3051/6010B)	Arsenic	9.7
	Total Metals (SW-846-3051/6010B)	Chromium	9.1
	Total Metals (SW-846-3051/6010B)	Lead	19
DLRP-CO-037			
	Total Metals (SW-846-3051/6010B)	Chromium	7.1
DLRP-CO-055			
	EPH (MAEPH)	Fluoranthene	0.33
	EPH (MAEPH)	Pyrene	0.3
	Pesticides (SW8081A)	4,4'-DDD	0.028
	Pesticides (SW8081A)	4,4'-DDT	0.027
	Pesticides (SW8081A)	gamma-Chlordane	0.01
	SVOCs (SW8270C)	Benz(a)anthracene	0.38
	SVOCs (SW8270C)	Benzo(a)pyrene	0.38
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.51
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.42
	SVOCs (SW8270C)	Chrysene	0.42
	SVOCs (SW8270C)	Fluoranthene	0.77
	SVOCs (SW8270C)	Phenanthrene	0.41
	SVOCs (SW8270C)	Pyrene	0.66
	Total Metals (SW-846-3051/6010B)	Arsenic	33
	Total Metals (SW-846-3051/6010B)	Chromium	19
	Total Metals (SW-846-3051/6010B)	Lead	24
DLRP-CO-055A			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	1.4
DLRP-CO-055B			
	Total Metals (SW-846-3051/6010B)	Lead	25
DLRP-CO-056			
	PCBs (SW8082)	Aroclor 1254	0.068
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.68
	Total Metals (SW-846-3051/6010B)	Arsenic	22
	Total Metals (SW-846-3051/6010B)	Chromium	17
	Total Metals (SW-846-3051/6010B)	Lead	15
DLRP-CO-057			
	Pesticides (SW8081A)	4,4'-DDT	0.018
	Total Metals (SW-846-3051/6010B)	Arsenic	20
	Total Metals (SW-846-3051/6010B)	Chromium	12
	Total Metals (SW-846-3051/6010B)	Lead	8

TABLE 5-4
AOC 40 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-057 (cont.)			
	VOCs (SW8260B)	Acetone	0.27
DLRP-CO-059			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.55
	Total Metals (SW-846-3051/6010B)	Arsenic	21
	Total Metals (SW-846-3051/6010B)	Chromium	10
	Total Metals (SW-846-3051/6010B)	Lead	9.6
DLRP-CO-060			
	EPH (MAEPH)	Fluoranthene	0.34
	SVOCs (SW8270C)	Benz(a)anthracene	0.41
	SVOCs (SW8270C)	Benzo(a)pyrene	0.43
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.53
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.3
	SVOCs (SW8270C)	Chrysene	0.41
	SVOCs (SW8270C)	Fluoranthene	0.86
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.31
	SVOCs (SW8270C)	Phenanthrene	0.58
	SVOCs (SW8270C)	Pyrene	0.75
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Chromium	11
	Total Metals (SW-846-3051/6010B)	Lead	5.7
DLRP-CO-060A			
	All parameters below laboratory PQLs.		
DLRP-CO-061			
	EPH (MAEPH)	Fluoranthene	0.36
	EPH (MAEPH)	Pyrene	0.3
	SVOCs (SW8270C)	Benz(a)anthracene	0.41
	SVOCs (SW8270C)	Benzo(a)pyrene	0.37
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.45
	SVOCs (SW8270C)	Chrysene	0.39
	SVOCs (SW8270C)	Fluoranthene	0.95
	SVOCs (SW8270C)	Phenanthrene	0.41
	SVOCs (SW8270C)	Pyrene	0.71
	Total Metals (SW-846-3051/6010B)	Chromium	6.4
	Total Metals (SW-846-3051/6010B)	Lead	4.2
DLRP-CO-061A			
	All parameters below laboratory PQLs.		
DLRP-CO-062			
	Total Metals (SW-846-3051/6010B)	Arsenic	19
	Total Metals (SW-846-3051/6010B)	Chromium	8.4
	Total Metals (SW-846-3051/6010B)	Lead	8.9
DLRP-CO-063*			
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Chromium	9.2

TABLE 5-4
AOC 40 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-063* (cont.)			
	Total Metals (SW-846-3051/6010B)	Lead	4.3
DLRP-CO-065			
	SVOCs (SW8270C)	Anthracene	1.1
	SVOCs (SW8270C)	Benz(a)anthracene	1.4
	SVOCs (SW8270C)	Benzo(a)pyrene	1.2
	SVOCs (SW8270C)	Benzo(b)fluoranthene	1.4
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.7
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.52
	SVOCs (SW8270C)	Carbazole	0.37
	SVOCs (SW8270C)	Chrysene	1.3
	SVOCs (SW8270C)	Dibenzofuran	0.37
	SVOCs (SW8270C)	Fluoranthene	3.5
	SVOCs (SW8270C)	Fluorene	0.31
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.79
	SVOCs (SW8270C)	Phenanthrene	4
	SVOCs (SW8270C)	Pyrene	2.9
	Total Metals (SW-846-3051/6010B)	Arsenic	14
	Total Metals (SW-846-3051/6010B)	Chromium	10
	Total Metals (SW-846-3051/6010B)	Lead	8.1
DLRP-CO-065A			
	All parameters below laboratory PQLs.		
DLRP-CO-071			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.58
	SW8015B	Diesel Range Organics	210
	Total Metals (SW-846-3051/6010B)	Chromium	12
DLRP-CO-072			
	Total Metals (SW-846-3051/6010B)	Chromium	11
DLRP-CO-073			
	Total Metals (SW6010B)	Arsenic	12
DLRP-CO-074			
	Total Metals (SW-846-3051/6010B)	Chromium	6.5
DLRP-CO-075			
	Total Metals (SW-846-3051/6010B)	Chromium	9.5
	Total Metals (SW-846-3051/6010B)	Lead	4.2
DLRP-CO-076			
	Total Metals (SW-846-3051/6010B)	Chromium	9.6
DLRP-CO-077			
	Total Metals (SW6010B)	Arsenic	11
	Total Metals (SW6010B)	Lead	13
DLRP-CO-077A			
	Total Metals (SW6010B)	Arsenic	19
	Total Metals (SW6010B)	Lead	11

TABLE 5-4
AOC 40 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-077B			
	Total Metals (SW6010B)	Arsenic	21
	Total Metals (SW6010B)	Lead	11
DLRP-CO-077C			
	Total Metals (SW6010B)	Arsenic	31
	Total Metals (SW6010B)	Lead	26
DLRP-CO-077D			
	Total Metals (SW6010B)	Arsenic	66
	Total Metals (SW6010B)	Lead	89
DLRP-CO-078			
	All parameters below laboratory PQLs.		
DLRP-CO-078A			
	Total Metals (SW6010B)	Arsenic	13
	Total Metals (SW6010B)	Lead	16
DLRP-CO-079			
	Total Metals (SW-846-3051/6010B)	Chromium	7.7
	VOCs (SW8260B)	Acetone	0.35
DLRP-CO-080			
	Total Metals (SW-846-3051/6010B)	Chromium	13

Notes:

PPM = Parts Per Million

* = Denotes Quality Assurance / Quality Control Sample

TABLE 5-5
AOC 40 Other Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number
BACKGROUND SAMPLES			
DLRP-BG-006	07/11/2001	02-083	0107086
DLRP-BG-007	07/11/2001	02-083	0107086
DLRP-BG-008	07/11/2001	02-083	0107086
DLRP-BG-009	07/11/2001	02-083	0107086
CONCRETE SAMPLES			
DLRP-CP-002	06/19/2001		0106237
DLRP-CP-003	06/19/2001		0106237
DLRP-CP-004	11/15/2001		0111164
DLRP-CP-005	03/11/2002		0203081
DLRP-CP-006	03/18/2002		0203147
GROUNDWATER SAMPLES			
DLRP-GW-001	01/07/2002		0201039
DLRP-GW-001A	01/14/2002		0201104
DLRP-GW-002	02/11/2002		0202063
DLRP-GW-003	02/14/2002		0202090

TABLE 5-6
AOC 40 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)*
		BACKGROUND SAMPLES	
DLRP-BG-006			
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Chromium	16
	Pesticides (SW8081A)	4,4'-DDE	0.063
	Pesticides (SW8081A)	4,4'-DDT	0.14
	Total Metals (SW-846-3051/6010B)	Lead	20
DLRP-BG-007			
	Total Metals (SW-846-3051/6010B)	Arsenic	9.6
	Total Metals (SW-846-3051/6010B)	Lead	9.6
	Total Metals (SW-846-3051/6010B)	Chromium	13
DLRP-BG-008			
	Total Metals (SW-846-3051/6010B)	Chromium	9
	Total Metals (SW-846-3051/6010B)	Arsenic	11
DLRP-BG-009			
	Total Metals (SW-846-3051/6010B)	Arsenic	17
	Total Metals (SW-846-3051/6010B)	Lead	14
	Pesticides (SW8081A)	4,4'-DDT	0.02
	Total Metals (SW-846-3051/6010B)	Chromium	14
		CONCRETE SAMPLES	
DLRP-CP-002			
	SVOCs (SW8270C)	Pyrene	1.6
	Total Metals (SW-846-3051/6010B)	Barium	37
	SVOCs (SW8270C)	Benz(a)anthracene	0.77
	SVOCs (SW8270C)	Anthracene	0.31
	SVOCs (SW8270C)	Fluoranthene	1.8
	Pesticides (SW8081A)	gamma-BHC	0.0019
	Total Metals (SW-846-3051/6010B)	Selenium	11
	Total Metals (SW-846-3051/6010B)	Lead	28
	Total Metals (SW-846-3051/6010B)	Arsenic	19
	Total Metals (SW-846-3051/6010B)	Chromium	17
	Total Mercury (SW7471A)	Mercury	0.047
	Pesticides (SW8081A)	alpha-Chlordane	0.0034
	Pesticides (SW8081A)	4,4'-DDT	0.4
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.46
	Pesticides (SW8081A)	4,4'-DDD	0.012
	SVOCs (SW8270C)	Phenanthrene	1.2
	VOCs (SW8260B)	Tetrachloroethene	0.055
	VOCs (SW8260B)	cis-1,2-Dichloroethene	0.047
	SVOCs (SW8270C)	Chrysene	0.75
	SVOCs (SW8270C)	Benzo(k)fluoranthene	0.3
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.4
	SVOCs (SW8270C)	Benzo(a)pyrene	0.66
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.86
	Pesticides (SW8081A)	4,4'-DDE	0.092
DLRP-CP-003			
	Total Metals (SW-846-3051/6010B)	Arsenic	21
	Total Mercury (SW7471A)	Mercury	0.034
	Total Metals (SW-846-3051/6010B)	Lead	37

TABLE 5-6
AOC 40 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)*
DLRP-CP-003 (cont.)			
	Total Metals (SW-846-3051/6010B)	Chromium	20
	Pesticides (SW8081A)	alpha-Chlordane	0.0011
	Total Metals (SW-846-3051/6010B)	Barium	42
	SVOCs (SW8270C)	Pyrene	0.33
	Pesticides (SW8081A)	4,4'-DDT	0.12
	Pesticides (SW8081A)	4,4'-DDE	0.066
	Pesticides (SW8081A)	4,4'-DDD	0.031
	VOCs (SW8260B)	Tetrachloroethene	0.022
	SVOCs (SW8270C)	Fluoranthene	0.4
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.33
DLRP-CP-004			
	Pesticides (SW8081A)	4,4'-DDT	0.3
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Barium	35
	Total Metals (SW-846-3051/6010B)	Chromium	18
	Total Metals (SW-846-3051/6010B)	Lead	41
	Pesticides (SW8081A)	4,4'-DDE	0.094
	Pesticides (SW8081A)	4,4'-DDD	0.031
DLRP-CP-005			
	SVOCs (SW8270c)	Benzo(g,h,i)perylene	0.31
	Total Metals (SW-846-3051/6010B)	Chromium	28
	Total Metals (SW-846-3051/6010B)	Lead	20
	Pesticides (SW8081A)	4,4'-DDT	0.24
	Pesticides (SW8081A)	4,4'-DDE	0.05
	PCBs (SW8082)	Aroclor 1260	0.46
	VOCs (SW8260B)	Naphthalene	0.44
	Total Metals (SW-846-3051/6010B)	Barium	55
	SVOCs (SW8270c)	Anthracene	0.35
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	SVOCs (SW8270c)	Benzo(b)fluoranthene	0.66
	SVOCs (SW8270c)	Benzo(a)pyrene	0.49
	SVOCs (SW8270c)	Benz(a)anthracene	0.59
	SVOCs (SW8270c)	Fluoranthene	1.5
	SVOCs (SW8270c)	Fluorene	0.31
	SVOCs (SW8270c)	Indeno(1,2,3-cd)pyrene	0.35
	SVOCs (SW8270c)	Pyrene	1.2
	SVOCs (SW8270c)	Chrysene	0.6
	SVOCs (SW8270c)	Phenanthrene	1.5
DLRP-CP-006			
	Total Metals (SW-846-3051/6010B)	Chromium	29
	Total Metals (SW-846-3051/6010B)	Barium	63
	SVOCs (SW8270C)	Fluoranthene	0.48
	Total Metals (SW-846-3051/6010B)	Lead	16
	Pesticides (SW8081A)	4,4'-DDT	0.022
	PCBs (SW8082)	Aroclor 1260	0.027
	VOCs (SW8260B)	Naphthalene	0.075
	SVOCs (SW8270C)	Pyrene	0.41
	SVOCs (SW8270C)	Phenanthrene	0.4
	Total Metals (SW-846-3051/6010B)	Arsenic	21

TABLE 5-6
AOC 40 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)*
GROUNDWATER SAMPLES			
DLRP-GW-001			
	Pesticides (SW8081A)	alpha-Chlordane	1.7×10^{-5}
	Pesticides (SW8081A)	4,4'-DDT	1.9×10^{-5}
	E150.1	pH	6.5 (pH Units)
	E160.2	Suspended Solids (Residue, Non-Filterable)	28
	SW7060A	Arsenic	0.019
	SW7421	Lead	8.1×10^{-3}
	TPH (SW8015B)	Diesel Range Organics	0.23
	Pesticides (SW8081A)	delta-BHC	3.8×10^{-5}
	Pesticides (SW8081A)	gamma-Chlordane	1.7×10^{-5}
	Pesticides (SW8081A)	Heptachlor	1.3×10^{-5}
DLRP-GW-001A			
	SW7060A	Arsenic	0.046
DLRP-GW-002			
	E160.2	Suspended Solids (Residue, Non-Filterable)	24
	E150.1	pH	6.6 (pH Units)
	Pesticides (SW8081A)	4,4'-DDT	1.1×10^{-4}
	SW7060A	Arsenic	0.019
DLRP-GW-003			
	TPH (SW8015B)	Diesel Range Organics	0.11
	SW7060A	Arsenic	0.21
	E405.1	Biochemical Oxygen Demand	10
	E160.2	Suspended Solids (Residue, Non-Filterable)	69
	E150.1	pH	6.1 (pH Units)

Notes:

PPM = Parts Per Million

* = Concentrations in ppm except as noted in groundwater samples.

TABLE 6-3
AOC 41 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-069	08/06/2002	02-301	0208039	Pass
DLRP-CO-070	08/06/2002	02-301	0208039	Pass

TABLE 6-4
AOC 41 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-069			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.31
	Total Metals (SW-846-3051/6010B)	Chromium	5.2
	Total Metals (SW-846-3051/6010B)	Lead	8.8
DLRP-CO-070			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.65
	Total Metals (SW-846-3051/6010B)	Barium	33
	Total Metals (SW-846-3051/6010B)	Chromium	9.2
	Total Metals (SW-846-3051/6010B)	Lead	110
	VPH (MAVPH)	C9-C10 Aromatic Hydrocarbons	1.8
	VPH (MAVPH)	C9-C12 Aliphatic Hydrocarbons	0.67

Notes:

PPM = Parts Per Million

TABLE 7-3
SA 12 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-054	05/07/2002	02-301	0205072	Pass
DLRP-CO-058	06/06/2002	02-301	0206039	Pass
DLRP-CO-064	07/18/2002	02-301	0207162	Pass
DLRP-CO-066	07/25/2002	02-301	0207224	Pass
DLRP-CO-067	07/29/2002	02-301	0207257	Pass
DLRP-CO-068*	07/29/2002	02-301	0207257	Pass

Notes:

* = Denotes Quality Assurance / Quality Control Sample

TABLE 7-4
SA 12 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-054			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.7
	Total Metals (SW-846-3051/6010B)	Arsenic	12
	Total Metals (SW-846-3051/6010B)	Chromium	9.9
	Total Metals (SW-846-3051/6010B)	Lead	31
DLRP-CO-058			
	EPH (MAEPH)	Benzo(b)fluoranthene	0.3
	EPH (MAEPH)	Benzo(k)fluoranthene	0.42
	EPH (MAEPH)	Chrysene	0.31
	EPH (MAEPH)	Fluoranthene	0.62
	EPH (MAEPH)	Phenanthrene	0.3
	EPH (MAEPH)	Pyrene	0.64
	Total Metals (SW-846-3051/6010B)	Chromium	4.7
	Total Metals (SW-846-3051/6010B)	Lead	30
DLRP-CO-064			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	1.6
	Total Mercury (SW7471A)	Mercury	0.087
	Total Metals (SW-846-3051/6010B)	Arsenic	15
	Total Metals (SW-846-3051/6010B)	Chromium	8
	Total Metals (SW-846-3051/6010B)	Lead	16
DLRP-CO-066			
	Pesticides (SW8081A)	4,4'-DDT	0.035
	Total Metals (SW-846-3051/6010B)	Arsenic	6.8
	Total Metals (SW-846-3051/6010B)	Chromium	7.2
	Total Metals (SW-846-3051/6010B)	Lead	32
DLRP-CO-067			
	Pesticides (SW8081A)	4,4'-DDE	0.018
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.29
	Total Metals (SW-846-3051/6010B)	Arsenic	8.2
	Total Metals (SW-846-3051/6010B)	Chromium	5.5
	Total Metals (SW-846-3051/6010B)	Lead	20
DLRP-CO-068*			
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.34
	Total Metals (SW-846-3051/6010B)	Chromium	5.6
	Total Metals (SW-846-3051/6010B)	Lead	19

Notes:

PPM = Parts Per Million

* = Denotes Quality Assurance / Quality Control Sample

TABLE 8-3
SA 13 Confirmatory Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number	Sample Pass/Fail
DLRP-CO-005	06/15/2001	01-161	0106188	Pass
DLRP-CO-006	06/15/2001	01-161	0106188	Pass
DLRP-CO-007	06/15/2001	01-161	0106188	Pass

TABLE 8-4
SA 13 Confirmatory Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-CO-005			
	Pesticides (SW8081A)	4,4'-DDE	0.014
	Pesticides (SW8081A)	4,4'-DDT	0.016
	Total Metals (SW-846-3051/6010B)	Arsenic	13
	Total Metals (SW-846-3051/6010B)	Chromium	12
	Total Metals (SW-846-3051/6010B)	Lead	11
	VOCs (SW8260B)	Carbon disulfide	0.27
DLRP-CO-006			
	Pesticides (SW8081A)	4,4'-DDD	0.0028
	Pesticides (SW8081A)	4,4'-DDE	0.0081
	Pesticides (SW8081A)	4,4'-DDT	0.031
	Total Metals (SW-846-3051/6010B)	Arsenic	14
	Total Metals (SW-846-3051/6010B)	Chromium	18
	Total Metals (SW-846-3051/6010B)	Lead	35
DLRP-CO-007			
	Pesticides (SW8081A)	4,4'-DDD	0.036
	Pesticides (SW8081A)	4,4'-DDE	0.031
	Pesticides (SW8081A)	4,4'-DDT	0.12
	Pesticides (SW8081A)	alpha-BHC	0.00099
	Total Mercury (SW7471A)	Mercury	0.032
	Total Metals (SW-846-3051/6010B)	Arsenic	16
	Total Metals (SW-846-3051/6010B)	Chromium	13
	Total Metals (SW-846-3051/6010B)	Lead	82
	VOCs (SW8260B)	Carbon disulfide	0.099

Notes:

PPM = Parts Per Million

* = Denotes Quality Assurance / Quality Control Sample

TABLE 8-5
SA 13 Other Sample Summary

Sample ID	Date Collected	USACE Transmittal Number	AMRO Work Order Number
BACKGROUND SAMPLES			
DLRP-BG-001	11/30/2000	01-014	11310
DLRP-BG-002	11/30/2000	01-014	11310
DLRP-BG-014	04/09/2002		204104
DLRP-BG-015	04/09/2002		204104

TABLE 8-6
SA 13 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
BACKGROUND SAMPLES			
DLRP-BG-001			
	Pesticides (SW8081A)	4,4'-DDE	0.0026
	Pesticides (SW8081A)	4,4'-DDT	0.004
	Total Metals (SW-846-3051/6010B)	Arsenic	22
	Total Metals (SW-846-3051/6010B)	Chromium	19
	Total Metals (SW-846-3051/6010B)	Lead	120
DLRP-BG-002			
	Pesticides (SW8081A)	4,4'-DDE	0.0041
	Pesticides (SW8081A)	4,4'-DDT	0.0081
	Total Metals (SW-846-3051/6010B)	Arsenic	23
	Total Metals (SW-846-3051/6010B)	Chromium	17
	Total Metals (SW-846-3051/6010B)	Lead	63
DLRP-BG-014			
	EPH (MAEPH)	Benz(a)anthracene	0.39
	EPH (MAEPH)	Benzo(a)pyrene	0.38
	EPH (MAEPH)	Benzo(b)fluoranthene	0.46
	EPH (MAEPH)	Chrysene	0.42
	EPH (MAEPH)	Fluoranthene	1.2
	EPH (MAEPH)	Phenanthrene	0.54
	EPH (MAEPH)	Pyrene	1
	SVOCs (SW8270C)	Benz(a)anthracene	0.43
	SVOCs (SW8270C)	Benzo(a)pyrene	0.4
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.44
	SVOCs (SW8270C)	Benzo(g,h,i)perylene	0.27
	SVOCs (SW8270C)	Bis(2-ethylhexyl)phthalate	0.45
	SVOCs (SW8270C)	Chrysene	0.42
	SVOCs (SW8270C)	Fluoranthene	0.84
	SVOCs (SW8270C)	Indeno(1,2,3-cd)pyrene	0.29
	SVOCs (SW8270C)	Phenanthrene	0.47
	SVOCs (SW8270C)	Pyrene	0.85
	Total Metals (SW-846-3051/6010B)	Arsenic	23
	Total Metals (SW-846-3051/6010B)	Chromium	24
	Total Metals (SW-846-3051/6010B)	Lead	220
	Total Metals (SW-846-3051/6010B)	Selenium	11
DLRP-BG-015			
	EPH (MAEPH)	Fluoranthene	0.26
	Pesticides (SW8081A)	4,4'-DDE	0.023
	SVOCs (SW8270C)	Benz(a)anthracene	0.33
	SVOCs (SW8270C)	Benzo(a)pyrene	0.29
	SVOCs (SW8270C)	Benzo(b)fluoranthene	0.33
	SVOCs (SW8270C)	Chrysene	0.32
	SVOCs (SW8270C)	Fluoranthene	0.74
	SVOCs (SW8270C)	Phenanthrene	0.78

TABLE 8-6
SA 13 Other Sample Results

Sample ID	Analysis (Test Method)	Parameter	Concentration (ppm)
DLRP-BG-015 (cont.)			
	SVOCs (SW8270C)	Pyrene	0.7
	Total Metals (SW-846-3051/6010B)	Arsenic	19
	Total Metals (SW-846-3051/6010B)	Chromium	20
	Total Metals (SW-846-3051/6010B)	Lead	49
	VOCs (SW8260B)	Toluene	0.026

Notes:

PPM = Parts Per Million

APPENDIX E –South Post Impact Area

E.1 South Post Impact Area

Additional Background Information

Chronology of Events South Post Impact Area AOC 25

Event	Date
1,200 pounds per year (lbs/yr) disposal of explosives and ammunition by open burn or open detonation	From 1979 to 1992
Groundwater Measurements	1992-1998
Groundwater Sampling	1992-2004
Monitoring well installation	1992-1997
RI	1996
ROD signed	1996
LTMP issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005
Annual LTM sampling discontinued at AOC 25	2005
Revised LTMP	October 2008
LTM & Maintenance	2005-2009
Third Five-Year Review	October 2010
LTM & Maintenance	2010-2014
Fourth Five-Year Review	September 2015
LTM & Maintenance	2015-2019
Fifth Five-Year Review	2020

Note: Annual LTM & Maintenance activities at AOC 25 since 2005 consists of annual inspection of monitoring wells and every 5 years water levels are collected.

Chronology of Events South Post Impact Area AOC 26

Event	Date
Open burn and open detonation of waste explosives	Prior to 1979
Demolition training	Ongoing
Groundwater Measurements	1992-1998
Groundwater Sampling	1992-Present
Monitoring well installation	1992-1997
RI	1996
ROD signed	1996
LTMP issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005
Annual LTM & Maintenance	2005-2009
Revised LTMP	October 2008
Perchlorate Source Investigation	November 2009
AOC 26 Perchlorate Injection Letter Report	February 2010
Third Five-Year Review	October 2010
Annual LTM & Maintenance	2010 - 2014
Revised LTMP	2013
Revised LTMP	February 2015
Perchlorate and Explosives Explosive Investigation	February and October 2014

Fourth Five-Year Review	2015
Annual LTM & Maintenance	2014 -2019
Fifth Five-Year Review	2020

Chronology of Events South Post Impact Area AOC 27

Event	Date
Open burn and open detonation of grenades and pyrotechnics	Prior to 1979
Firing of small-caliber automatic weapons	Ongoing
Groundwater Measurements	1992-1998
Groundwater Sampling	1992-Present
Monitoring well installation	1992-1997
RI	1996
ROD signed	1996
LTMP issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005
Revised LTMP	October 2008
Annual LTM & Maintenance	2005-2009
Third Five-Year Review	October 2010
Annual LTM & Maintenance	2010 - 2014
Revised LTMP	2013
Revised LTMP	February 2015
Fourth Five-Year Review	September 2015
Annual LTM & Maintenance	2015 - 2019
Fifth Five-Year Review	2020

Chronology of Events South Post Impact Area AOC 41

Event	Date
Groundwater Measurements	1992-1998
Groundwater Sampling	1992-Present
Monitoring well installation	1992-1997
RI	1996
ROD signed	1996
LTMP issued	May 1997
First Five-Year Review	September 2000
Waste debris removed to DCL	2002
Second Five-Year Review	September 2005
Annual LTM & Maintenance	2005-2006
LTM discontinued	April 2007
LTM & Maintenance	2007-2009
Third Five-Year Review	October 2010
LTM & Maintenance	2010-2014
Fourth Five-Year Review	September 2015
LTM & Maintenance	2015-2019
Fifth Five-Year Review	2020

Note: Annual LTM & Maintenance activities at AOC 41 since 2007 consists of annual inspection of monitoring wells and every 5 years water levels are collected.

Physical Characteristics

The SPIA RI indicated that two distinct watersheds are present and are separated by a bedrock ridge, which acts as a groundwater divide in the northern SPIA area (Horne, 1996). One of the watersheds has a groundwater flow regime to the north into Slate Rock Brook and Slate Rock Pond. Areas having this flow regime include Zulu (AOC 26) and Hotel (AOC 27) ranges and Cranberry Pond in the northeast corner of the SPIA. The second watershed has a southeast and east flow regime towards an unnamed brook and New Cranberry Pond. This watershed also has a flow regime directly to the Nashua River encompassing the area directly north of the New Cranberry Pond. AOC 41 wells are located within the second watershed with groundwater flow towards New Cranberry Pond. The water level of New Cranberry Pond is significant in defining the direction of the groundwater flow in the lower sand. The water level in the pond has been controlled by a culvert located on the eastern shore, impeding flow and maintaining a high water level. The pond recharges the aquifer and helps direct the local groundwater flow toward the north and east.

AOC 25 (EOD Range) Background

The following information supplements the AOC background discussion provided in the main body of text.

The EOD Range is located east of Firebreak Road, approximately 2 miles south of the main entrance to the South Post. The site is rectangular and measures approximately 600 ft by 1,500 ft.

From 1979 to 1992, approximately 1,200 pounds per year of explosives and munitions were disposed of at the disposal area at the east end of the range by either open burning or open detonation. The 1994 RI indicated that the EOD Range currently operates with RCRA emergency permit status on a case-by-case basis. Open burning involved the placement of ordnance (small arms ammunition, smoke grenades, cartridge activated devices, and pyrotechnics) in a pit or a trench within the designated 2-acre area. The items were completely covered with packing material, wooden crates, or cardboard; soaked with diesel fuel, oil, and non-serviceable waste flammables; and ignited with smokeless powder charges. The pit was allowed to burn out and to cool for 24-hours before the items were inspected for completeness of burn. Typically, if the pit was to be reused, the items were excavated and buried nearby. If the pit was not to be reused, the pit was generally backfilled (E&E, 1994).

Open detonation was used on munitions and ordnance that contain explosive fillers. They were detonated with an explosive counter charge, such as Composition C-4 (Harrisite) or trinitrotoluene (TNT), in open pits or on a flat surface.

Possible metals contaminants, per the 2004 SPIA Annual Report, within AOC 25 include: copper and zinc from brass shell casings at disposal areas; lead from bullets in the impact areas; and iron, aluminum and possibly other metals (barium and cobalt) from pyrotechnics at impact or training areas. Manganese, chromium and nickel could also come from armored target vehicles, but these metals are in metallic form, which are relatively insoluble. The use of pyrotechnics could leave a more varied residue of several heavy metals (USACE, 2005).

The range was closed as part of the 1996 ROD.

AOC 26 (Zulu Ranges)

The following information supplements the AOC background discussion provided in the main

body of text.

Possible metals contaminants within AOC 26 include: copper and zinc from brass shell casings at disposal areas; lead from bullets in the impact areas; and iron, aluminum and possibly other metals (barium and cobalt) from pyrotechnics at impact or training areas. Manganese, chromium and nickel could also come from armored target vehicles, but these metals are in metallic form, which are relatively insoluble. The use of pyrotechnics could leave a more varied residue of several heavy metals (USACE, 2005).

AOC 27 (Hotel Range) Background

The following information supplements the AOC background discussion provided in the main body of text.

Possible metals contaminants within AOC 27 include: copper and zinc from brass shell casings at firing areas; lead from bullets in the impact areas; and iron, aluminum and possibly other metals (barium and cobalt) from pyrotechnics at impact or training areas. Manganese, chromium and nickel could also come from armored target vehicles, but these metals are in metallic form, which are relatively insoluble. The use of pyrotechnics could leave a more varied residue of several heavy metals (USACE, 2005).

Groundwater, surface water, sediment and soil samples were collected during the 1996 RI at AOC 27. Samples were submitted for TCL organics, explosives, metals and TPH analyses. The pesticides, mostly DDT and its derivatives DDD and dichloro-diphenyl-dichloroethylene (DDE) were below background in soils and were not present in groundwater, which only showed low concentrations of delta-BHC (0.045ug/L in the one confirmed result). Pesticide residues are likely to be a result of pest control rather than training activities at the site. The groundwater affected by the site flows north across Old Turnpike Road to a wetland within the northern part of Hotel Range, or possibly continuing towards Slate Rock Pond.

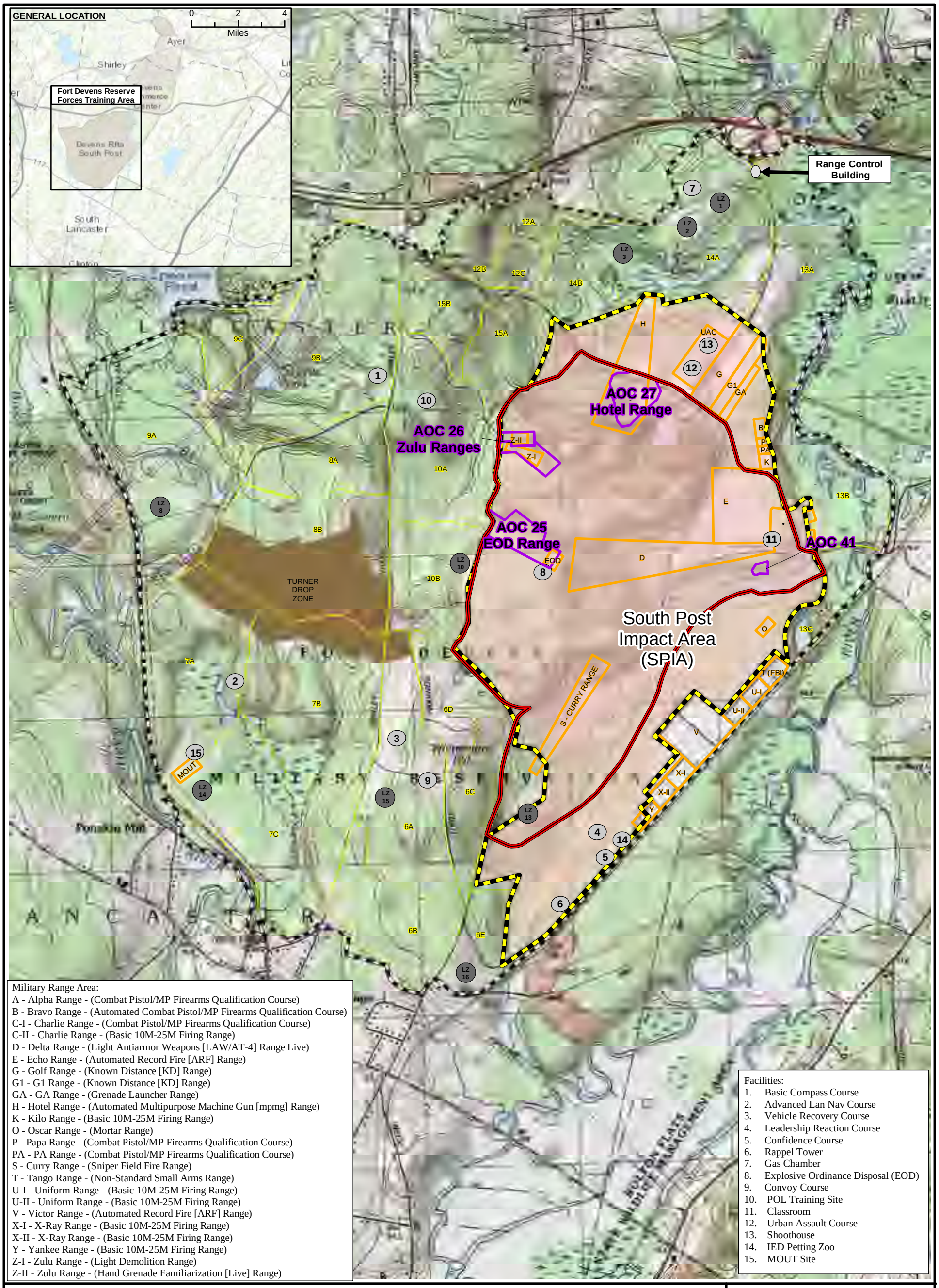
No evidence of site related chemical stress to plants or wildlife was observed during the field surveys. The toxicity testing done at Zulu Ranges (AOC 26) implied that the level of lead in Cranberry Pond water does not pose a hazard to aquatic biota. The mean concentrations of COPC were unlikely to pose a risk to the selected receptors, mallards, and raccoons, with the possible exception of the effect of copper on mallards. Potential risks to benthic invertebrates from several metals in sediments (antimony, copper, lead, mercury, and nickel), and also from 4-amino-2,6-dinitrotoluene, were noted.

AOC 41 (Unauthorized Dumping Site) Background

Refer to summary in the main body of text.

E.2 South Post Impact Area

Figures



Military Range Area:
A - Alpha Range - (Combat Pistol/MP Firearms Qualification Course)
B - Bravo Range - (Automated Combat Pistol/MP Firearms Qualification Course)
C-I - Charlie Range - (Combat Pistol/MP Firearms Qualification Course)
C-II - Charlie Range - (Basic 10M-25M Firing Range)
D - Delta Range - (Light Antiarmor Weapons [LAW/AT-4] Range Live)
E - Echo Range - (Automated Record Fire [ARF] Range)
G - Golf Range - (Known Distance [KD] Range)
G1 - G1 Range - (Known Distance [KD] Range)
GA - GA Range - (Grenade Launcher Range)
H - Hotel Range - (Automated Multipurpose Machine Gun [mpmg] Range)
K - Kilo Range - (Basic 10M-25M Firing Range)
O - Oscar Range - (Mortar Range)
P - Papa Range - (Combat Pistol/MP Firearms Qualification Course)
PA - PA Range - (Combat Pistol/MP Firearms Qualification Course)
S - Curry Range - (Sniper Field Fire Range)
T - Tango Range - (Non-Standard Small Arms Range)
U-I - Uniform Range - (Basic 10M-25M Firing Range)
U-II - Uniform Range - (Basic 10M-25M Firing Range)
V - Victor Range - (Automated Record Fire [ARF] Range)
X-I - X-Ray Range - (Basic 10M-25M Firing Range)
X-II - X-Ray Range - (Basic 10M-25M Firing Range)
Y - Yankee Range - (Basic 10M-25M Firing Range)
Z-I - Zulu Range - (Light Demolition Range)
Z-II - Zulu Range - (Hand Grenade Familiarization [Live] Range)

Legend

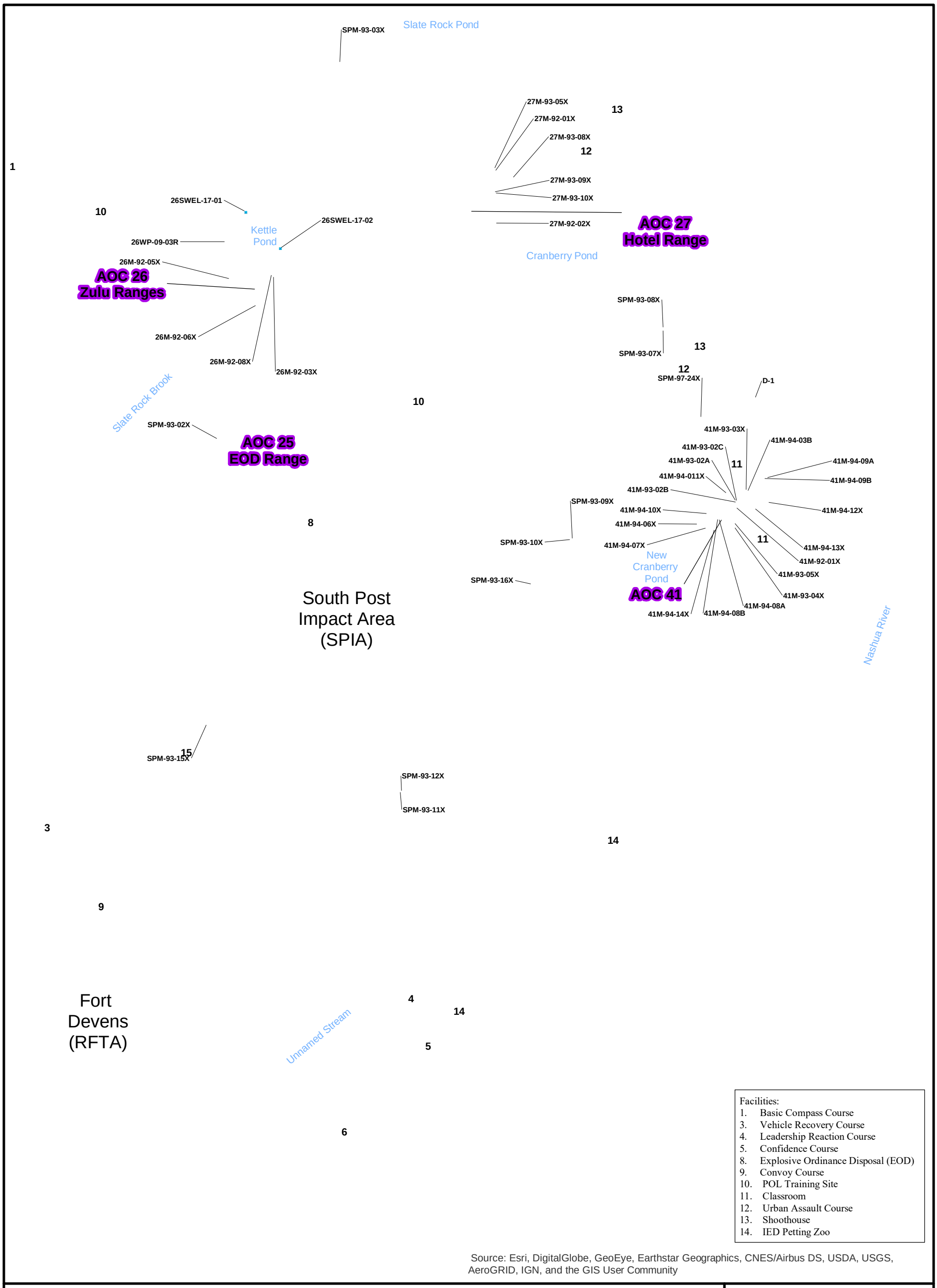
- Ft. Devens RFTA Boundary
- Area of Contamination (AOC)
- South Post Impact Area (SPIA)
- Turner Drop Zone
- Military Range
- Training Area
- SPIA Monitored Area
- Landing Zone
- Facility

N

0 1,000 2,000 4,000
Feet

Figure E-1
Fort Devens
Reserve Forces Training Area
(RFTA)
Site Location Map

RENOVA environmental services



Facilities:
1. Basic Compass Course
3. Vehicle Recovery Course
4. Leadership Reaction Course
5. Confidence Course
8. Explosive Ordinance Disposal (EOD)
9. Convoy Course
10. POL Training Site
11. Classroom
12. Urban Assault Course
13. Shoothouse
14. IED Petting Zoo

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Ft. Devens RFTA Boundary
- Area of Contamination (AOC)
- South Post Impact Area (SPIA)
- Turner Drop Zone
- Military Range
- Training Area
- Landing Zone
- Facility
- LTM Sample Well
- LTM Well–Periodic Gauge Only
- Surface Water Elevation Location
- Surface Water Sampling Location
- SPIA Monitored Area
- Bedrock Ridge
- Surface Water

N

0 550 1,100 2,200
Feet

Figure E-2
South Post Impact Area Site Layout

RENOVA environmental services

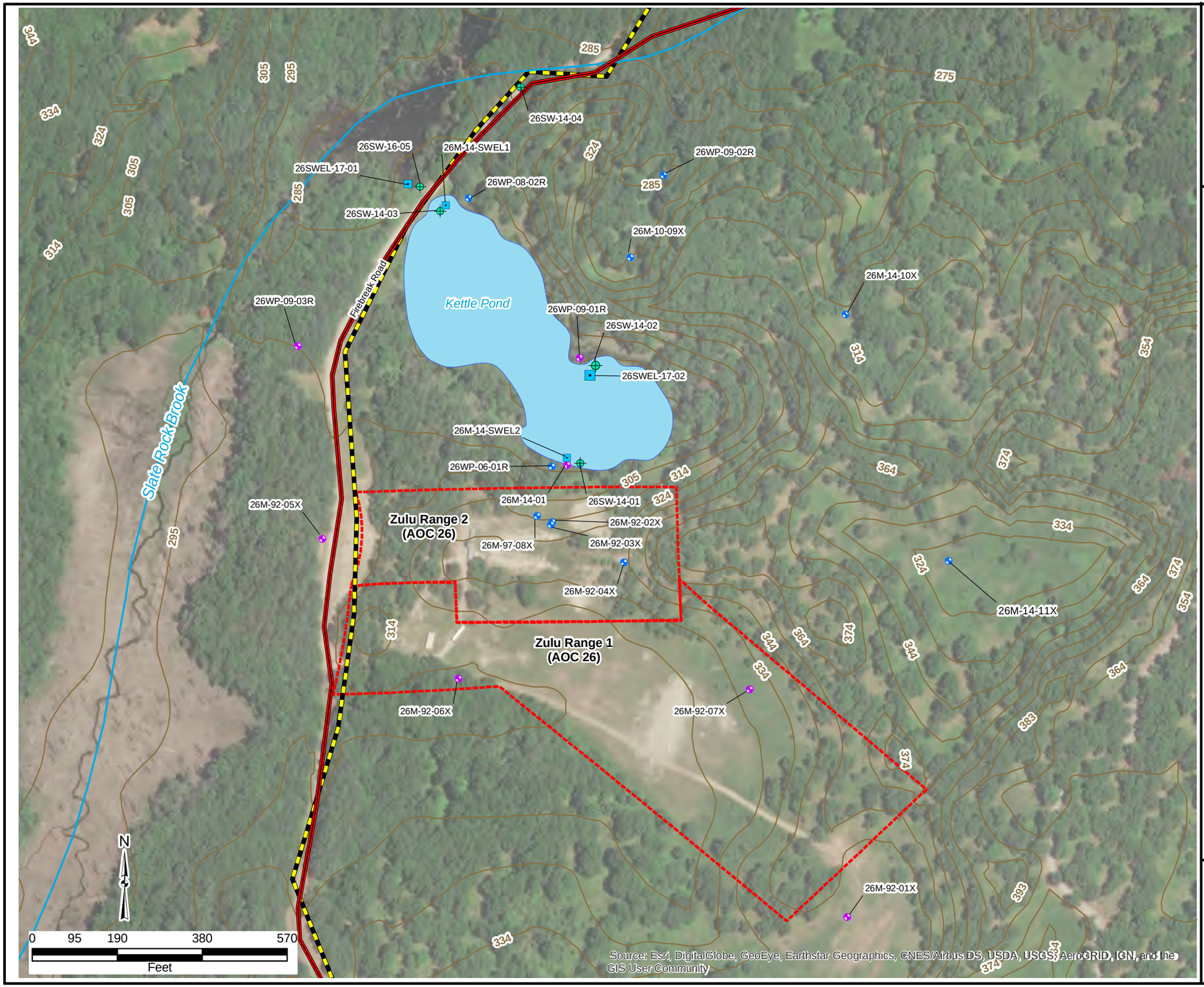


Figure E-3
Site Layout
South Post Impact Area
Area of Contamination 26
Zulu Ranges 1 and 2

Legend

- LTM Sample Monitoring Well
- LTM Well Point–Periodic Gauge Only
- Surface Water Elevation Location
- Surface Water Sampling Location
- 26M-92-03X Well/Elevation Point Identification
- —334— Topographic Contour (ft NGVD, interval=10 feet)
- Surface Water Course
- Area of Contamination (AOC)
- Estimated Extent of Kettle Pond
- SPIA Monitored Area
- South Post Impact Area

Notes:
Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

Figure E-4
Site Layout
South Post Impact Area
Area of Contamination 27
Hotel Range

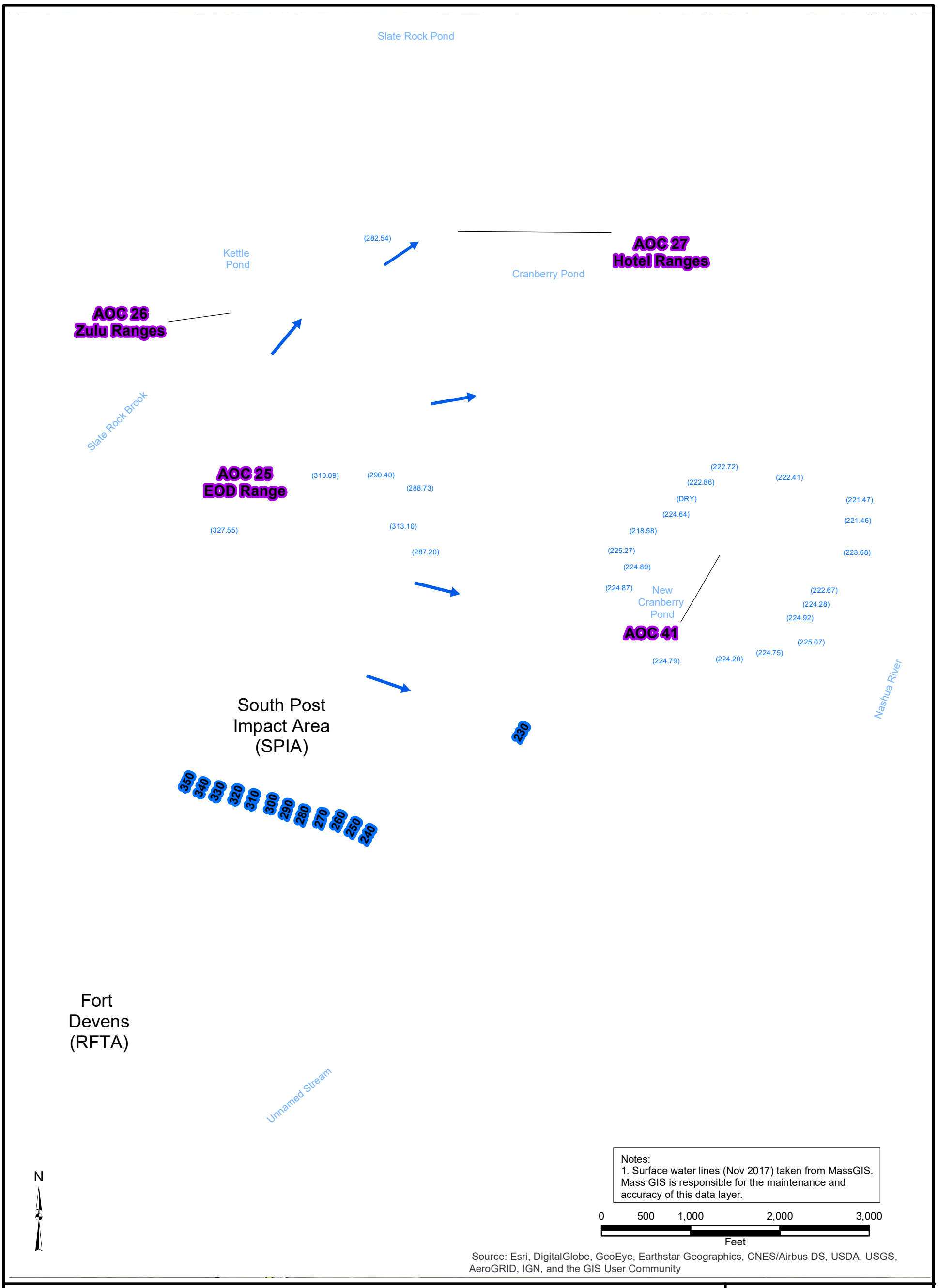
Legend

- LTM Sample Monitoring Well
- Abandoned Well Point/ Monitoring Well InstallationLocation - Shallow Refusal
- LTM Well Point–Periodic Gauge Only
- Surface Water Elevation Location
- 27M-93-05X Well/Elevation Point Identification
- 334 Topographic Contour (ft NGVD, interval=10 feet)
- Area of Contamination (AOC)

Notes:
1. Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services



Legend

- Ft. Devens RFTA Boundary
- Area of Contamination (AOC)
- South Post Impact Area (SPIA)
- Turner Drop Zone
- Military Range
- Training Area
- SPIA Monitored Area
- LTM Sample Well
- LTM Well–Periodic Gauge Only
- Surface Water Elevation Location
- Surface Water Sampling Location
- Bedrock Ridge
- Surface Water
- 340 — Interpreted Groundwater Contour (Ft)
- Groundwater Flow Direction (Approx.)
- (285.00) — Groundwater Elevation (Feet)
- 26M-92-03X — Well/Elevation Point Identification

Figure E-5
Interpretive Ground Water Table Elevation
South Post Impact Area
November 2019

RENOVA environmental services

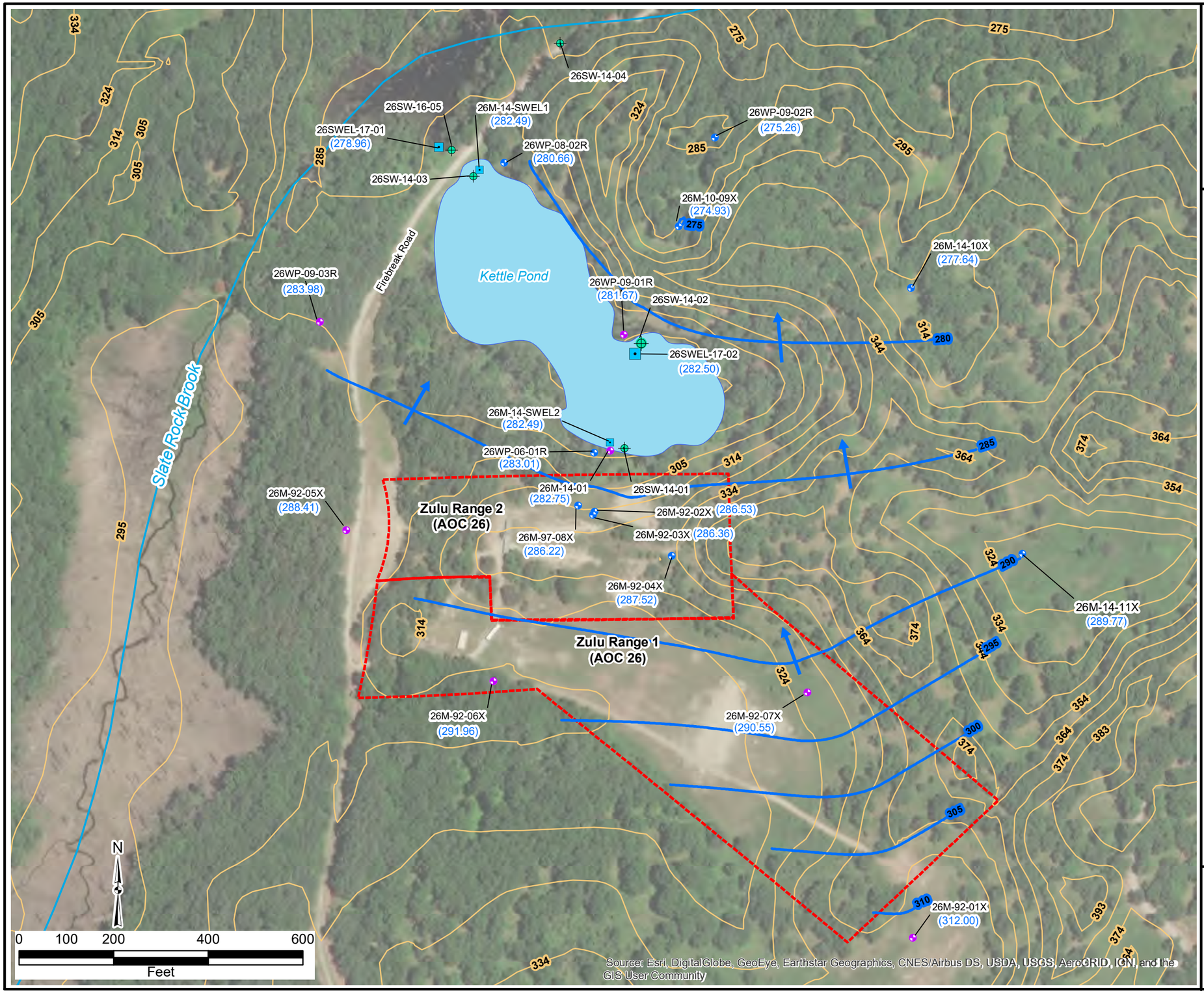


Figure E-6
Intrepretive Water Table Elevation
South Post Impact Area
Area of Contamination 26
Zulu Ranges 1 and 2
May 2019

Legend

- LTM Sample Monitoring Well
- LTM Well Point–Periodic Gauge Only
- Surface Water Elevation Location
- Surface Water Sampling Location
- 26M-92-03X — Well/Elevation Point Identification
- 334 — Topographic Contour (ft NGVD, interval=10 feet)
- Surface Water Course
- Area of Contamination (AOC)
- Estimated Extent of Kettle Pond
- 276 — Groundwater Contour Elevation (ft amsl)
- (285.37) — Monitoring Point Groundwater Elevation (ft amsl)
- Groundwater Flow Direction

Notes:
Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

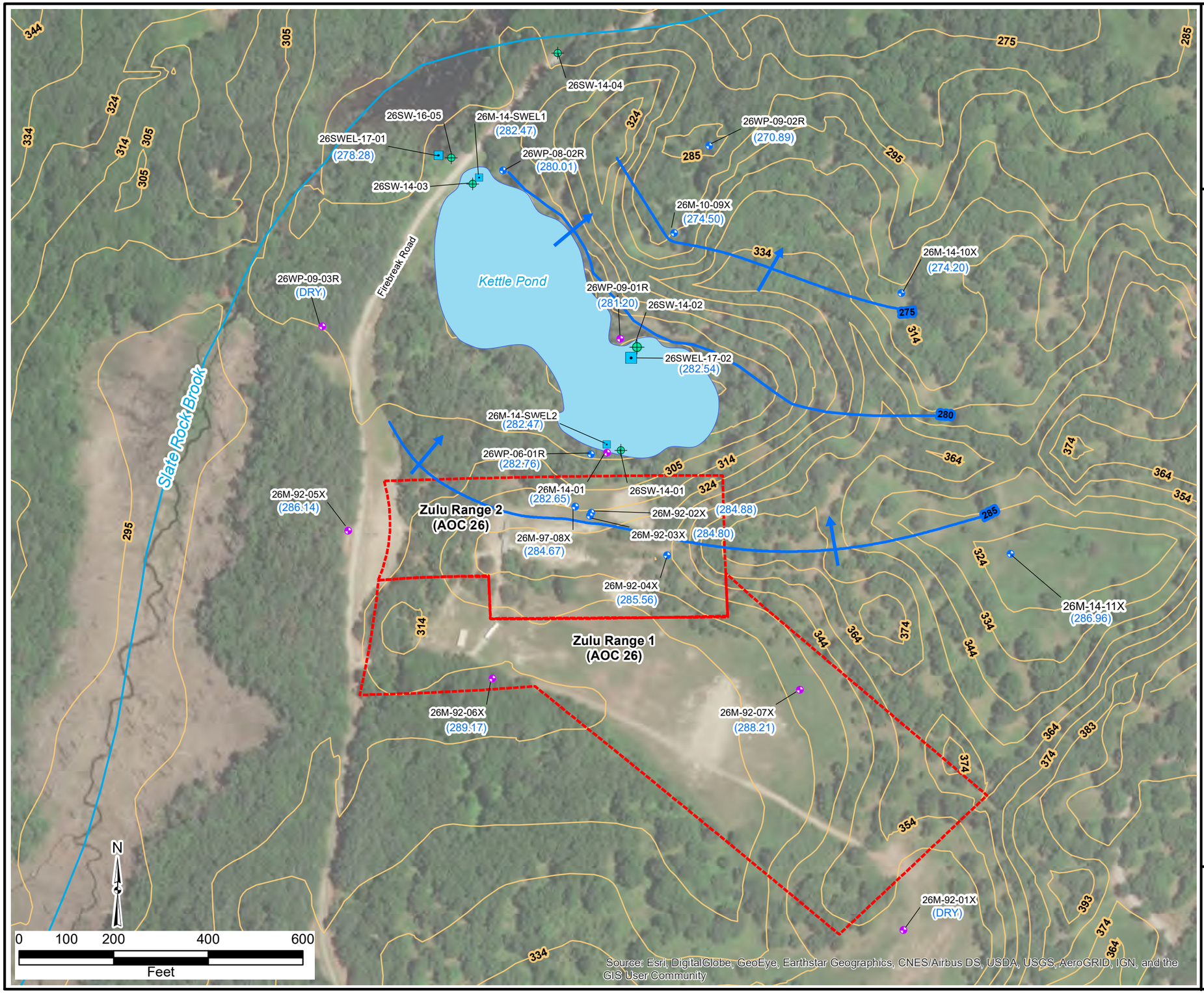


Figure E-7
Intrepretive Water Table Elevation
South Post Impact Area
Area of Contamination 26
Zulu Ranges 1 and 2
November 2019

Legend

- LTM Sample Monitoring Well
- LTM Well Point–Periodic Gauge Only
- Surface Water Elevation Location
- Surface Water Sampling Location
- 26M-92-03X — Well/Elevation Point Identification
- 334 — Topographic Contour (ft NGVD, interval=10 feet)
- Surface Water Course
- Area of Contamination (AOC)
- Estimated Extent of Kettle Pond
- 276 — Groundwater Contour Elevation (ft amsl)
- (285.37) — Monitoring Point Groundwater Elevation (ft amsl)
- Groundwater Flow Direction

Notes:
Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

Figure E-8
Interprative Water Table Elevation
South Post Impact Area
Area of Contamination 27
Hotel Range
November 2019

Legend

- LTM Sample Monitoring Well
- Abandoned Well Point/ Monitoring Well InstallationLocation - Shallow Refusal
- LTM Well Point–Periodic Gauge Only
- Surface Water Elevation Location
- 27M-93-05X Well/Elevation Point Identification
- 334 Topographic Contour (ft NGVD, interval=10 feet)
- 276 Groundwater Contour Elevation (ft amsl)
- Area of Contamination (AOC)
- (231.63) Groundwater Elevation (ft)
- Groundwater Flow Direction

Notes:
1. Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

Figure E-9
Interpretive Water Table Elevation
South Post Impact Area
Area of Contamination 25
EOD Range
November 2019

Legend

- Abandoned Well Point/ Monitoring Well InstallationLocation - Shallow Refusal
- LTM Well Point–Periodic Gauge Only
- 25M-92-08X Well/Elevation Point Identification
- 334 Topographic Contour (ft NGVD, interval=10 feet)
- Area of Contamination (AOC)
- South Post Impact Area
- SPIA Monitored Area
- 276 Groundwater Contour Elevation (ft amsl)
- Groundwater Flow Direction
- (231.63) Groundwater Elevation (ft)

Notes:
1. Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

Figure E-10
Interpretive Water Table Elevation
South Post Impact Area
Area of Contamination 41
November 2019

Legend

- LTM Sample Monitoring Well
- Abandoned Well Point/ Monitoring Well InstallationLocation - Shallow Refusal
- LTM Well Point–Periodic Gauge Only
- 41M-94-12X Well/Elevation Point Identification
- 334 Topographic Contour (ft NGVD, interval=10 feet)
- Area of Contamination (AOC)
- SPIA Monitored Area
- 276 Groundwater Contour Elevation (ft amsl)
- Groundwater Flow Direction
- (231.63) Groundwater Elevation (ft)

Notes:
1. Topographic contours from www.mass.gov, dated 2015.

ft = feet
NGVD = National Geodetic Vertical Datum
LTM=long-term monitoring

RENOVA environmental services

Figure E-11 - AOC 26 Perchlorate Trends

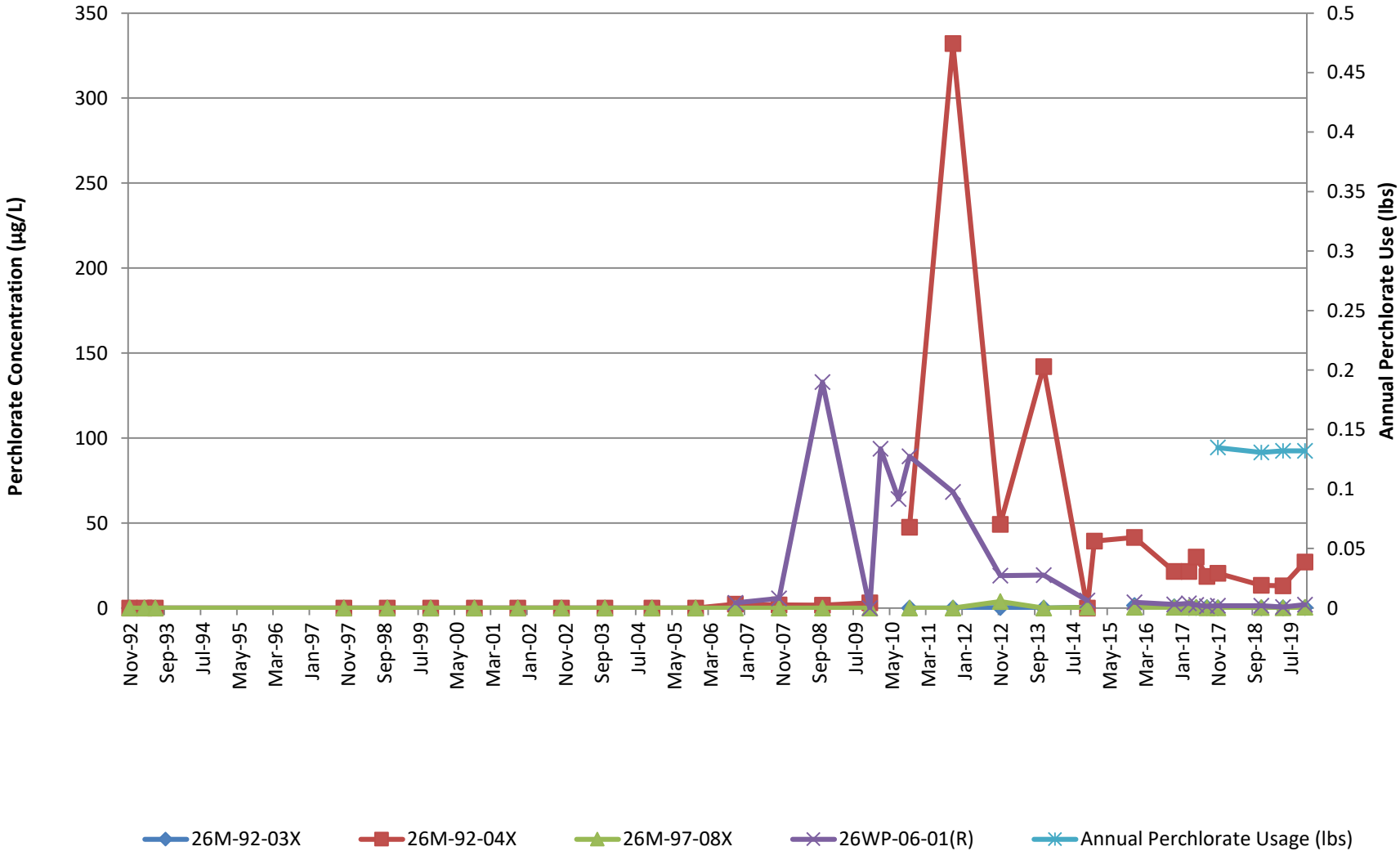
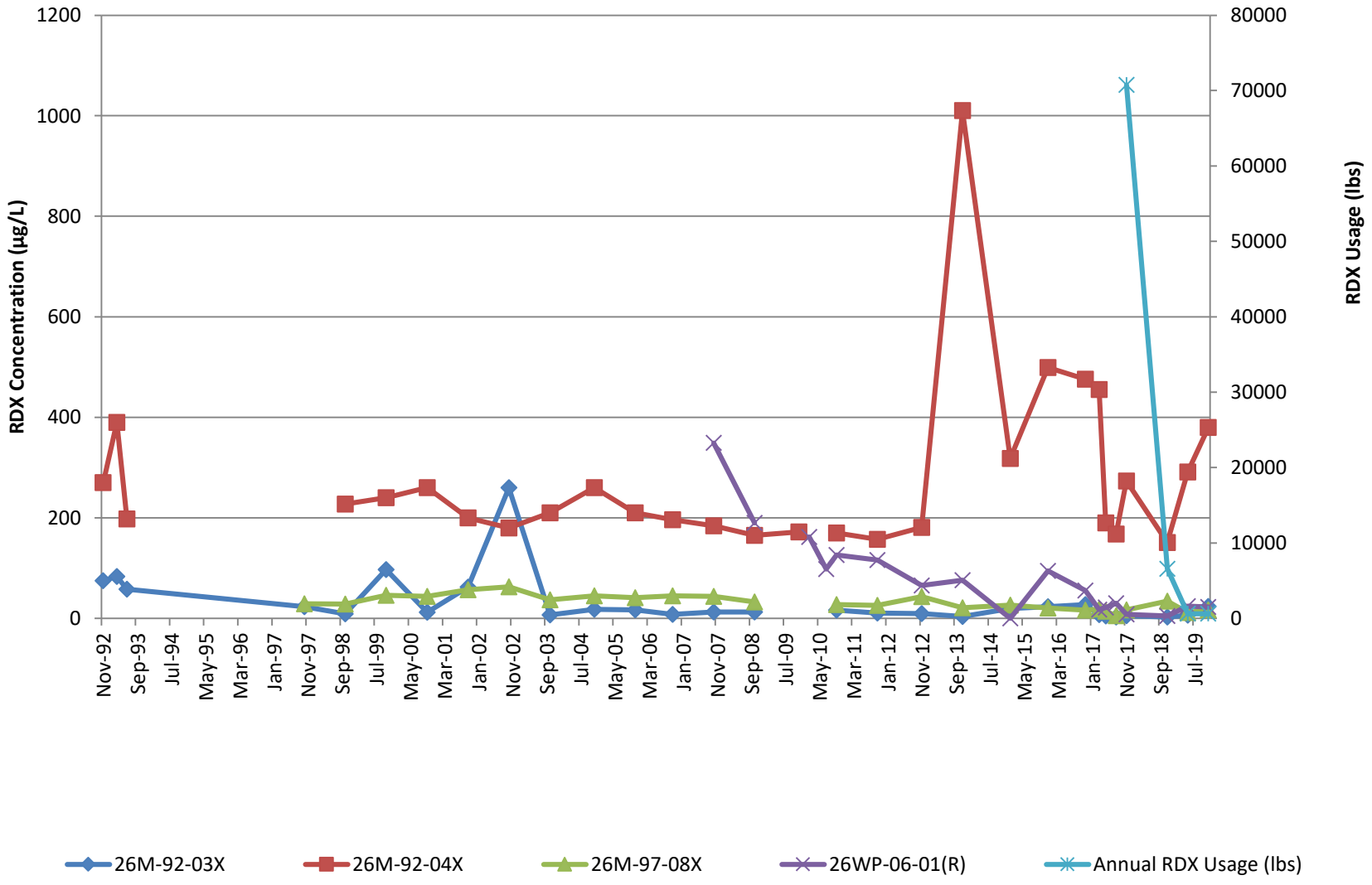


Figure E-12 - AOC 26 RDX Trends



E.3 South Post Impact Area

Tables

TABLE E-1
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Aluminum (µg/L)				Antimony (µg/L)				Arsenic (µg/L)				Barium (µg/L)				Beryllium (µg/L)				Cadmium (µg/L)				Calcium (µg/L)				Chromium (µg/L)				Cobalt (µg/L)				Copper (µg/L)				Iron (µg/L)				Lead (µg/L)			
	GW-1 Standard	NS				6				10				2,000				4				5				NS				100				NS				NS				NS				15			
	GW-3 Standard	NS				8,000				900				50,000				200				4				NS				300				NS				NS				NS				10			
	Background	6,870				3				10.5				40				5				4				14,700				14.7				25				8.09				9,000				4			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																																
26M-92-02X	10/21/2010	100	U	--	--	50	U	--	--	6		--	--	10	U	--	--	5	U	--	--	4	U	--	--	2,400		--	--	8	J	--	--	20	U	--	--	10	U	--	--	90		--	--	10	U	--	--
	10/18/2011	100	U	--	--	4	U	--	--	6		--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,400		--	--	10		--	--	20	U	--	--	10	U	--	--	200		--	--	10	U	--	--
	11/13/2012	100	U	--	--	0.13	J	--	--	5		--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,600		--	--	5	J	--	--	20	U	--	--	10	U	--	--	60		--	--	10	U	--	--
	11/12/2013	100	U	--	--	0.566		--	--	5		--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,400		--	--	3	J	--	--	20	U	--	--	2	J	--	--	60		--	--	10	U	--	--
	11/24/2014	--	--	100	U	--	--	2	U	--	--	3.4	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,330	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/9/2015	--	--	100	U	--	--	2	U	--	--	3.5	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,520	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/1/2016	--	--	100	U	--	--	2	U	--	--	4.7	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,550	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/27/2017	--	--	95.7	J	--	--	1	U	--	--	2.6	J	--	--	1.0	J	--	--	1	U	--	--	1	U	--	--	2,460		--	--	5	U	--	--	1	U	--	--	2	U	--	--	140	J	--	--	2	U
	11/29/2018	--	--	25	U	--	--	1	U	--	--	2.6	J	--	--	5.0	U	--	--	1	U	--	--	1	U	--	--	2,470		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/21/2019	--	--	45.6	J	--	--	0.25	J	--	--	5.2	J	--	--	5.0	U	--	--	1.0	U	--	--	1.0	U	--	--	2,700		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	120	J	--	--	2.0	U
26M-92-03X	10/21/2010	100	U	--	--	50	U	--	--	5	U	--	--	7.4	J	--	--	5	U	--	--	4	U	--	--	3,100		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	10/21/2010[D]	100	U	--	--	50	U	--	--	5	U	--	--	7.8	J	--	--	5	U	--	--	4	U	--	--	3,300		--	--	10	U	--	--	20	U	--	--	10	U	--	--	10	U	--	--	20	U	--	--
	10/18/2011	100	U	--	--	4	U	--	--	5	U	--	--	6	J	--	--	5	U	--	--	5	U	--	--	2,700		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	10/18/2011[D]	100	U	--	--	4	U	--	--	5	U	--	--	6	J	--	--	5	U	--	--	5	U	--	--	2,800		--	--	10	U	--	--	20	U	--	--	10	U	--	--	30	J	--	--	10	U	--	--
	11/13/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	7	J	--	--	5	U	--	--	5	U	--	--	3,200		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	11/13/2012[D]	100	U	--	--	0.5	U	--	--	5	U	--	--	6	J	--	--	5	U	--	--	5	U	--	--	3,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	11/12/2013	100	U	--	--	0.923		--	--	5	U	--	--	5	J	--	--	5	U	--	--	5	U	--	--	2,900		--	--	10	U	--	--	20	U	--	--	3	J	--	--	50	U	--	--	10	U	--	--
	11/12/2013[D]	100	U	--	--	0.961		--	--	5	U	--	--	5	J	--	--	5	U	--	--	5	U	--	--	2,800		--	--	10	U	--	--	20	U	--	--	3	J	--	--	50	U	--	--	10	U	--	--
	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,530	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/24/2014[D]	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,590	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/8/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,560	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U			2.5	U
	11/1/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,980	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/1/2016[D]	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,950	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	3/13/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	6.5	J	--	--	1	U	--	--	1	U	--	--	3,800		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	5/23/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	6.1	J	--	--	1	U	--	--	1	U	--	--	2,750		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	8/22/2017	--	--	25	U	--	--	0.63	U	--	--	5	U	--	--	5.8	J	--	--	1	U	--	--	1	U	--	--	2,870		--	--	5	U	--	--	1	U	--	--	1.3	J	--	--	50	U	--	--	2	U
	11/27/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	6.8	J	--	--	1	U	--	--	1	U	--	--	2,620		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/29/2018	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5.3	J	--	--	1	U	--	--	1	U	--	--	3,030		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	5/20/2019	--	--	25	U	--	--	1.2	U	--	--	5.0	U	--	--	6.8	J	--	--	1.0	U	--	--	1.0	U	--	--	3,510		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	11/21/2019	--	--	25	U	--	--	1.0	U	--	--	5.0	U	--	--	7.2	J	--	--	1.0	U	--	--	1.0	U	--	--	3,360		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
26M-92-04X	10/21/2010	100	U	--	--	50	U	--	--	5	U	--	--	8.8	J	--	--	5	U	--	--	4	U	--	--	9,100		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	10/18/2011	100	U	--	--	4	U	--	--	5	U	--	--	6	J	--	--	5	U	--	--	5	U	--	--	7,200		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	11/13/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	9	J	--	--	5	U	--	--	5	U	--	--	9,400		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	11/12/2013	100	U	--	--	0.514		--	--	5	U	--	--	10		--	--	5	U	--	--	5	U	--	--	10,000		--	--	10	U	--	--	20	U	--	--	2	J	--	--	50	U	--	--	10	U	--	--
	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	9,170		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/24/2014[D]	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	9,090		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/8/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	8,260		--	--	5	U	--	--	25	U	--	--	13	U			50	U	--	--	2.5	U
	11/1/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,840		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	3/13/2017	--	--	16.6	J	--	--	1	U	--	--	5	U	--	--	5.7	J	--	--	1	U	--	--	1	U	--	--	7,920		--	--	5	U	--	--	1	U	--	--	2	U	--	--	21.9	J	--	--	2	U
	5/23/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	4.1	J	--	--	1	U	--	--	1	U	--	--	6,680		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	8/22/2017	--	--	25	U	--	--	0.69	U	--	--	5	U	--	--	4.9	J	--	--	1	U	--	--	1	U	--	--	7,070		--	--	5	U	--	--	1	U	--	--	1.6	J	--	--	50	U	--	--	2	U
	11/27/2017	--	--	35.9	J	--	--	1	U	--	--	5	U	--	--	5.1	J	--	--	1	U	--	--	1	U	--	--	7,410		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/29/2018	--	--	25	U	--	--	1	U	--	--	5	U	--	--	4.0	J	--	--	1	U	--	--	1	U	--	--	5,900		--	--	5	U	--	--	1	U	--	--	1.4	J	--	--	50	U	--	--	2	U
	5/20/2019	--	--	31.2	J	--	--	0.42	U	--	--	5.0	U	--	--	4.3	J	--	--	1.0	U	--	--	1.0	U	--	--	7,750		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	26.9	J	--	--	2.0	U
	11/21/2019	--	--	25	U	--	--	1.0	U	--	--	5.0	U	--	--	4.7	J	--	--	1.0	U	--	--	1.0	U	--	--	8,740		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	11/21/2019[D]	--	--	25	U	--	--	1.0	U	--	--	5.0	U	--	--	4.8	J	--	--	1.0	U	--	--	1.0	U	--	--	8,610		--	--	5.0	U	--	--	1.0	U	--	--	1.1	J	--	--	50	U	--	--	2.0	U
26M-92-05X	11/2/2016	--	--	199	J	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,650	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	65	J	--	--	2.5	U
26M-92-06X	11/1/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,500	U	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
26M-97-08X	10/21/2010	100	U	--	--	50	U	--	--	5	U	--	--	7.8	J	--	--	5	U	--	--	4	U	--	--	2,600		--	--	7	J	--	--	20	U	--	--	10	U	--	--	80		--	--	10	U	--	--
	10/21/2010[D]	100	U	--	--	50	U	--	--	5	U	--	--	7.6	J	--	--	5	U	--	--	4	U	--	--	2,500		--	--	8	J	--	--	20	U	--	--	10	U	--	--	90		--	--	10	U	--	--
	10/18/2011	100	U	--	--	4	U	--	--	5	U	--	--	8	J	--	--	5	U	--	--	5	U	--	--	2,700		--	--	4	J	--	--	20	U	--	--	10	U	--	--	50		--	--	10	U	--	--
	10/18/2011[D]	100	U	--	--	4	U	--	--	5	U	--	--	8	J	--	--	5	U	--	--	5	U	--	--	2,700		--	--	4	J	--	--	20	U	--	--	10	U	--	--	50		--	--	10	U	--	--
	11/14/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	10		--	--	5	U	--	--	5	U	--	--	3,500		--	--	2	J	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
	11/14/2012[D]	100	U	--	--	0.5	U	--	--	5	U	--	--	10		--	--	5	U	--	--	5	U	--	--	3,400		--	--	2	J	--	--	20	U	--	--	10	U	--	--	20	J	--	--	10	U	--	--
	11/12/2013	100	U	--	--	0.306	J	--	--	5	U	--	--	9	J	--	--	5	U	--	--	5	U	--	--	2,800		--	--	10		--	--	20	U	--	--	2	J	--	--	100		--	--	10	U	--	--
	11/12/2013[D]	100	U	--	--	0.78	J	--	--	5	U	--	--	8	J	--	--	5	U	--	--	5	U	--	--	2,800		--	--	10		--	--	20	U	--	--	2	J	--	--	110		--	--	10	U	--	--
	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,550	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/24/2014[D]	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,600	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/9/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,020	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/1/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,130	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	3/13/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	11	J	--	--	1	U	--	--	1	U	--	--	4,210		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	3/13/2017[D]	--	--	25	U	--	--	1	U	--	--	5	U	--	--	10.3	J	--	--	1	U	--	--	1	U	--	--	4,050		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	5/23/2017	--	--	25.2	J	--	--	1	U	--	--	5	U	--	--	7.9	J	--	--	1	U	--	--	1	U	--	--	3,240		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	8/21/2017	--	--	25	U	--	--	0.70	U	--	--	5	U	--	--	5.5	J	--	--	1	U	--	--	1	U	--	--	3,210		--	--	5	U	--	--	1	U	--	--	6.1	J	--	--	50	U	--	--	2	U
	8/21/2017[D]	--	--	16.4	J	--	--	0.52	U	--	--	5	U	--	--	5.6	J	--	--	1	U	--	--	1	U	--	--	3,130		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/27/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	6.6	J	--	--	1	U	--	--	1	U	--	--	2,670		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/27/2017[D]	--	--	25	U	--	--	1	U	--	--	5	U	--	--	6.1	J	--	--	1	U	--	--	1	U	--	--	2,630		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/29/2018	--	--	14.3	J	--	--	1	U	--	--	5	U	--	--	8.7	J	--	--	1	U	--	--	1	U	--	--	2,760		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	5/20/2019	--	--	25.1	J	--	--	1.0	U	--	--	5.0	U	--	--	6.6	J	--	--	1.0	U	--	--	1.0	U	--	--	2,760		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	11/21/2019	--	--	25	U	--	--	0.25	J	--	--	5.0	U	--	--	8.1	J	--	--	1.0	U	--	--	1.0	U	--	--	3,240		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
26M-10-09X	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,720	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/10/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,610	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/2/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,770	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/28/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	1.7	J	--	--	1	U	--	--	1	U	--	--	4,270	J	--	--	1.1	J	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/27/2018	--	--	16.6	J	--	--	1	U	--	--	5.0	U	--	--	5.0	U	--	--	1.0	U	--	--	1.0	U	--	--	3,010		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	11/22/2019	--	--	25	U	--	--	1.0	U	--	--	5.0	U	--	--	5.0	U	--	--	1.0	U	--	--	1.0	U	--	--	4,590		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
26M-14-10X	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	10,200	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/9/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	8,160		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/28/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	1.5	J	--	--	1	U	--	--	1	U	--	--	9,300		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/29/2018	--	--	58	J	--	--	1	U	--	--	5	U	--	--	2.5	J	--	--	1	U	--	--	1	U	--	--	8,150		--	--	5	U	--	--	1	U	--	--	2	U	--	--	81.2	J	--	--	2	U
	11/22/2019	--	--	10,100		--	--	1.5	J	--	--	19.9		--	--	50.5	J	--	--	0.30	J	--	--	1.0	U	--	--	9,630		--	--	29.9		--	--	8.4	J	--	--	20.8	J	--	--	18,300		--	--	7.4	

TABLE E-1
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Magnesium (µg/L)				Manganese (µg/L)				Mercury (µg/L)				Nickel (µg/L)				Potassium (µg/L)				Selenium (µg/L)				Silver (µg/L)				Sodium (µg/L)				Thallium (µg/L)				Vanadium (µg/L)				Zinc (µg/L)			
	GW-1 Standard	NS				NS				2				100				NS				50				100				NS				2				30				5,000			
	GW-3 Standard	NS				NS				20				200				NS				100				7				NS				3,000				4,000				900			
	Background	3,481				291				0.243				34				2,370				3				5				10,800				7				11				21.1			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																												
26M-92-02X	10/21/2010	910		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	3,200		--	--	20	U	--	--	10	U	--	--	13.6	J	--	--
	10/18/2011	960		--	--	10	U	--	--	0.2	U	--	--	5	J	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	3,100		--	--	2	U	--	--	10	U	--	--	50	U	--	--
	11/13/2012	1,000		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	3,500		--	--	0.08	J	--	--	10	U	--	--	21	J	--	--
	11/12/2013	870		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	3,200		--	--	0.5	U	--	--	10	U	--	--	13	J	--	--
	11/24/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,960	J	--	--	1	U	--	--	5	U	--	--	10.3	J
	12/9/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,220	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/1/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,380	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/27/2017	--	--	977	J	--	--	2.6	J	--	--	0.1	U	--	--	1.2	J	--	--	347	J	--	--	5	U	--	--	2	U	--	--	3,190	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/29/2018	--	--	940	J	--	--	2.0	U	--	--	0.1	U	--	--	0.80	J	--	--	357	J	--	--	5	U	--	--	2	U	--	--	3,170	J	--	--	1	U	--	--	2	U	--	--	4.7	J
	11/21/2019	--	--	1,060	J	--	--	2.9	J	--	--	0.1	U	--	--	1.4	J	--	--	333	J	--	--	5.0	U	--	--	2.0	U	--	--	3,190	J	--	--	1.0	U	--	--	2.0	U	--	--	4.7	J
26M-92-03X	10/21/2010	440	J	--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,500	J	--	--	20	U	--	--	10	U	--	--	12.5	J	--	--
	10/21/2010[D]	310	J	--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,600	J	--	--	20	U	--	--	10	U	--	--	12	J	--	--
	10/18/2011	290		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,300	J	--	--	2	U	--	--	10	U	--	--	50	U	--	--
	10/18/2011[D]	280		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,300	J	--	--	2	U	--	--	10	U	--	--	50	U	--	--
	11/13/2012	360		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,400	J	--	--	0.04	J	--	--	10	U	--	--	18	J	--	--
	11/13/2012[D]	340		--	--	10	U	--	--	0.01	J	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,300	J	--	--	0.5	U	--	--	10	U	--	--	17	J	--	--
	11/12/2013	260		--	--	4	J	--	--	0.2	U	--	--	25	U	--	--	560	J	--	--	10	U	--	--	7	U	--	--	1,400	J	--	--	0.5	U	--	--	10	U	--	--	13	J	--	--
	11/12/2013[D]	260		--	--	4	J	--	--	0.2	U	--	--	25	U	--	--	550	J	--	--	10	U	--	--	7	U	--	--	1,300	J	--	--	0.5	U	--	--	10	U	--	--	11	J	--	--
	11/24/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/24/2014[D]	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	12/8/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/1/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/1/2016[D]	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	3/13/2017	--	--	295	J	--	--	3.8	U	--	--	0.1	U	--	--	0.60	J	--	--	966	J	--	--	5	U	--	--	2	U	--	--	1,690	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/23/2017	--	--	239	U	--	--	3.2	J	--	--	0.039	U	--	--	1	U	--	--	922	U	--	--	5	U	--	--	2	U	--	--	2,220	U	--	--	1	U	--	--	2	U	--	--	5	U
	8/22/2017	--	--	264	J	--	--	3.8	J	--	--	0.051	U	--	--	2.2	J	--	--	792	J	--	--	5	U	--	--	2	U	--	--	1,490	J	--	--	1	U	--	--	2	U	--	--	5.2	J
	11/27/2017	--	--	211	J	--	--	2.7	J	--	--	0.1	U	--	--	1.0	U	--	--	623	J	--	--	5	U	--	--	2	U	--	--	1,440	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/29/2018	--	--	324	J	--	--	2.5	J	--	--	0.1	U	--	--	1.0	U	--	--	745	J	--	--	5	U	--	--	2	U	--	--	1,680	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/20/2019	--	--	338	J	--	--	2.3	J	--	--	0.10	U	--	--	1.0	U	--	--	811	J	--	--	5.0	U	--	--	2.0	U	--	--	2,040	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
	11/21/2019	--	--	363	J	--	--	2.9	J	--	--	0.10	U	--	--	1.0	U	--	--	700	J	--	--	5.0	U	--	--	2.0	U	--	--	1,750	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
26M-92-04X	10/21/2010	800		--	--	12		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,500		--	--	20	U	--	--	10	U	--	--	12.2	J	--	--
	10/18/2011	760		--	--	11		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,400		--	--	2	U	--	--	10	U	--	--	50	U	--	--
	11/13/2012	830		--	--	11		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,300		--	--	0.03	J	--	--	10	U	--	--	18	J	--	--
	11/12/2013	850		--	--	14		--	--	0.2	U	--	--	25	U	--	--	630	J	--	--	10	U	--	--	7	U	--	--	2,700		--	--	0.5	U	--	--	10	U	--	--	10	J	--	--
	11/24/2014	--	--	2,500	U	--	--	9.1	J	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,730	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/24/2014[D]	--	--	2,500	U	--	--	9.3	J	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,520	J	--	--	1	U	--	--	5	U	--	--	14.8	J
	12/8/2015	--	--	2,500	U	--	--	8.6	J	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,580	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/1/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	3/13/2017	--	--	630	J	--	--	6.7	U	--	--	0.1	U	--	--	0.40	J	--	--	558	J	--	--	5	U	--	--	2	U	--	--	2,760	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/23/2017	--	--	586	J	--	--	3.7	J	--	--	0.036	U	--	--	1	U	--	--	572	U	--	--	5	U	--	--	2	U	--	--	2,850	U	--	--	1	U	--	--	2	U	--	--	5	U
	8/22/2017	--	--	649	J	--	--	6.2	J	--	--	0.057	U	--	--	0.70	J	--	--	1,090	J	--	--	5	U	--	--	2	U	--	--	2,680	J	--	--	1	U	--	--	2	U	--	--	5.0	J
	11/27/2017	--	--	585	J	--	--	10.0	J	--	--	0.1	U	--	--	0.50	J	--	--	466	J	--	--	5	U	--	--	2	U	--	--	2,510	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/29/2018	--	--	478	J	--	--	9.7	J	--	--	0.1	U	--	--	1.0	U	--	--	385	J	--	--	5	U	--	--	2	U	--	--	2,370	J	--	--	1	U	--	--	2	U	--	--	4.7	J
	5/20/2019	--	--	693	J	--	--	28.1		--	--	0.10	U	--	--	1.0	U	--	--	411	J	--	--	5.0	U	--	--	2.0	U	--	--	2,490	J	--	--	1.0	U	--	--	2.0	U	--	--	4.9	J
	11/21/2019	--	--	676	J	--	--	8.7	J	--	--	0.10	U	--	--	1.0	U	--	--	397	J	--	--	5.0	U	--	--	2.0	U	--	--	2,500	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
	11/21/2019[D]	--	--	653	J	--	--	9.6	J	--	--	0.10	U	--	--	1.0	U	--	--	380	J	--	--	5.0	U	--	--	0.7	J	--	--	2,470	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
26M-92-05X	11/2/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,240	J	--	--	1	U	--	--	5	U	--	--	10	U
26M-92-06X	11/1/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
26M-97-08X	10/21/2010	130		--	--	2.9	J	--	--	0.2	U	--	--	4.9	J	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,200	J	--	--	20	U	--	--	10	U	--	--	12.5	J	--	--
	10/21/2010[D]	120		--	--	2.6	J	--	--	0.2	U	--	--	4.8	J	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,100	J	--	--	20	U	--	--	10	U	--	--	14.7	J	--	--
	10/18/2011	150		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,000	J	--	--	2	U	--	--	10	U	--	--	50	U	--	--
	10/18/2011[D]	150		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,100	J	--	--	2	U	--	--	10	U	--	--	50	U	--	--
	11/14/2012	170		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,500	J	--	--	0.5	U	--	--	10	U	--	--	22	J	--	--
	11/14/2012[D]	180		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,500	J	--	--	0.5	U	--	--	10	U	--	--	20	J	--	--
	11/12/2013	130		--	--	6	J	--	--	0.2	U	--	--	25	U	--	--	410	J	--	--	10	U	--	--	7	U	--	--	1,200	J	--	--	0.5	U	--	--	10	U	--	--	13	J	--	--
	11/12/2013[D]	130		--	--	7	J	--	--	0.2	U	--	--	25	U	--	--	420	J	--	--	10	U	--	--	7	U	--	--	1,200	J	--	--	0.5	U	--	--	10	U	--	--	16	J	--	--
	11/24/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/24/2014[D]	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	12/9/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/1/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	3/13/2017	--	--	296	J	--	--	1.8	U	--	--	0.1	U	--	--	1	U	--	--	601	J	--	--	5	U	--	--	2	U	--	--	1,710	J	--	--	1	U	--	--	2	U	--	--	5	U
	3/13/2017[D]	--	--	281	J	--	--	2.0	U	--	--	0.1	U	--	--	1	U	--	--	621	J	--	--	5	U	--	--	2	U	--	--	1,670	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/23/2017	--	--	282	U	--	--	5.4	J	--	--	0.039	U	--	--	1	U	--	--	993	U	--	--	5	U	--	--	2	U	--	--	2,810	U	--	--	1	U	--	--	2	U	--	--	5.4	J
	8/21/2017	--	--	347	J	--	--	2.5	J	--	--	0.10	U	--	--	1	U	--	--	468	J	--	--	5	U	--	--	2	U	--	--	1,760	J	--	--	1	U	--	--	2	U	--	--	5	U
	8/21/2017[D]	--	--	371	J	--	--	2.4	J	--	--	0.053	U	--	--	1	U	--	--	475	J	--	--	5	U	--	--	2	U	--	--	1,890	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/27/2017	--	--	284	J	--	--	1.5	J	--	--	0.1	U	--	--	1	U	--	--	450	J	--	--	5	U	--	--	2	U	--	--	1,510	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/27/2017[D]	--	--	284	J	--	--	1.5	J	--	--	0.1	U	--	--	1	U	--	--	436	J	--	--	5	U	--	--	2	U	--	--	1,530	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/29/2018	--	--	183	J	--	--	4.7	J	--	--	0.1	U	--	--	1	U	--	--	623	J	--	--	5	U	--	--	2	U	--	--	1,360	J	--	--	1	U	--	--	2	U	--	--	4.5	J
	5/20/2019	--	--	296	J	--	--	2.1	J	--	--	0.10	U	--	--	1.0	U	--	--	525	J	--	--	5.0	U	--	--	2.0	U	--	--	1,720	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
	11/21/2019	--	--	315	J	--	--	1.7	J	--	--	0.10	U	--	--	1.0	U	--	--	507	J	--	--	5.0	U	--	--	0.8	J	--	--	1,760	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
26M-10-09X	11/24/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,970	J	--	--	1	U	--	--	5	U	--	--	10	U
	12/10/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,670	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/2/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,960	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/28/2017	--	--	808	J	--	--	2.6	J	--	--	0.1	U	--	--	1	U	--	--	500	J	--	--	5	U	--	--	2	U	--	--	3,580	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/27/2018	--	--	519	J	--	--	2.0	U	--	--	0.10	U	--	--	1.0	U	--	--	433	J	--	--	5.0	U	--	--	2.0	U	--	--	3,420	J	--	--	1	U	--	--	2.0	U	--	--	5.0	U
	11/22/2019	--	--	862	J	--	--	1.7	J	--	--	0.10	U	--	--	1.0	U	--	--	426	J	--	--	5.0	U	--	--	2.0	U	--	--	3,910	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
26M-14-10X	11/24/2014	--	--	2,500	U	--	--	12.4	J	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,010		--	--	1	U	--	--	5	U	--	--	10	U
	12/9/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	4,260	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/28/2017	--	--	1,970	J	--	--	1.5	J	--	--	0.1	U	--	--	1	U	--	--	1,460	J	--	--	5	U	--	--	2	U	--	--	4,770	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/29/2018	--	--	1,670	J	--	--	4.1	J	--	--	0.1	U	--	--	1	U	--	--	1,380	J	--	--	5	U	--	--	2	U	--	--	4,290	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/22/2019	--	--	5,110		--	--	254		--	--	0.10	U	--	--	19.5	J	--	--	3,540	J	--	--	5.0	U	--	--	2.0	U	--	--	4,580	J	--	--	1.0	U	--	--	15.8	J	--	--	66.2	

TABLE E-1
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Aluminum (µg/L)				Antimony (µg/L)				Arsenic (µg/L)				Barium (µg/L)				Beryllium (µg/L)				Cadmium (µg/L)				Calcium (µg/L)				Chromium (µg/L)				Cobalt (µg/L)				Copper (µg/L)				Iron (µg/L)				Lead (µg/L)			
	GW-1 Standard	NS				6				10				2,000				4				5				NS				100				NS				NS				NS				15			
	GW-3 Standard	NS				8,000				900				50,000				200				4				NS				300				NS				NS				NS				10			
	Background	6,870				3				10.5				40				5				4				14,700				14.7				25				8.09				9,000				4			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																																
26M-I4-11X	11/24/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,840	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	12/9/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,860	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/25/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	3,210		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/28/2018	--	--	2,130		--	--	1.0	U	--	--	9.2	J	--	--	9.4	J	--	--	1.0	U	--	--	1.0	U	--	--	3,310		--	--	8.8	J	--	--	2.2	J	--	--	7.7	J	--	--	4,440		--	--	2.7	J
	11/22/2019	--	--	106	J	--	--	1.0	U	--	--	5.0	U	--	--	5.0	U	--	--	1.0	U	--	--	1.0	U	--	--	3,100		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	191	J	--	--	2.0	U
26WP-06-01[1]	10/21/2010	100	U	--	--	50	U	--	--	5	U	--	--	11		--	--	5	U	--	--	4	U	--	--	11,000	U	--	--	5	J	--	--	20	U	--	--	10	U	--	--	25,000		--	--	10	U	--	--
	10/18/2011	100	U	--	--	4	U	--	--	5	U	--	--	10		--	--	5	U	--	--	5	U	--	--	9,300		--	--	10	U	--	--	20	U	--	--	10		--	--	5,800		--	--	10	U	--	--
	11/14/2012	100	U	--	--	0.42	J	--	--	5	U	--	--	9	J	--	--	5	U	--	--	5	U	--	--	7,700		--	--	10	U	--	--	20	U	--	--	10	U	--	--	7,000		--	--	10	U	--	--
	11/12/2013	100	U	--	--	1.062		--	--	5	U	--	--	8	J	--	--	5	U	--	--	--	J	--	--	6,100		--	--	6	J	--	--	20	U	--	--	6	J	--	--	40,000		--	--	10	U	--	--
	11/24/2014	100	U	100	U	2	U	2	U	3	U	3	U	25	U	25	U	2	U	2	U	2	U	2	U	6,790		6,650		5	U	5	U	25	U	25	U	13	U	13	U	9,700	J	3,070		2.5	U	2.5	U
	12/9/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,630		--	--	5	U	--	--	25	U	--	--	13	U	--	--	5,650		--	--	2.5	U
26WP-06-01R	3/13/2017	--	--	16.3	J	--	--	1	U	--	--	5	U	--	--	4	J	--	--	1	U	--	--	1	U	--	--	3,550		--	--	5	U	--	--	1.1	J	--	--	1.8	U	--	--	23.1	J	--	--	2	U
	5/22/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	2.1	J	--	--	1	U	--	--	1	U	--	--	3,010		--	--	5	U	--	--	0.20	J	--	--	2.4	J	--	--	50	U	--	--	2.0	U
	5/22/2017[D]	--	--	25	U	--	--	1	U	--	--	5	U	--	--	2.0	J	--	--	1	U	--	--	1	U	--	--	2,930		--	--	5	U	--	--	1.0	U	--	--	2.6	J	--	--	50	U	--	--	2.0	U
	8/21/2017	--	--	16.2	J	--	--	0.61	U	--	--	5	U	--	--	2.4	J	--	--	1	U	--	--	1	U	--	--	3,860		--	--	5	U	--	--	1.0	U	--	--	3.4	J	--	--	50	U	--	--	2.0	U
	11/27/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	2	J	--	--	1	U	--	--	1	U	--	--	3,090		--	--	5	U	--	--	1	U	--	--	1.0	J	--	--	32.8	J	--	--	2	U
	11/28/2018	--	--	25	U	--	--	1	U	--	--	5	U	--	--	1.5	J	--	--	1	U	--	--	1	U	--	--	2,430		--	--	5	U	--	--	1	U	--	--	1.0	J	--	--	50	U	--	--	2	U
	11/28/2018[D]	--	--	25	U	--	--	1	U	--	--	5	U	--	--	1.8	J	--	--	1	U	--	--	0.20	J	--	--	2,370		--	--	5	U	--	--	1	U	--	--	1.4	J	--	--	50	U	--	--	2	U
	5/20/2019	--	--	25	U	--	--	0.34	U	--	--	5.0	U	--	--	1.6	J	--	--	1.0	U	--	--	1.0	U	--	--	2,700		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	5/20/2019[D]	--	--	25	U	--	--	0.24	U	--	--	5.0	U	--	--	1.5	J	--	--	1.0	U	--	--	1.0	U	--	--	2,650		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
	11/21/2019	--	--	25	U	--	--	1.0	U	--	--	5.0	U	--	--	1.8	J	--	--	1.0	U	--	--	1.0	U	--	--	2,790		--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U
26WP-08-02[1]	10/21/2010	260		--	--	50	U	--	--	64		--	--	5.2	J	--	--	5	U	--	--	4	U	--	--	3,400		--	--	2	J	--	--	3.1	J	--	--	22		--	--	17,000		--	--	6	J	--	--
	10/18/2011	100	U	--	--	4	U	--	--	62		--	--	3	J	--	--	5	U	--	--	5	U	--	--	3,100		--	--	10	U	--	--	20	U	--	--	10	U	--	--	20,000		--	--	10	U	--	--
	11/14/2012	20	J	--	--	0.28	J	--	--	68		--	--	5	J	--	--	5	U	--	--	1	J	--	--	3,600		--	--	10	U	--	--	6	J	--	--	10	U	--	--	37,000		--	--	6	J	--	--
	11/12/2013	100	U	--	--	0.454	J	--	--	53		--	--	3	J	--	--	5	U	--	--	1	J	--	--	3,500		--	--	10	U	--	--	20	U	--	--	4	J	--	--	26,000		--	--	14		--	--
	11/25/2014	100	U	100	U	2	U	2	U	53.7		53.5		25	U	25	U	2	U	2	U	2	U	2	U	2,740	J	3,440	J	5	U	5	U	25	U	25	U	13	U	13	U	21,000		20,700		2.5	U	2.5	U
	11/25/2014[D]	100	U	--	--	2	U	--	--	52.7		--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,770	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	21,300		--	--	2.5	U	--	--
	12/9/2015	--	--	100	U	--	--	2	U	--	--	58.1		--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,650		--	--	5	U	--	--	25	U	--	--	13	U	--	--	21,900		--	--	2.5	U
	12/9/2015[D]	--	--	100	U	--	--	2	U	--	--	54.4		--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,650		--	--	5	U	--	--	25	U	--	--	13	U	--	--	19,500		--	--	2.5	U
26WP-08-02R	11/27/2017	--	--	20.4	J	--	--	1	U	--	--	31.9		--	--	1.7	J	--	--	1	U	--	--	1	U	--	--	2,120		--	--	5	U	--	--	1.3	J	--	--	2	U	--	--	8,260		--	--	2	U
	11/27/2018	--	--	45.4	J	--	--	1	U	--	--	27.1		--	--	1.7	J	--	--	1	U	--	--	1	U	--	--	2,300		--	--	1	J	--	--	0.90	J	--	--	1.2	J	--	--	6,970		--	--	2	U
	11/21/2019	--	--	50.0	J	--	--	1.0	U	--	--	16.6		--	--	5.0	U	--	--	1.0	U	--	--	1.0	U	--	--	1,780		--	--	5.0	U	--	--	0.70	J	--	--	2.0	U	--	--	5,960		--	--	2.0	U
26WP-09-01[1]	11/25/2014	100	U	100	U	2	U	2	U	15.5		15.3		25	U	25	U	2	U	2	U	2	U	2	U	2,500	U	2,900	J	5	U	5	U	25	U	25	U	13	U	13	U	6,390		6,180		2.5	U	2.5	U
26WP-09-01R	11/28/2017	--	--	158	J	--	--	1	U	--	--	10.4		--	--	6.0	J	--	--	1	U	--	--	1	U	--	--	2,050		--	--	5	U	--	--	1.6	J	--	--	2	U	--	--	2,800	J	--	--	2	U
	11/28/2018	--	--	131	J	--	--	1	U	--	--	9.2	J	--	--	6.2	J	--	--	1	U	--	--	1	U	--	--	2,670		--	--	5	U	--	--	2.0	J	--	--	2	U	--	--	3,750		--	--	2	U
	11/22/2019	--	--	112	J	--	--	1.0	U	--	--	6.8	J	--	--	4.6	J	--	--	1.0	U	--	--	1.0	U	--	--	1,750		--	--	5.0	U	--	--	1.5	J	--	--	2.0	U	--	--	3,070		--	--	2.0	U
26WP-09-02[1]	11/25/2014	100	U	100	U	2	U	2	U	3	U	3	U	25	U	25	U	2	U	2	U	2	U	2	U	2,500	U	2,900	J	5	U	5	U	25	U	25	U	13	U	13	U	162		50	U	2.5	U	2.5	U
26WP-09-02R	11/25/2017	--	--	55.4	J	--	--	1	U	--	--	5	U	--	--	7.5	J	--	--	1	U	--	--	1	U	--	--	892	J	--	--	5	U	--	--	0.3	J	--	--	2	U	--	--	29.7	J	--	--	2	U
	11/28/2018	--	--	29.6	J	--	--	1	U	--	--	5	U	--	--	8.1	J	--	--	1	U	--	--	1	U	--	--	818	J	--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/22/2019	--	--	32.2	J	--	--	1.0	U	--	--	5	U	--	--	6.8	J	--	--	1.0	U	--	--	1.0	U	--	--	855	J	--	--	5.0	U	--	--	1.0	U	--	--	2.0	U	--	--	50	U	--	--	2.0	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Estimated results
[D] - Duplicate Sample
-- Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations
1 - Wellpoints 26WP-06-01, 26WP-08-02, 26WP-09-01, and 26WP-09-02 were removed in January 2017 and replaced with 26WP-06-01R, 26WP-08-02R, 26WP-09-01R, and 26WP-09-02R, respectively.

TABLE E-1
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Magnesium (µg/L)				Manganese (µg/L)				Mercury (µg/L)				Nickel (µg/L)				Potassium (µg/L)				Selenium (µg/L)				Silver (µg/L)				Sodium (µg/L)				Thallium (µg/L)				Vanadium (µg/L)				Zinc (µg/L)			
	GW-1 Standard	NS				NS				2				100				NS				50				100				NS				2				30				5,000			
	GW-3 Standard	NS				NS				20				200				NS				100				7				NS				3,000				4,000				900			
	Background	3,481				291				0.243				34				2,370				3				5				10,800				7				11				21.1			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																												
26M-14-11X	11/24/2014	--	--	2,500	U	--	--	31.6		--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,820	J	--	--	1	U	--	--	5	U	--	--	10	U
	12/9/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/25/2017	--	--	704	J	--	--	2.9	J	--	--	0.1	U	--	--	1.1	J	--	--	547	J	--	--	5	U	--	--	2	U	--	--	2,300	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/28/2018	--	--	1,220	J	--	--	80.6		--	--	0.10	U	--	--	5.6	J	--	--	852	J	--	--	5.0	U	--	--	2.0	U	--	--	2,380	J	--	--	1.0	U	--	--	2.9	J	--	--	17.9	J
	11/22/2019	--	--	725	J	--	--	5.6	J	--	--	0.18	J	--	--	0.4	J	--	--	471	J	--	--	5.0	U	--	--	2.0	U	--	--	2,210	J	--	--	1.0	U	--	--	2.0	U	--	--	5.0	U
26WP-06-01[1]	10/21/2010	810		--	--	47				0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,000		--	--	20	U	--	--	10	U	--	--	**100**		--	--
	10/18/2011	710		--	--	30				0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,200		--	--	2	U	--	--	10	U	--	--	**45**	J	--	--
	11/14/2012	640		--	--	38				0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,300		--	--	0.03	J	--	--	10	U	--	--	**44**	J	--	--
	11/12/2013	500		--	--	73				0.2	U	--	--	25	U	--	--	620	J	--	--	10	U	--	--	7	U	--	--	2,400		--	--	0.073	J	--	--	10	U	--	--	**117**		--	--
	11/24/2014	2,500	U	2,500	U	151		35.5		0.15	U	0.15	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	2,650	J	2,500	U	1	U	1	U	5	U	5	U	**26.6**		10.4	J
	12/9/2015	--	--	2,500	U			50.4		--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,620	J	--	--	1	U	--	--	5	U	--	--	10	U
26WP-06-01R	3/13/2017	--	--	345	J	--	--	35.1		--	--	0.1	U	--	--	0.90	J	--	--	631	J	--	--	5	U	--	--	2	U	--	--	1,790	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/22/2017	--	--	310	J	--	--	17.8		--	--	0.040	U	--	--	1.0	U	--	--	499	J	--	--	5	U	--	--	2	U	--	--	1,640	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/22/2017[D]	--	--	297	J	--	--	18.2		--	--	0.045	U	--	--	1.0	U	--	--	469	J	--	--	5	U	--	--	2	U	--	--	1,590	J	--	--	1	U	--	--	2	U	--	--	5	U
	8/21/2017	--	--	455	J	--	--	7.6	J	--	--	0.10	U	--	--	1.0	U	--	--	567	J	--	--	5	U	--	--	2	U	--	--	1,870	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/27/2017	--	--	303	J	--	--	14.4	J	--	--	0.1	U	--	--	1.0	U	--	--	581	J	--	--	5	U	--	--	2	U	--	--	1,550	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/28/2018	--	--	239	J	--	--	3.4	J	--	--	0.1	U	--	--	1.0	U	--	--	492	J	--	--	5	U	--	--	2	U	--	--	1,640	J	--	--	1	U	--	--	2	U	--	--	9.5	J
	11/28/2018[D]	--	--	255	J	--	--	5.5	J	--	--	0.1	U	--	--	1.0	U	--	--	494	J	--	--	5	U	--	--	2	U	--	--	1,640	J	--	--	1	U	--	--	2	U	--	--	5	U
	5/20/2019	--	--	318	J	--	--	2.6	J	--	--	0.10	U	--	--	0.50	J	--	--	505	J	--	--	5.0	U	--	--	2.0	U	--	--	1,700	J	--	--	1.0	U	--	--	2.0	U	--	--	6.1	J
	5/20/2019[D]	--	--	289	J	--	--	3.3	J	--	--	0.10	U	--	--	1.0	U	--	--	486	J	--	--	5.0	U	--	--	2.0	U	--	--	1,670	J	--	--	1.0	U	--	--	2.0	U	--	--	5	U
	11/21/2019	--	--	292	J	--	--	2.9	J	--	--	0.10	U	--	--	1.0	U	--	--	497	J	--	--	5.0	U	--	--	2.0	U	--	--	1,560	J	--	--	1.0	U	--	--	2.0	U	--	--	5	U
26WP-08-02[1]	10/21/2010	610		--	--	123		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,600	J	--	--	20	U	--	--	10	U	--	--	**6,960**		--	--
	10/18/2011	610		--	--	131		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,400	J	--	--	2	U	--	--	10	U	--	--	**6,750**		--	--
	11/14/2012	720		--	--	167		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,900	J	--	--	0.3	J	--	--	10	U	--	--	**9,790**		--	--
	11/12/2013	620		--	--	149		--	--	0.2	U	--	--	25	U	--	--	400	J	--	--	10	U	--	--	7	U	--	--	2,100		--	--	0.5	U	--	--	10	U	--	--	**6,720**		--	--
	11/25/2014	2,500	U	2,500	U	151		149		0.15	U	0.15	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	2,500	U	2,500	U	1	U	1	U	5	U	5	U	**3,390**		**3,260**	
	11/25/2014[D]	2,500	U	--	--	151		--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	**3,350**		--	--
	12/9/2015	--	--	2,500	U	--	--	163		--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	**3,240**	
	12/9/2015[D]	--	--	2,500	U	--	--	158		--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	**3,420**	
26WP-08-02R	11/27/2017	--	--	496	J	--	--	170		--	--	0.1	U	--	--	0.50	J	--	--	703	J	--	--	5	U	--	--	2	U	--	--	1,480	J	--	--	1	U	--	--	0.8	J	--	--	5	U
	11/27/2018	--	--	604	J	--	--	113		--	--	0.1	U	--	--	0.60	J	--	--	675	J	--	--	5	U	--	--	2	U	--	--	1,110	J	--	--	1	U	--	--	0.7	J	--	--	5	U
	11/21/2019	--	--	422	J	--	--	72.5		--	--	0.10	U	--	--	0.60	J	--	--	247	J	--	--	5.0	U	--	--	2.0	U	--	--	1,440	J	--	--	1.0	U	--	--	1.5	J	--	--	5	U
26WP-09-01[1]	11/25/2014	2,500	U	2,500	U	138		134		0.15	U	0.15	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	2,610	J	2,860	J	1	U	1	U	5	U	5	U	**1,890**		**1,870**	
26WP-09-01R	11/28/2017	--	--	496	J	--	--	66.3		--	--	0.1	U	--	--	0.70	J	--	--	401	J	--	--	5	U	--	--	2	U	--	--	1,720	J	--	--	1	U	--	--	1.0	J	--	--	5	U
	11/28/2018	--	--	608	J	--	--	90.1		--	--	0.1	U	--	--	1.0	J	--	--	360	J	--	--	5	U	--	--	2	U	--	--	1,520	J	--	--	1	U	--	--	0.70	J	--	--	5	U
	11/22/2019	--	--	395	J	--	--	57.4		--	--	0.10	U	--	--	0.50	J	--	--	500	U	--	--	5.0	U	--	--	2.0	U	--	--	1,910	J	--	--	1.0	U	--	--	0.70	J	--	--	5	U
26WP-09-02[1]	11/25/2014	2,500	U	2,500	U	19.3		18.1		0.15	U	0.15	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	2,500	U	2,860	J	1	U	1	U	5	U	5	U	**3,150**		**3,410**	
26WP-09-02R	11/25/2017	--	--	306	J	--	--	40.6		--	--	0.1	U	--	--	1.0	J	--	--	600	J	--	--	5	U	--	--	2	U	--	--	1,470	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/28/2018	--	--	273	J	--	--	18.5		--	--	0.1	U	--	--	0.40	J	--	--	546	J	--	--	5	U	--	--	2	U	--	--	1,870	J	--	--	1	U	--	--	2	U	--	--	5	U
	11/22/2019	--	--	352	J	--	--	8.5	J	--	--	0.10	U	--	--	1.0	U	--	--	477	J	--	--	5.0	U	--	--	2.0	U	--	--	1,540	J	--	--	1.0	U	--	--	2.0	U	--	--	5	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Estimated results
[D] - Duplicate Sample
-- Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations
1 - Wellpoints 26WP-06-01, 26WP-08-02, 26WP-09-01, and 26WP-09-02 were removed in January 2017 and replaced with 26WP-06-01R, 26WP-08-02R, 26WP-09-01R, and 26WP-09-02R, respectively.

TABLE E-2
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES PERCHLORATE
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200		2	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000		1,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																														
26M-92-02X	10/21/2010	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	--	--
	10/18/2011	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	--	--
	11/13/2012	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.097	J
	11/12/2013	0.204	UJ	0.204	U	0.204	U	0.204	U	0.204	UJ	0.204	U	0.204	UJ	0.204	U	0.204	U	0.204	U	0.204	U	0.204	UJ	0.204	UJ	0.204	U	0.1	
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	U
	1/13/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	12/9/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5.1	U	0.51	U	0.2	U	0.1	U
	11/1/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.20	U	0.10	U	0.10	U
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.20	U	0.10	U	0.11	J
	11/29/2018	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.072	J
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.13	J
26M-92-03X	10/21/2010	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	**16.3**		0.208	U	0.208	U	2.23		--	--
	10/21/2010[D]	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	0.213	U	**16.3**		0.213	U	0.213	U	2.11		--	--
	10/18/2011	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	**10.7**		0.204	U	0.204	U	2.58		--	--
	10/18/2011[D]	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	**11.4**		0.2	U	0.2	U	2.14		--	--
	11/13/2012	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	**9.75**		0.205	U	0.205	U	1.82		0.322	J
	11/13/2012[D]	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	**9.57**		0.205	U	0.205	U	2.06		--	--
	11/12/2013	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	**3.62**		0.202	U	0.202	U	0.806		--	--
	11/12/2013[D]	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	**4.04**		0.204	U	0.204	U	0.765		--	--
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.36	
	1/13/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	**19.3**		5	U	0.5	U	8.4		--	--
	1/13/2015[D]	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	**20**		5	U	0.5	U	8.9		--	--
	12/8/2015	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.53	UJ	1.1	UJ	1.1	UJ	**23.2**	J	5.3	UJ	0.53	UJ	6.5	J	1.5	
	11/1/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	**27.4**		0.1	U	0.2	U	16.6		0.72	
	11/1/2016[D]	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	**28.7**		0.1	U	0.2	U	17.6		0.8	
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**7.4**		0.10	U	0.10	U	2.9		0.19	J
	5/23/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**4.9**		0.10	U	0.10	U	2.3		0.21	
	8/22/2017	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	**2.7**		0.095	U	0.095	U	0.76		0.23	
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**5.3**		0.10	U	0.10	U	1.2		0.16	J
	11/29/2018	0.10	U	0.10	U	0.43		0.10	U	0.10	U	0.12	J	0.10	U	0.10	U	0.10	U	0.10	U	**2.9**		0.10	U	0.10	U	0.65		0.13	J
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**6.5**		0.10	U	0.10	U	1.4		0.18	J
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**23.8**		0.10	U	0.10	U	2.7		0.19	J
26M-92-04X	10/21/2010	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	**170**		0.208	U	0.208	U	28.7		**47.5**	
	10/18/2011	0.202	U	0.202	U	0.202	U	0.202	U	0.429		0.202	U	0.202	U	0.202	U	0.766		0.202	U	**157**		0.202	U	0.202	U	27.7		**332**	
	10/18/2011[D]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**353**	
	11/13/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.563		0.204	U	0.204	U	0.204	U	0.75		0.204	U	**181**		0.204	U	0.204	U	24.7		**49.2**	
	11/13/2012[D]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**47.9**	
	11/12/2013	0.206	U	0.206	U	0.206	U	0.206	U	0.468		0.206	U	0.206	U	0.206	U	0.727		0.206	U	**1,010**		0.206	U	0.206	U	52.9		**142**	
	11/12/2013[D]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**142**	
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**34.6**	
	1/13/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	**318**		5	U	0.5	U	27.1		--	
	1/13/2015[D]	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	**312**		5	U	0.5	U	26.1		**39.4**	
	12/8/2015	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.57	UJ	1.1	UJ	1.1	UJ	**499**	J	5.7	UJ	0.57	UJ	72.6	J	**41.5**	
	11/1/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.42	U	0.1	U	0.1	U	0.1	U	0.51		0.1	U	**476**		0.1	U	0.21	U	39.9		**21.5**	
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**455**		0.10	U	0.10	U	50.3		**21.5**	
	5/23/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	**190**		0.10	U	0.10	U	33.4		**30.0**	
	8/22/2017	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.45		0.095	U	**168**		0.095	U	0.095	U	21.1		**18.5**	
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.31		0.10	U	0.10	U	0.10	U	0.56		0.10	U	**273**		0.10	U	0.10	U	28.6		**20.5**	
	11/29/2018	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.53		0.10	U	**151**		0.10	U	0.10	U	33.3		**13.3**	
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.58		0.10	U	**291**		0.10	U	0.10	U	54.4		**13.0**	
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.45		0.10	U	**371**		0.10	U	0.10	U	59.4		**27.0**	
	11/21/2019[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.47		0.10	U	**380**		0.10	U	0.10	U	60.5		**27.1**	
26M-92-05X	11/2/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
26M-92-06X	11/1/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.1	U
26M-97-08X	10/21/2010	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	**27.6**		0.204	U	0.204	U	7.88		--	--
	10/21/2010[D]	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	**27.7**		0.21	U	0.21	U	8.14		--	--
	10/18/2011	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	**25.8**		0.2	U	0.2	U	4.76		--	--
	10/18/2011[D]	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	**25.5**		0.2	U	0.2	U	4.28		--	--
	11/14/2012	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	**43.2**		0.206	U	0.206	U	11.7		**3.84**	
	11/13/2012[D]	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	**43.5**		0.205	U	0.205	U	11.5		--	--
	11/13/2013	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	**20.9**		0.204	U	0.204	U	7.88		--	--
	11/12/2013[D]	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	**19.2**		0.206	U	0.206	U	7.5		--	--
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.39	

TABLE E-2
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES PERCHLORATE
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200		2	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000		1,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																														
26M-97-08X (Continued)	1/13/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	26.5		5	U	0.5	U	10		--	--
	1/13/2015[D]	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	29.1		5	U	0.5	U	10.4		0.46	
	12/9/2015	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.51	UJ	1	UJ	1	UJ	20.5	J	5.1	UJ	0.51	UJ	7.4	J	0.35	
	11/1/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	16.3		0.1	U	0.2	U	6.9		0.38	
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	18.3		0.10	U	0.10	U	7.8		0.4	
	3/13/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	18.5		0.10	U	0.10	U	7.3		0.41	
	5/23/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	14.1		0.10	U	0.10	U	6.0		0.35	
	8/21/2017	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	5.5		0.097	U	0.097	U	2.9		0.13	J
	8/21/2017[D]	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	5.1		0.097	U	0.097	U	2.8		0.12	J
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	16.8		0.10	U	0.10	U	4.1		0.15	J
	11/27/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	15.1		0.10	U	0.10	U	3.6		0.15	J
	11/29/2018	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	34.2		0.097	U	0.097	U	6.1		0.25	
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	11.5		0.10	U	0.10	U	3.7		0.17	J
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	16.9		0.10	U	0.10	U	6.7		0.35	
26M-10-09X	10/25/2010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0472	J
	10/18/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.035	J
	11/14/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.026	J
	11/12/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019	J
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	1/13/2015	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	12/10/2015	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.54	UJ	1.1	UJ	1.1	UJ	0.22	UJ	5.4	UJ	0.54	UJ	0.22	UJ	0.10	U
	11/2/2016	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.10	U
	11/28/2017	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.10	U
	11/27/2018	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.10	U
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26M-14-10X	10/15/2014	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.02	U	0.06	U	0.06	U	0.02	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.10	U
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	1/13/2015	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	12/9/2015	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.56	UJ	1.1	UJ	1.1	UJ	0.22	UJ	5.6	UJ	0.56	UJ	0.22	UJ	0.10	U
	11/28/2017	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.12	J
	11/29/2018	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.083	J
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.13	J
26M-14-11X	10/15/2014	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.11	J	0.06	U	0.06	U	0.06	U	0.15	J
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.16	J
	1/13/2015	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	12/9/2015	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.5	UJ	1	UJ	1	UJ	0.22	UJ	5.1	UJ	0.5	UJ	0.22	UJ	0.15	J
	11/25/2017	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	4.5		0.1	U	0.1	U	0.49		0.22	
	11/28/2018	0.097	U	0.097	U	0.27		0.097	U	0.097	U	0.18	J	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.20	
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.17	J
26WP-06-01[2]	2/23/2010	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	162	J	0.2	UJ	0.2	UJ	36.5	J	93.7	
	7/2/2010	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	98.1		0.2	U	0.2	U	24.1		64.1	
	10/21/2010	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	126		0.206	U	0.206	U	33.1		89.2	
	10/18/2011	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	116		0.2	U	0.2	U	33.3		68.3	
	11/14/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	65.2		0.204	U	0.204	U	20.8		19.1	
	11/12/2013	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	0.208	U	76		0.208	U	0.208	U	18.8		19.4	
	11/24/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.4	
	1/13/2015	0.21	U	0.28	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.52	U	1	U	1	U	0.21	U	5.2	U	0.52	U	0.21	U	--	
	12/9/2015	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.54	UJ	1.1	UJ	1.1	UJ	94.4	J	5.4	UJ	0.54	UJ	34.8	J	3.3	
	11/1/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	55.4		0.10	U	0.20	U	22		2.1	
26WP-06-01R	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	UJ	0.10	UJ	0.10	U	0.10	U	17.4		0.10	U	0.10	U	3.7		2.7	
	5/22/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	21.8	J	0.10	U	0.10	U	4.0		1.8	U
	5/22/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	22.0		0.10	U	0.10	U	4.2		2.0	U
	8/21/2017	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	30.0	J	0.098	U	0.098	U	11.2		1.1	
	11/27/2017	0.10	U	0.10	U	0.10	UJ	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	7.8		0.10	U	0.10	U	3.2		1.3	J
	11/28/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	5.1		0.098	U	0.098	U	1.6		1.5	
	11/28/2018[D]	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	4.5		0.097	U	0.097	U	1.8		1.3	
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	23.5		0.10	U	0.10	U	4.6		0.62	
	5/20/2019[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	24.3		0.10	U	0.10	U	4.6		0.60	
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	22.6		0.10	U	0.10	U	3.9		2.0	J
26WP-08-02[2]	10/21/2010	0.251	J	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.225	U	0.05	U
	10/18/2011	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.05	U
	11/14/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.05	U
	11/12/2013	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.05	U
	11/25/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	1/13/2015	0.21	U	0.28	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.52	U	1	U	1	U	0.21	U	5.2	U	0.21	U	0.21	U	--	--
	12/9/2015	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.56	UJ	1.1	UJ	1.1	UJ	0.22	UJ	5.6	UJ	0.56	UJ	0.22	UJ	0.10	U
	12/09/2015[D]	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.56	UJ	1.1	UJ	1.1	UJ	0.22	UJ	5.6	UJ	0.56	UJ	0.22	UJ	0.10	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26WP-08-02R	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/27/2018	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.097	UJ	0.10	U
	11/21/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U

TABLE E-2
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES PERCHLORATE
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200		2	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000		1,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																														
26WP-09-01[2]	10/21/2010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	U
	10/18/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	U
	11/14/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	U
	11/12/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	U
	11/25/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	1/13/2015	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	8/22/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26WP-09-01R	11/28/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.16	J	0.10	U	0.10	U	0.10	U	0.10	U
	11/28/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.20	U	0.098	U	0.098	U	0.098	U	0.10	U
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26WP-09-02[2]	10/21/2010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.057	
	10/18/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.047	J
	11/14/2012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.046	J
	11/12/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.072	
	11/25/2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	1/13/2015	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	8/22/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26WP-09-02R	11/25/2017	0.1	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.53		0.10	U	0.10	U	0.10	U	0.10	U
	11/28/2018	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.10	U
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Estimated results
UJ - Estimated detection limits
[D] - Duplicate Sample
- - Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations
1 - Due to laboratory error during the November 2014 LTM sampling event, Percholorates were sampled in November 2014 and explosives were subsequenty sampled in January 2015.
2 - Wellpoints 26WP-06-01, 26WP-08-02, 26WP-09-01, and 26WP-09-02 were removed in January 2017 and replaced with 26WP-06-01R, 26WP-08-02R, 26WP-09-01R, and 26WP-09-02R, respectively.

TABLE E-3
SUMMARY OF SURFACE WATER DATA - EXPLOSIVES PERCHLORATE
SPIA AREA OF CONTAMINATION 26
FORT DEVENS RESERVE FORCES TRAINING AREA

		1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
Provisional Freshwater Chronic Values		11		17		40		--		--		19		--		--		74		--		6,140		--		--		329		--	
EPA Region 3 BTAG Screening Level		--		--		100		44		81		1,480		--		--		--		--		360		--		--		150		--	
HC_5 Threshold Levels		114		274		116		615		710		1,239		--		--		1,983		--		2,074		--		--		2,097		--	
Chronic Toxicity Benchmark		--		--		--		--		--		--		--		--		--		--		--		--		--		--		9,300	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Location ID	**Sample Date**																														
26SW-14-01	10/7/2014	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	33		0.06	U	0.06	U	6.6		3.40	
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	3.4		0.10	U	0.10	U	0.94		0.18	J
	5/22/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	9.3		0.10	U	0.10	U	0.10	U	0.10	U
	5/22/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	9.1		0.10	U	0.10	U	0.10	U	0.66	
	8/21/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	10.7		0.10	U	0.10	U	2.3		0.38	
	8/21/2017[D]	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	9.3		0.098	U	0.098	U	2.0		0.38	
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	12.0		0.10	U	0.10	U	3.6		0.58	
	11/27/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	18.4		0.10	U	0.10	U	5.3		--	
	11/27/2018	0.10	U	0.10	U	2.9		0.10	U	0.10	U	0.70		0.10	U	0.10	U	0.28		0.10	U	5.7		0.10	U	0.10	U	1.7		0.23	
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	6.0		0.10	U	0.10	U	1.4		0.36	
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	16.1		0.10	U	0.10	U	4.3		0.31	
26SW-14-02	10/7/2014	0.10	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.10	U
	10/7/2014[D]	0.074	J	0.06	U	0.031	J	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.082	J	0.06	U	0.06	U	0.10	U
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.8		0.10	U	0.10	U	0.51		0.097	J
	5/22/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	8/21/2017	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.78		0.099	U	0.099	U	0.36		0.10	U
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.5		0.10	U	0.10	U	0.62		0.11	J
	11/27/2018	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.097	U	0.10	U
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.1		0.10	U	0.10	U	0.53		0.075	J
	11/22/2019	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.74	J	0.10	UJ	0.10	UJ	0.92	J	0.10	U
26SW-14-03	10/7/2014	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.25	J	0.06	U	0.06	U	0.14	J	0.10	U
	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.90		0.10	U	0.10	U	0.47		0.13	J
	5/22/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.38		0.10	U	0.10	U	0.10	U	0.10	U
	8/21/2017	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.10	U
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.5		0.10	U	0.10	U	0.43		0.093	J
	11/27/2018	0.098	U	0.098	U	0.098	U	0.10	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.10	U	4.0		0.098	U	0.098	U	0.91		0.16	J
	5/20/2019	0.10	UJ	0.10	U	0.10	UJ	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.7		0.10	R	0.10	U	0.71		0.081	J
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.53		0.10	U	0.10	U	0.10	U	0.10	U
26SW-14-04	10/7/2014	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.10	U
	3/13/2017	0.10	UJ	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	UJ	0.10	UJ	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	3/13/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	5/22/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	8/21/2017	0.098	U	0.098	U	0.098	UJ	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	UJ	0.098	U	0.098	U	0.10	U
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	4.8		0.10	U	0.10	U	0.10	U	0.10	U
	11/27/2018	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/27/2018[D]	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.10	U
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	5/20/2019[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/22/19[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
26SW-16-05	3/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.1		0.10	U	0.10	U	0.62		0.083	J
	5/22/2017	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.19	J	0.10	UJ	0.10	UJ	0.21	J	0.65	
	8/21/2017	0.10	UJ	0.10	UJ	6.4	J	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ	0.15	J	0.10	UJ	5.6	J	0.10	UJ	0.10	UJ	0.49	J	0.10	U
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	1.2		0.10	U	0.10	U	0.10	U	0.061	J
	11/27/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	3.3		0.098	U	0.098	U	0.61		0.18	J
	5/20/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.70		0.10	U	0.10	U	0.39		0.057	J
	11/22/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.16	J	0.10	U	0.10	U	0.10	U	0.10	U

Notes:
U - Not detected above laboratory detection limits.
J - Estimated results
UJ - Estimated detection limits
R - Rejected
[D] - Duplicate Sample
-- Not analyzed
Provisional Freshwater Chronic Values, EPA Region 3 BTAG Screening Level, and HC_5 Threshold Levels for explosives from Lotufo, G. R. et al. 2017. *Review and Synthesis of Evidence Regarding Environmental Risks Posed by Munitions Constituents (MC) in Aquatic Systems.* SERDP ER-2341. ERDC/EL TR-17-17 October 2017.
Chronic Toxicity Benchmark value for perchlorate from Dean, K. E., R. A Palachek, J. M. Noel, R. Warbritton, J. Aufderheide, and J. Wiremen. 2004. *Development of freshwater water-quality criteria for perchlorate* . Environmental Toxicology and Chemistry 23 (6) 1441-1451.

TABLE E-4
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 27
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Aluminum (µg/L)				Antimony (µg/L)				Arsenic (µg/L)				Barium (µg/L)				Beryllium (µg/L)				Cadmium (µg/L)				Calcium (µg/L)				Chromium (µg/L)				Cobalt (µg/L)				Copper (µg/L)				Iron (µg/L)				Lead (µg/L)			
	GW-1 Standard	NS				6				10				2,000				4				5				NS				100				NS				NS				NS				15			
	GW-3 Standard	NS				8,000				900				50,000				200				4				NS				300				NS				NS				NS				10			
	Background	6,870				3				10.5				40				5				4				14,700				14.7				25				8.09				9,000				4			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																																
27M-92-01X	10/25/2010	340		--	--	50	U	--	--	5	U	--	--	5.8	J	--	--	5	U	--	--	4	U	--	--	11,000		--	--	10		--	--	20	U	--	--	6	J	--	--	360		--	--	3.5	J	--	--
	11/15/2012	180		--	--	0.81	U	--	--	5	U	--	--	5	J	--	--	5	U	--	--	5	U	--	--	7,300		--	--	10	U	--	--	20	U	--	--	6	J	--	--	180		--	--	4	J	--	--
	11/25/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	10,400		--	--	5	U	--	--	25	U	--	--	13	U	--	--	88	J	--	--	2.5	U
	11/2/2016	--	--	185	J	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	10,000		--	--	5	U	--	--	25	U	--	--	13	U	--	--	171		--	--	2.5	U
	11/26/2018	--	--	31.5	J	--	--	0.46	J	--	--	5	U	--	--	2.3	J	--	--	1	U	--	--	1	U	--	--	5,650		--	--	5	U	--	--	1	U	--	--	2.5	J	--	--	18.3	J	--	--	2	U
27M-93-05X	10/25/2010	990		--	--	50	U	--	--	7		--	--	6.3	J	--	--	5	U	--	--	4	U	--	--	10,000		--	--	2	J	--	--	20	U	--	--	4.6	J	--	--	1,100	U	--	--	2.9	J	--	--
	11/13/2012	340		--	--	0.55	U	--	--	4	J	--	--	6	J	--	--	5	U	--	--	5	U	--	--	12,000		--	--	10	U	--	--	20	U	--	--	5	J	--	--	210	U	--	--	5	J	--	--
	11/25/2014	--	--	151	J	--	--	2	U	--	--	5.1	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	13,600		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/2/2016	--	--	100	U	--	--	2	U	--	--	3.1	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	12,300		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/2/2016[D]	--	--	100	U	--	--	2	U	--	--	3.1	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	12,100		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/26/2018	--	--	161	J	--	--	0.39	J	--	--	1.8	J	--	--	5	J	--	--	1	U	--	--	1	U	--	--	15,400		--	--	5	U	--	--	1.2	J	--	--	2.5	J	--	--	266	J	--	--	1.1	J
27M-93-06X	10/25/2010	51	J	--	--	50	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	4	U	--	--	4,400		--	--	10	U	--	--	20	U	--	--	10	U	--	--	80		--	--	6.9	J	--	--
	11/13/2012	170		--	--	0.38	J	--	--	15		--	--	47		--	--	5	U	--	--	5	U	--	--	16,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50		--	--	10	U	--	--
	11/25/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,800		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/2/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,680	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/26/2018	--	--	15.6	J	--	--	1	U	--	--	5	U	--	--	1.4	J	--	--	1	U	--	--	1	U	--	--	3,830		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
	11/26/2018[D]	--	--	25	U	--	--	1	U	--	--	5	U	--	--	1.5	J	--	--	1	U	--	--	1	U	--	--	4,030		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
27M-93-08X	10/25/2010	100	U	--	--	50	U	--	--	5	U	--	--	2.9	J	--	--	5	U	--	--	4	U	--	--	5,900		--	--	6	J	--	--	20	U	--	--	10	U	--	--	29	J	--	--	10	U	--	--
	11/15/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	6,300		--	--	7	J	--	--	20	U	--	--	10	U	--	--	60		--	--	10	U	--	--
	11/25/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,310		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/2/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,200		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
	11/26/2018	--	--	25	U	--	--	1	U	--	--	5	U	--	--	2.9	J	--	--	1	U	--	--	1	U	--	--	6,400		--	--	1.8	J	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Laboratory estimate, below detection limits.
[D] - Duplicate Sample
-- Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations

TABLE E-4
SUMMARY OF GROUNDWATER DATA - METALS
SPIA AREA OF CONTAMINATION 27
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	Magnesium (µg/L)				Manganese (µg/L)				Mercury (µg/L)				Nickel (µg/L)				Potassium (µg/L)				Selenium (µg/L)				Silver (µg/L)				Sodium (µg/L)				Thallium (µg/L)				Vanadium (µg/L)				Zinc (µg/L)			
	GW-1 Standard	NS				NS				2				100				NS				50				100				NS				2				30				5,000			
	GW-3 Standard	NS				NS				20				200				NS				100				7				NS				3,000				4,000				900			
	Background	3,481				291				0.2				34				2,370				3				5				10,800				7				11				21.1			
		Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Well ID	**Sample Date**																																												
27M-92-01X	10/25/2010	590		--	--	18		--	--	0.2	U	--	--	6.4	J	--	--	2,100	J	--	--	10	U	--	--	7	U	--	--	6,200		--	--	20	U	--	--	10	U	--	--	47.3	J	--	--
	11/15/2012	480		--	--	15		--	--	0.2	U	--	--	25	U	--	--	1,500	J	--	--	10	U	--	--	7	U	--	--	6,700		--	--	0.03	J	--	--	10	U	--	--	42	J	--	--
	11/25/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	10	U	--	--	2.5	U	--	--	5,620		--	--	1	U	--	--	5	U	--	--	41.1	
	11/2/2016	--	--	2,500	U	--	--	8	J	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,960		--	--	1	U	--	--	5	U	--	--	12.5	J
	11/26/2018	--	--	424	J	--	--	4.3	J	--	--	0.1	U	--	--	1	U	--	--	477	J	--	--	5	U	--	--	2	U	--	--	6,580	J	--	--	1	U	--	--	2	U	--	--	9.1	J
27M-93-05X	10/25/2010	1,200		--	--	27		--	--	0.2	U	--	--	3.7	J	--	--	2,500		--	--	10	U	--	--	2.5	U	--	--	5,300		--	--	20	U	--	--	8.5	J	--	--	30.4	J	--	--
	11/13/2012	620		--	--	39		--	--	0.01	J	--	--	6	J	--	--	3,000		--	--	10	U	--	--	7	U	--	--	4,300		--	--	0.5	U	--	--	10	U	--	--	21	J	--	--
	11/25/2014	--	--	2,500	U	--	--	23.9	--	--	--	0.15	U	--	--	20	U	--	--	3,010	J	--	--	10	U	--	--	2.5	U	--	--	4,860	J	--	--	1	U	--	--	6.1	J	--	--	13.8	J
	11/2/2016	--	--	2,500	U	--	--	71.5		--	--	0.1	U	--	--	20	U	--	--	2,570	J	--	--	5	U	--	--	2.5	U	--	--	2,510	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/2/2016[D]	--	--	2,500	U	--	--	68.5		--	--	0.1	U	--	--	20	U	--	--	2,540	J	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/26/2018	--	--	977	J	--	--	158		--	--	0.1	U	--	--	3.5	J	--	--	2,880	J	--	--	5	U	--	--	2	U	--	--	2,630	J	--	--	1	U	--	--	2	U	--	--	4.6	J
27M-93-06X	10/25/2010	1,100		--	--	10	U	--	--	0.05	J	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	2.5	U	--	--	2,000		--	--	20	U	--	--	10	U	--	--	15.4	J	--	--
	11/13/2012	160		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	4,700		--	--	10	U	--	--	7	U	--	--	9,600		--	--	0.5	U	--	--	10	U	--	--	20	U	--	--
	11/25/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	10	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	19.5	J
	11/2/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
	11/26/2018	--	--	988	J	--	--	1.1	J	--	--	0.1	U	--	--	1	U	--	--	639	J	--	--	5	U	--	--	2	U	--	--	2,220	J	--	--	1	U	--	--	2	U	--	--	10.3	J
	11/26/2018[D]	--	--	1,060	J	--	--	2	U	--	--	0.1	U	--	--	1	U	--	--	633	J	--	--	5	U	--	--	2	U	--	--	2,340	J	--	--	1	U	--	--	2	U	--	--	8.6	J
27M-93-08X	10/25/2010	1,300		--	--	10	U	--	--	0.2	U	--	--	3.5	J	--	--	1,300	J	--	--	10	U	--	--	2.5	U	--	--	4,600		--	--	20	U	--	--	10	U	--	--	15.2	J	--	--
	11/15/2012	1,600		--	--	2	J	--	--	0.2	U	--	--	25	U	--	--	1,500	J	--	--	10	U	--	--	7	U	--	--	4,700		--	--	0.5	U	--	--	10	U	--	--	16	J	--	--
	11/25/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	10	U	--	--	2.5	U	--	--	4,520	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/2/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	4,670	J	--	--	1	U	--	--	5	U	--	--	10	U
	11/26/2018	--	--	1,620	J	--	--	2	U	--	--	0.1	U	--	--	0.4	J	--	--	1,250	J	--	--	5	U	--	--	2	U	--	--	4,220	J	--	--	1	U	--	--	2	U	--	--	5	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Laboratory estimate, below detection limits.
[D] - Duplicate Sample
- - Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations

TABLE E-5
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES
SPIA AREA OF CONTAMINATION 27
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																												
27M-92-01X	10/25/2010	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ
	11/15/2012	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
	1/14/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/26/2018	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U
27M-93-05X	10/25/2010	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.255	J	0.206	UJ	0.206	UJ	0.206	UJ
	11/13/2012	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U
	1/14/2015	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.50	U	1.0	U	1.0	U	0.20	U	5	U	0.50	U	0.20	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/2/2016[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/26/2018	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U
27M-93-06X	10/25/2010	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	**2.12**	J	0.205	UJ	0.205	UJ	0.726	J
	11/13/2012	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U
	1/14/2015	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.53	U	1.1	U	1.1	U	0.21	U	5.3	U	0.53	U	0.21	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.39		0.10	U	0.10	U	0.25	
	11/26/2018	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.45		0.094	U	0.094	U	0.31	
	11/26/2018[D]	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.40		0.095	U	0.095	U	0.32	
27M-93-08X	10/25/2010	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ	0.206	UJ
	11/15/2012	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
	1/14/2015	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.54	U	1.10	U	1.10	U	0.22	U	5.40	U	0.54	U	0.22	U
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/26/2018	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U	0.095	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Laboratory estimate, below detection limits.
[D] - Duplicate Sample
-- Not analyzed
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations
1 - Due to laboratory error during the November 2014 LTM sampling event, Percholorates were sampled in November 2014 and explosives were subsequenty sampled in January 2015.

TABLE E-6
SUMMARY OF GROUNDWATER DATA - METALS
SPIA SOUTH POST MONITORING WELLS
FORT DEVENS RESERVE FORCES TRAINING AREA

Analyte	Aluminum (µg/L)				Antimony (µg/L)				Arsenic (µg/L)				Barium (µg/L)				Beryllium (µg/L)				Cadmium (µg/L)				Calcium (µg/L)				Chromium (µg/L)				Cobalt (µg/L)				Copper (µg/L)				Iron (µg/L)				Lead (µg/L)			
GW-1 Standard	NS				6				10				2,000				4				5				NS				100				NS				NS				NS				15			
GW-3 Standard	NS				8,000				900				50,000				200				4				NS				300				NS				NS				NS				10			
Background	6,870				3				10.5				40				5				4				14,700				15				25				8				9,000				4			
Well ID / Sample Date	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Hydrant D-1																																																
11/26/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,690		--	--	5	U	--	--	25	U	--	--	13	U	--	--	169		--	--	2.5	U
2/18/2016	100	U	100	U	2	U	2	U	2.4	J	2	U	25	U	25	U	2	U	2	U	2	U	2	U	6,090		5,960		5	U	5	U	25	U	25	U	13	U	13	U	50	U	50	U	2.5	U	2.5	U
10/31/2016	100	U	100	U	2	U	2	U	3.8	J	2.6	J	25	U	25	U	2	U	2	U	2	U	2	U	6,670		6,610		5	U	5	U	25	U	25	U	13	U	13	U	50	U	50	U	2.5	U	2.5	U
11/28/2017	25	U	25	U	1	U	1	U	2.6	J	2.8	J	5	U	1.2	J	1	U	1	U	1	U	1	U	6,740		6,810		5	U	1.1	J	1	U	1	U	12.2	J	12.2	J	32.8	J	42.8	J	2	U	2	U
11/29/2018	25	U	25	U	1	U	1	U	5	U	5	U	5	U	5	U	1	U	1	U	1	U	1	U	6,420		6,540		5	U	1	J	1	U	1	U	17.5	J	8.8	J	117	J	41.6	J	2	U	2	U
11/26/2019	25	U	25	U	1	U	1	U	4.7	J	5	U	5	U	5	U	1	U	1	U	1	U	1	U	5,110		2,400		5	U	5	U	1	U	1	U	2.4	J	2	U	50	U	50	U	1.8	J	1.1	J
SPM-93-06X																																																
10/25/2010	480		--	--	50	U	--	--	13		--	--	60		--	--	5	U	--	--	4	U	--	--	32,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
10/18/2011	390		--	--	4	U	--	--	13		--	--	59		--	--	5	U	--	--	5	U	--	--	30,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/13/2012	140		--	--	0.16	J	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	4,400		--	--	10	U	--	--	20	U	--	--	10	U	--	--	130		--	--	17		--	--
11/13/2013	140		--	--	1.848		--	--	12		--	--	36		--	--	5	U	--	--	5	U	--	--	14,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	12.5		--	--	36.8	J	--	--	2	U	--	--	2	U			13,700		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/8/2015	--	--	118	J	--	--	2	U	--	--	13.9		--	--	48.0	J	--	--	2	U	--	--	2	U			13,300		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	
11/2/2016	--	--	100	U	--	--	2	U	--	--	15.9		--	--	30.7	J	--	--	2	U	--	--	2	U	--	--	12,200		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/2/2016[D]	--	--	100	U	--	--	2	U	--	--	16.1		--	--	30.9	J	--	--	2	U	--	--	2	U	--	--	12,400		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/14/2017	--	--	74.1	J	--	--	0.44	J	--	--	14.7		--	--	32.3	J	--	--	1	U	--	--	1	U	--	--	12,800		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/14/2017[D]	--	--	69.9	J	--	--	0.38	J	--	--	14.6		--	--	32.3	J	--	--	1	U	--	--	1	U	--	--	12,700		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/26/2018	--	--	125	J	--	--	0.28	J	--	--	14.7		--	--	36.7	J	--	--	1	U	--	--	1	U	--	--	13,900		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/26/2018[D]	--	--	122	J	--	--	0.31	J	--	--	13.0		--	--	34.8	J	--	--	1	U	--	--	1	U	--	--	13,100		--	--	5	U	--	--	1	U	--	--	1	J	--	--	50	U	--	--	2	U
11/25/2019	--	--	103	J	--	--	0.42	J	--	--	12.2		--	--	37.9	J	--	--	1	U	--	--	1	U	--	--	13,000		--	--	5	U	--	--	1	U	--	--	2	U	--	--	22.6	J	--	--	1.2	J
11/25/2019[D]	--	--	102	J	--	--	0.35	J	--	--	13.3		--	--	39.2	J	--	--	1	U	--	--	1	U	--	--	13,000		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2.2	J
SPM-93-08X																																																
10/25/2010	100	U	--	--	50	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	4	U	--	--	2,600		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
10/19/2011	40	J	--	--	0.3	J	--	--	2	J	--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,400		--	--	5	J	--	--	20	U	--	--	10	U	--	--	110		--	--	10	U	--	--
11/13/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,400		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/14/2013	100		--	--	0.288	J	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,200		--	--	10	U	--	--	20	U	--	--	3	J	--	--	50	U	--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,500	U	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/7/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,500	U	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/3/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,500	U	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/13/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,460		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/19/2018	--	--	18	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,460		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	1.3	J
11/25/2019	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,360		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
SPM-93-10X																																																
10/26/2010	83	J	--	--	50	U	--	--	6		--	--	10	U	--	--	5	U	--	--	4	U	--	--	3,100		--	--	2	J	--	--	20	U	--	--	10	U	--	--	120		--	--	10	U	--	--
10/19/2011	40	J	--	--	0.19	J	--	--	10		--	--	10	U	--	--	5	U	--	--	5	U	--	--	2,900		--	--	2	J	--	--	20	U	--	--	10	U	--	--	50		--	--	2	J	--	--
11/15/2012	80	J	--	--	0.17	J	--	--	4.7	J	--	--	10	U	--	--	5	U	--	--	5	U	--	--	3,200		--	--	2	J	--	--	20	U	--	--	10	U	--	--	--		--	--	10	U	--	--
11/13/2013	50	J	--	--	0.67		--	--	7		--	--	10	U	--	--	5	U	--	--	5	U	--	--	3,000		--	--	4	J	--	--	20	U	--	--	10	U	--	--	--		--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	6.1		--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,220	J	--	--	5	U	--	--	25	U	--	--	--	U	--	--	50	U	--	--	2.5	U
12/7/2015	--	--	100	U	--	--	2	U	--	--	6.2		--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,090	J	--	--	5	U	--	--	25	U	--	--	--	U	--	--	50	U	--	--	2.5	U
10/31/2016	--	--	100	U	--	--	2	U	--	--	6.3		--	--	25	U	--	--	2	U	--	--	2	U	--	--	3,090	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/14/2017	--	--	88.7	J	--	--	1	U	--	--	6.1	J	--	--	1.3	J	--	--	1	U	--	--	1	U	--	--	3,100		--	--	2.2	J	--	--	1	U	--	--	1	U	--	--	141	J	--	--	2.0	U
11/19/2018	--	--	50.3	U	--	--	1	U	--	--	5.7	J	--	--	5	U	--	--	0.2	J	--	--	1	U	--	--	3,140		--	--	2.2	J	--	--	1	U	--	--	2	U	--	--	22.1	J	--	--	1.9	J
11/26/2019	--	--	39.2	J	--	--	1	U	--	--	4.2	J	--	--	5	U	--	--	1	U	--	--	1	U	--	--	3,070		--	--	2.8	J	--	--	1	U	--	--	2	U	--	--	45.6	J	--	--	2.0	U
SPM-93-12X																																																
10/25/2010	100	U	--	--	50	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	4	U	--	--	6,500		--	--	3	J	--	--	20	U	--	--	10	U	--	--	43	J	--	--	10	U	--	--
10/19/2011	10	U	--	--	1	U	--	--	5	U	--	--	2	J	--	--	5	U	--	--	5	U	--	--	6,500		--	--	3	J	--	--	20	U	--	--	10	U	--	--	20	J	--	--	2	J	--	--
11/15/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	6,500		--	--	3	J	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/13/2013	100	U	--	--	0.942		--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U	--	--	5,800		--	--	4	J	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,650		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/7/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,340		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
10/31/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	6,600		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/27/2017	--	--	25	U	--	--	0.30	J	--	--	5	U	--	--	3.0	J	--	--	1	U	--	--	1	U	--	--	7,200		--	--	2.3	J	--	--	1	U	--	--	11.9	J	--	--	50	U	--	--	2	U
11/19/2018	--	--	149	U	--	--	0.20	J	--	--	5	U	--	--	2.6	J	--	--	1	U	--	--	1	U	--	--	7,190		--	--	2.7	J	--	--	1	U	--	--	1.3	J	--	--	239	J	--	--	2	J
11/25/2019	--	--	67.1	J	--	--	0.10	U	--	--	5	U	--	--	2.2	J	--	--	1	U	--	--	1	U	--	--	6,720		--	--	2.1	J	--	--	1	U	--	--	2	U	--	--	101	J	--	--	2	U
SPM-93-16X																																																
10/26/2010	100	U	--	--	50	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	4	U			2,300		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
10/19/2011	10	U	--	--	1	U	--	--	3	J	--	--	10	U	--	--	5	U	--	--	5	U			2,400		--	--	10	U	--	--	20	U	--	--	10	U	--	--	70		--	--	10	U	--	--
11/15/2012	100	U	--	--	0.5	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U			2,500		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/13/2013	100	U	--	--	0.312	J	--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U			2,200		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U			2	U	--	--	2,600	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/7/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U			2	U	--	--	2,500	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/7/2015[D]	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U			2	U	--	--	2,500	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
10/31/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	2,500	U	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/14/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,300		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/19/2018	--	--	24.7	U	--	--	0.3	J	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,420		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/26/2019	--	--	25	U	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	2,390		--	--	5	U	--	--	1	U	--	--	2	U	--	--	50	U	--	--	1.5	J
SPM-97-23X																																																
10/25/2010	3.8	J	--	--	50	U	--	--	5	U	--	--	10	U	--	--	5	U	--	--	4	U			4,000		--	--	10	U	--	--	20	U	--	--	10	U	--	--	120		--	--	10	U	--	--
10/19/2011[A]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/14/2012[B]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/13/2013	100	U	--	--	0.93		--	--	5	U	--	--	10	U	--	--	5	U	--	--	5	U			3,800		--	--	10	U	--	--	20	U	--	--	10	U	--	--	350		--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	3	U	--	--	25	U	--	--	2	U			2	U	--	--	6,420		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/8/2015	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U			2	U	--	--	4,160	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/3/2016	--	--	100	U	--	--	2	U	--	--	2	U	--	--	25	U	--	--	2	U	--	--	2	U	--	--	4,260	J	--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/27/2017	--	--	25	U	--	--	1	U	--	--	5	U	--	--	2.6	J	--	--	1	U	--	--	1	U	--	--	4,760		--	--	5	U	--	--	1	U	--	--	2	U	--	--	112	J	--	--	2	U
11/27/2018	--	--	20.8	J	--	--	1	U	--	--	5	U	--	--	5	U	--	--	1	U	--	--	1	U	--	--	4,660		--	--	5	U	--	--	1	U	--	--	3.2	J	--	--	57.8	J	--	--	2	U
11/25/2019	--	--	120	J	--	--	0.37	J	--	--	5	U	--	--	2.6	J	--	--	1	U	--	--	1	U	--	--	6,880		--	--	5	U	--	--	1	U	--	--	9.2	J	--	--	358		--	--	1.3	J
SPM-97-24X																																																
10/25/2010	100	U	--	--	50	U	--	--	6		--	--	10	U	--	--	5	U	--	--	4	U	--	--	7,200		--	--	10	U	--	--	20	U	--	--	10	U	--	--	50	U	--	--	10	U	--	--
10/19/2011	30	J	--	--	0.29	J	--	--	6		--	--	10	U	--	--	5	U	--	--	5	U	--	--	6,900		--	--	10	U	--	--	20	U	--	--	10	U	--	--	40	J	--	--	2	J	--	--
11/15/2012	100	U	--	--	0.23	J	--	--	6		--	--	10	U	--	--	5	U	--	--	5	U	--	--	7,600		--	--	10	U	--	--	20	U	--	--	10	U	--	--	47	J	--	--	10	U	--	--
11/14/2013	100	U	--	--	0.943	J	--	--	6		--	--	10	U	--	--	5	U	--	--	5	U	--	--	6,800		--	--	10	U	--	--	20	U	--	--	2	J	--	--	50	U	--	--	10	U	--	--
11/26/2014	--	--	100	U	--	--	2	U	--	--	3.2	J	--	--	25	U	--	--	2	U	--	--	2	U	--	--	8,290		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
12/8/2015	--	--	100	U	--	--	2	U	--	--	5		--	--	25	U	--	--	2	U	--	--	2	U	--	--	8,170		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
10/31/2016	--	--	100	U	--	--	2	U	--	--	5.8		--	--	25	U	--	--	2	U	--	--	2	U	--	--	8,000		--	--	5	U	--	--	25	U	--	--	13	U	--	--	50	U	--	--	2.5	U
11/27/2017	--	--	14.7	J	--	--	0.22	J	--	--	3.0	J	--	--	1.5	J	--	--	1	U	--	--	1	U	--	--	9,120		--	--	1.1	J	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/28/2018	--	--	25	U	--	--	0.22	J	--	--	2.0	J	--	--	1.3	J	--	--	1	U	--	--	1	U	--	--	8,590		--	--	1	J	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U
11/25/2019	--	--	25	U	--	--	0.24	J	--	--	4.9	J	--	--	1.5	J	--	--	1	U	--	--	1	U	--	--	7,500		--	--	1.1	J	--	--	1	U	--	--	2	U	--	--	50	U	--	--	2	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Estimated results
UJ - Estimated detection limits
-- - Not analyzed
[D] - Duplicate Sample
[A] - Not sampled because flooding prohibited access to the well
[B] - Not sampled because well could not be located
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations

TABLE E-6
SUMMARY OF GROUNDWATER DATA - METALS
SPIA SOUTH POST MONITORING WELLS
FORT DEVENS RESERVE FORCES TRAINING AREA

Analyte	Magnesium (µg/L)				Manganese (µg/L)				Mercury (µg/L)				Nickel (µg/L)				Potassium (µg/L)				Selenium (µg/L)				Silver (µg/L)				Sodium (µg/L)				Thallium (µg/L)				Vanadium (µg/L)				Zinc (µg/L)			
GW-1 Standard	NS				NS				2				100				NS				50				100				NS				2				30				5,000			
GW-3 Standard	NS				NS				20				200				NS				100				7				NS				3,000				4,000				900			
Background	3,481				291				0.243				34				2,570				3				5				10,800				7				11				21			
Well ID / Sample Date	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual	Total	Qual	Dissolved	Qual
Hydrant D-1																																												
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,050	J	--	--	1	U	--	--	5	U	--	--	137	
2/18/2016	2,500	U	2,500	U	7.5	U	7.5	U	0.1	U	0.1	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	3,110	J	3,050	J	1	U	1	U	5	U	5	U	79.4		80.1	
10/31/2016	2,500	U	2,500	U	7.5	U	7.5	U	0.1	U	0.1	U	20	U	20	U	2,500	U	2,500	U	5	U	5	U	2.5	U	2.5	U	3,720	U	3,740	U	1	U	1	U	5	U	5	U	87.5		78.8	
11/28/2017	2,010	J	2,130	J	2.1	J	2.1	J	0.1	U	0.034	U	1	U	1	U	843	J	766	J	5	U	5	U	2	U	2	U	3,880	J	3,670	J	1	U	1	U	2	U	2	U	86		85.6	
11/29/2018	1,970	J	1,980	J	5.6	J	2.3	J	0.1	U	0.1	U	1	U	0.5	J	736	J	736	J	5	U	3.3	J	2	U	2	U	3,090	J	3,280	J	1	U	1	U	2	U	2	U	232		187	
11/26/2019	1,670	J	619	J	2	U	2	U	0.1	U	0.1	U	1	U	1	U	656	J	374	J	5	U	5	U	2	U	2	U	3,110	J	2,310	J	1	U	1	U	2	U	2	U	35.3		5	U
SPM-93-06X																																												
10/25/2010	78	J	--	--	10	U	--	--	0.05	J	--	--	25	U	--	--	4,000		--	--	10	U	--	--	7	U	--	--	6,800		--	--	20	U	--	--	10	U	--	--	11.5	J	--	--
10/18/2011	140		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	3,700		--	--	10	U	--	--	7	U	--	--	6,400		--	--	2	U	--	--	10	U	--	--	50	U	--	--
11/13/2012	1,200		--	--	7	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,000		--	--	0.5	U	--	--	10	U	--	--	22	J	--	--
11/13/2013	220		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	3,100		--	--	10	U	--	--	7	U	--	--	6,200		--	--	0.069	J	--	--	10	U	--	--	8	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,940	J	--	--	5	U	--	--	2.5	U	--	--	6,666		--	--	1	U	--	--	5	U	--	--	10	U
12/8/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,790	J	--	--	5	U	--	--	2.5	U	--	--	5,930		--	--	1	U	--	--	5	U	--	--	10	U
11/2/2016	--	--	2,500	U	--	--	22.1		--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,540		--	--	1	U	--	--	5	U	--	--	10	U
11/2/2016[D]	--	--	2,500	U	--	--	22.3		--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,500		--	--	1	U	--	--	5	U	--	--	10	U
11/14/2017	--	--	733	J	--	--	48.1		--	--	0.1	UJ	--	--	1	U	--	--	3,430	J	--	--	5	U	--	--	2	U	--	--	6,170	J	--	--	1	U	--	--	0.70	J	--	--	5	U
11/14/2017[D]	--	--	729	J	--	--	41.8		--	--	0.1	UJ	--	--	1	U	--	--	3,440	J	--	--	5	U	--	--	2	U	--	--	6,190	J	--	--	1	U	--	--	0.60	J	--	--	5	U
11/26/2018	--	--	639	J	--	--	46.0		--	--	0.1	U	--	--	1	U	--	--	3,360	J	--	--	5	U	--	--	2	U	--	--	6,290	J	--	--	1	U	--	--	2.0	U	--	--	5	U
11/26/2018[D]	--	--	657	J	--	--	47.7		--	--	0.1	U	--	--	1	U	--	--	3,210	J	--	--	5	U	--	--	2	U	--	--	6,260	J	--	--	1	U	--	--	2.0	U	--	--	5	U
11/25/2019	--	--	430	J	--	--	35.2		--	--	0.1	U	--	--	1	U	--	--	3,590	J	--	--	5	U	--	--	2	U	--	--	6,970	J	--	--	1	U	--	--	2.0	U	--	--	5	U
11/25/2019[D]	--	--	446	J	--	--	38.0		--	--	0.1	U	--	--	1	U	--	--	3,790	J	--	--	5	U	--	--	2	U	--	--	7,130	J	--	--	1	U	--	--	2.0	U	--	--	5	U
SPM-93-08X																																												
10/25/2010	310		--	--	10	U	--	--	0.04	J	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,200		--	--	20	U	--	--	10	U	--	--	11.7	J	--	--
10/19/2011	340		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	1,900	J	--	--	0.5	U	--	--	10	U	--	--	12	J	--	--
11/13/2012	310		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,000		--	--	0.5	U	--	--	10	U	--	--	16	J	--	--
11/14/2013	260		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,000		--	--	0.069	J	--	--	10	U	--	--	9	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
12/7/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
11/3/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
11/13/2017	--	--	319	J	--	--	1.0	J	--	--	0.1	U	--	--	1	U	--	--	403	J	--	--	5	U	--	--	2	U	--	--	2,110	J	--	--	1	U	--	--	2	U	--	--	5	U
11/19/2018	--	--	335	J	--	--	2.0	U	--	--	0.1	U	--	--	0.9	J	--	--	318	J	--	--	5	U	--	--	2	U	--	--	1,880	J	--	--	1	U	--	--	2	U	--	--	5.1	J
11/25/2019	--	--	306	J	--	--	1.5	J	--	--	0.10	U	--	--	1	U	--	--	358	J	--	--	5	U	--	--	2	U	--	--	1,940	J	--	--	1	U	--	--	2	U	--	--	5	U
SPM-93-10X																																												
10/26/2010	860		--	--	3.1	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,700		--	--	20	U	--	--	1.2	J	--	--	11.6	J	--	--
10/19/2011	890		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,600		--	--	0.5	U	--	--	10	U	--	--	12	J	--	--
11/15/2012	990		--	--	4	J	--	--	0.2	U	--	--	25	U	--	--	810	J	--	--	10	U	--	--	7	U	--	--	2,900		--	--	0.03	J	--	--	10	U	--	--	17	J	--	--
11/13/2013	810		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	530	J	--	--	10	U	--	--	7	U	--	--	2,900		--	--	0.5	U	--	--	1	J	--	--	11	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,870	J	--	--	1	U	--	--	5	U	--	--	10	U
12/7/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,830	J	--	--	1	U	--	--	5	U	--	--	10	U
10/31/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,910	U	--	--	1	U	--	--	5	U	--	--	10	U
11/14/2017	--	--	884	J	--	--	3.0	J	--	--	0.1	UJ	--	--	2.5	J	--	--	724	U	--	--	5	U	--	--	2	U	--	--	2,800	J	--	--	1	U	--	--	1.0	J	--	--	5	U
11/19/2018	--	--	832	J	--	--	2.0	U	--	--	0.1	U	--	--	1.5	J	--	--	610	J	--	--	5	U	--	--	2	U	--	--	2,660	J	--	--	1	U	--	--	2.0	U	--	--	6	J
11/26/2019	--	--	848	J	--	--	2.8	J	--	--	0.10	U	--	--	4.0	J	--	--	582	J	--	--	5	U	--	--	2	U	--	--	2,690	J	--	--	1	U	--	--	2.0	U	--	--	5	U
SPM-93-12X																																												
10/25/2010	1,900		--	--	2.4	J	--	--	0.06	J	--	--	7.8	J	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	5,400		--	--	20	U	--	--	10	U	--	--	12.3	J	--	--
10/19/2011	2,200		--	--	10	U	--	--	0.2	U	--	--	5	J	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	5,000		--	--	0.5	U	--	--	10	U	--	--	14	J	--	--
11/15/2012	2,200		--	--	2	J	--	--	0.2	U	--	--	4	J	--	--	12,000	U	--	--	10	U	--	--	7	U	--	--	5,400		--	--	0.5	U	--	--	10	U	--	--	33	J	--	--
11/13/2013	1,800		--	--	3	J	--	--	0.2	U	--	--	25	U	--	--	640	J	--	--	10	U	--	--	7	U	--	--	5,000		--	--	0.5	U	--	--	10	U	--	--	12	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,330		--	--	1	U	--	--	5	U	--	--	13.7	J
12/7/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,160		--	--	1	U	--	--	5	U	--	--	10	U
10/31/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	5,360		--	--	1	U	--	--	5	U	--	--	10.4	J
11/27/2017	--	--	2,050	J	--	--	10.0	J	--	--	0.032	U	--	--	3.4	J	--	--	1,020	J	--	--	5	U	--	--	2	U	--	--	5,950	J	--	--	1	U	--	--	2	U	--	--	58.9	
11/19/2018	--	--	2,520	J	--	--	12.6	J	--	--	0.1	U	--	--	1.2	J	--	--	869	J	--	--	5	U	--	--	2	U	--	--	4,990	J	--	--	1	U	--	--	2	U	--	--	12.6	J
11/25/2019	--	--	2,280	J	--	--	4.3	J	--	--	0.1	U	--	--	1	U	--	--	816	J	--	--	3.2	J	--	--	2	U	--	--	4,870	J	--	--	1	U	--	--	0.7	J	--	--	7.8	J
SPM-93-16X																																												
10/26/2010	600		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,200		--	--	20	U	--	--	10	U	--	--	10.4	J	--	--
10/19/2011	680		--	--	10	U	--	--	0.2	J	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,200		--	--	0.26	J	--	--	10	U	--	--	11	J	--	--
11/15/2012	690		--	--	2	J	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,400		--	--	0.07	J	--	--	10	U	--	--	16	J	--	--
11/13/2013	540		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,300		--	--	0.5	U	--	--	10	U	--	--	13	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
12/7/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
12/7/2015[D]	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
10/31/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,500	U	--	--	1	U	--	--	5	U	--	--	10	U
11/14/2017	--	--	619	J	--	--	2	U	--	--	0.1	UJ	--	--	1	U	--	--	421	U	--	--	5	U	--	--	2	U	--	--	2,320	J	--	--	1	U	--	--	2	U	--	--	5	U
11/19/2018	--	--	637	J	--	--	2	U	--	--	0.1	U	--	--	1	U	--	--	353	J	--	--	5	U	--	--	2	U	--	--	2,230	J	--	--	1	U	--	--	2	U	--	--	4.5	J
11/26/2019	--	--	584	J	--	--	2	U	--	--	0.1	U	--	--	1	U	--	--	396	J	--	--	5	U	--	--	2	U	--	--	2,320	J	--	--	1	U	--	--	2	U	--	--	5	U
SPM-97-23X																																												
10/25/2010	820		--	--	18		--	--	0.03	J	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,600		--	--	20	U	--	--	10	U	--	--	13.6	J	--	--
10/19/2011[#]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/14/2012[#]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/13/2013	760		--	--	31		--	--	0.2	U	--	--	25	U	--	--	2,500	U	--	--	10	U	--	--	7	U	--	--	2,300				0.5	U	--	--	10	U	--	--	13	J	--	--
11/26/2014	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,140	J	--	--	1	U	--	--	5	U	--	--	53.3	
12/8/2015	--	--	2,500	U	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,790	J	--	--	1	U	--	--	5	U	--	--	10	U
11/2/2016	--	--	2,500	U	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	2,880	J	--	--	1	U	--	--	5	U	--	--	10	U
11/27/2017	--	--	961	J	--	--	6.7	J	--	--	0.1	UJ	--	--	1	U	--	--	655	U	--	--	5	U	--	--	2	U	--	--	2,970	J	--	--	1	U	--	--	2	U	--	--	5	U
11/27/2018	--	--	974	J	--	--	5.8	J	--	--	0.1	U	--	--	0.4	J	--	--	616	J	--	--	5	U	--	--	2	U	--	--	2,950	J	--	--	1	U	--	--	2	U	--	--	23.6	
11/25/2019	--	--	978	J	--	--	109		--	--	0.1	U	--	--	1	U	--	--	2,550	J	--	--	5	U	--	--	2	U	--	--	2,760	J	--	--	1	U	--	--	2	U	--	--	15.3	J
SPM-97-24X																																												
10/25/2010	2,700		--	--	10	U	--	--	0.04	J	--	--	25	U	--	--	1,000	J	--	--	10	U	--	--	7	U	--	--	3,100		--	--	20	U	--	--	10	U	--	--	18.7	J	--	--
10/19/2011	3,000		--	--	4	J	--	--	0.2	U	--	--	25	U	--	--	1,000	J	--	--	10	U	--	--	7	U	--	--	2,700		--	--	0.06	J	--	--	10	U	--	--	11	J	--	--
11/15/2012	3,300		--	--	2	J	--	--	0.2	U	--	--	25	U	--	--	1,100	J	--	--	10	U	--	--	7	U	--	--	3,200		--	--	0.04	J	--	--	10	U	--	--	18	J	--	--
11/14/2013	2,600		--	--	10	U	--	--	0.2	U	--	--	25	U	--	--	880	J	--	--	10	U	--	--	7	U	--	--	3,000		--	--	0.5	U	--	--	10	U	--	--	8	J	--	--
11/26/2014	--	--	3,460	J	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,310	J	--	--	1	U	--	--	5	U	--	--	10	U
12/8/2015	--	--	3,320	J	--	--	7.5	U	--	--	0.15	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,380	J	--	--	1	U	--	--	5	U	--	--	10	U
10/31/2016	--	--	3,120	J	--	--	7.5	U	--	--	0.1	U	--	--	20	U	--	--	2,500	U	--	--	5	U	--	--	2.5	U	--	--	3,420	U	--	--	1	U	--	--	5	U	--	--	10	U
11/27/2017	--	--	3,670	J	--	--	2	U	--	--	0.1	U	--	--	1	U	--	--	1,180	J	--	--	5	U	--	--	2	U	--	--	3,550	J	--	--	1	U	--	--	2	U	--	--	5	U
11/28/2018	--	--	3,430	J	--	--	2	U	--	--	0.1	U	--	--	1	U	--	--	1,100	J	--	--	5	U	--	--	2	U	--	--	3,410	J	--	--	1	U	--	--	2	U	--	--	5	U
11/25/2019	--	--	3,040	J	--	--	1.1	J	--	--	0.10	U	--	--	1	U	--	--	1,000	J	--	--	5	U	--	--	2	U	--	--	2,880	J	--	--	1	U	--	--	2	U	--	--	5	U

Notes:
MCP Standards (GW-1, GW-3) for this table are current as of 2014 update
NS - No Standard
U - Not detected above laboratory detection limits.
J - Estimated results
UJ - Estimated detection limits
-- Not analyzed
[D] - Duplicate Sample
[#] - Not sampled because flooding prohibited access to the well
[#] - Not sampled because well could not be located
=Concentration greater than GW-1 Standards
=Concentration greater than GW-3 standards or Background Concentrations

TABLE E-7
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES PERCHLORATE
SPIA SOUTH POST MONITORING WELLS
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200		2	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000		1,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																														
Hydrant D-1	10/25/2010	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	--	--
	10/18/2011	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	--	--
	11/13/2012	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	--	--
	11/15/2013	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	--	--
	1/14/2015	0.200	U	0.210	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.500	U	1.000	U	1.000	U	0.200	U	5.000	U	0.500	U	0.200	U	--	--
	2/18/2016	0.210	UJ	0.210	UJ	0.210	UJ	0.210	UJ	0.210	UJ	0.210	UJ	0.210	UJ	0.520	UJ	1.000	UJ	1.000	UJ	0.210	UJ	5.200	UJ	0.520	UJ	0.210	UJ	--	--
	10/31/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/28/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	UJ	0.10	U	0.10	U	0.10	R[e]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/29/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	--	--
	11/26/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
SPM-93-06X	10/25/2010	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	0.200	UJ	--	--
	10/18/2011	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	0.210	U	--	--
	11/13/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	1.23		0.204	U	0.204	U	0.625		--	--
	11/13/2013	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	--	--
	1/14/2015	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.500	U	1.000	U	1.000	U	0.200	U	5.000	U	0.500	U	0.200	U	--	--
	12/8/2015	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.5	UJ	1	UJ	1	UJ	0.2	UJ	5	UJ	0.5	UJ	0.2	UJ	--	--
	8/22/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	U
	11/2/2016	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.10	U
	11/2/16[D]	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.094	U	0.10	U
	11/14/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/14/2017[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
	11/26/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.10	U
	11/26/2018[D]	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.10	U
	11/25/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	UJ	0.10	U	0.10	U	0.10	U
	11/25/2019[D]	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
SPM-93-08X	10/25/2010	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	0.204	UJ	--	--
	10/19/2011	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	0.202	U	--	--
	11/13/2012	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.182	J	0.203	U	0.203	U	0.203	U	--	--
	11/14/2013	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	--	--
	1/14/2015	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.500	U	1.000	U	1.000	U	0.200	U	5.000	U	0.500	U	0.200	U	--	--
	12/8/2015	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.52	UJ	1	UJ	1	UJ	0.21	UJ	5.2	UJ	0.52	UJ	0.21	UJ	--	--
	11/3/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	3.0		0.10	U	0.10	U	0.64		--	--
	11/19/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	UJ	0.098	U	0.098	U	--	--
	11/25/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
SPM-93-10X	10/26/2010	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	--	--
	10/19/2011	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	--	--
	11/15/2012	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	--	--
	11/13/2013	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	--	--
	1/14/2015	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.500	U	1.000	U	1.000	U	0.200	U	5.000	U	0.500	U	0.200	U	--	--
	12/7/2015	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.57	UJ	1.1	UJ	1.1	UJ	0.23	UJ	5.7	UJ	0.57	UJ	0.23	UJ	--	--
	10/31/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/14/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/19/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	UJ	0.098	U	0.098	U	--	--
	11/26/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
SPM-93-12X	10/25/2010	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	--	--
	10/19/2011	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	--	--
	11/15/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	11/13/2013	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	1/14/2015	0.220	U	0.220	U	0.220	U	0.220	U	0.220	U	0.220	U	0.220	U	0.560	U	1.100	U	1.100	U	0.220	U	5.600	U	0.560	U	0.220	U	--	--
	12/8/2015	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.20	UJ	0.51	UJ	1	UJ	1	UJ	0.20	UJ	5.1	UJ	0.51	UJ	0.20	UJ	--	--
	10/31/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.32		0.10	U	--	--
	11/27/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.25		0.10	U	0.10	U	0.10	U	--	--
	11/19/2018	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	UJ	0.10	U	0.10	U	--	--
	11/26/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
SPM-93-16X	10/26/2010	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	0.206	U	--	--
	10/19/2011	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	11/15/2012	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	--	--
	11/13/2013	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	1/14/2015	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.500	U	1.000	U	1.000	U	0.200	U	5.000	U	0.500	U	0.200	U	--	--
	12/8/2015	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.53	UJ	1.1	UJ	1.1	UJ	0.21	UJ	5.3	UJ	0.53	UJ	0.21	UJ	--	--
	12/8/2015[D]	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.22	UJ	0.54	UJ	1.1	UJ	1.1	UJ	0.22	UJ	5.4	UJ	0.54	UJ	0.22	UJ	--	--
	10/31/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.21		0.10	U	--	--
	11/14/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.1	U	0.10	U	--	--
	11/19/2018	0.098	U	0.098	U	4.5		0.16	J	0.098	U	0.98		0.098	U	0.098	U	0.52		0.098	U	0.098	U	0.098	UJ	0.098	U	0.098	U	--	--
	11/26/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--

TABLE E-7
SUMMARY OF GROUNDWATER DATA - EXPLOSIVES PERCHLORATE
SPIA SOUTH POST MONITORING WELLS
FORT DEVENS RESERVE FORCES TRAINING AREA

	Analyte	1,3,5 Trinitrobenzene (µg/L)		1,3 Dinitrobenzene (µg/L)		2,4,6-Trinitrotoluene (µg/L)		2,4-Dinitrotoluene (µg/L)		2,6-Dinitrotoluene (µg/L)		2-Amino-4,6-dinitrotoluene (µg/L)		2-Nitrotoluene (µg/L)		3-Nitrotoluene (µg/L)		4-Amino-2,6-dinitrotoluene (µg/L)		4-Nitrotoluene (µg/L)		RDX (µg/L)		Tetryl (µg/L)		Nitrobenzene (µg/L)		HMX (µg/L)		Perchlorate (µg/L)	
	GW-1 Standard	NS		NS		NS		30		NS		NS		NS		NS		NS		NS		1		NS		NS		200		2	
	GW-3 Standard	NS		NS		NS		50,000		NS		NS		NS		NS		NS		NS		50,000		NS		NS		50,000		1,000	
	Background	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	
		Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual	Total	Qual
Well ID	**Sample Date**																														
SPM-97-23X	10/25/2010	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	0.208	UJ	--	--
	10/19/2011[a]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/12[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/13/2013	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	0.205	U	--	--
	12/8/2015	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.23	UJ	0.57	UJ	1.1	UJ	1.1	UJ	0.23	UJ	5.7	UJ	0.57	UJ	0.23	UJ	--	--
	11/2/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/14/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
	11/26/2018	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	0.096	U	--	--
	11/25/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--
SPM-97-24X	10/25/2010	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.205	UJ	0.128	J	0.205	UJ	0.205	UJ	0.205	UJ	--	--
	10/19/2011	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	11/15/2012	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	11/14/2013	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	--	--
	1/14/2015	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.5	U	1	U	1	U	0.2	U	5	U	0.5	U	0.2	U	--	--
	12/8/2015	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.21	UJ	0.53	UJ	1.1	UJ	1.1	UJ	0.21	UJ	5.3	UJ	0.53	UJ	0.21	UJ	--	--
	10/31/2016	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.39		0.10	U	--	--
	11/13/2017	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.49		0.10	U	0.10	U	0.10	U	--	--
	11/28/2018	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	0.098	U	--	--
	11/25/2019	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	--	--

Notes:
W-3) for this table are current as of 2014 update
NS - No Standard
d above laboratory detection limits.
J - Estimated results
Estimated detection limits
D - Duplicate Sample
use flooding prohibited access to the well
d because well could not be located
MSD %Rs, results were qualified as rejected.
- - Not analyzed
[redacted]n greater than GW-1 Standards
ntration greater than GW-3 standards or Background Concentrations

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 180.1	08/26/2015	TURBIDITY	0.40	0.100	NTU	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	ZINC	0.011	0.002	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	CALCIUM	5.9	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	SILVER	ND	0.003	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	MANGANESE	ND	0.002	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	MAGNESIUM	2.3	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	ALUMINUM	ND	0.020	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	POTASSIUM	0.50	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	IRON	0.017	0.003	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/26/2015	COPPER	0.027	0.003	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/26/2015	CHLORIDE	3.7	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/26/2015	SULFATE	5.6	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/26/2015	NITRATE	0.33	0.050	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2120B	08/26/2015	COLOR	0	1.00	C UNITS	
2147006	01G	FINISHED: FAC WELL 1	SM 2150B	08/26/2015	ODOR	4.0	1.00	TON	
2147006	01G	FINISHED: FAC WELL 1	SM 2320B	08/26/2015	ALKALINITY (CACO3), TOTAL	25	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2340B	08/26/2015	HARDNESS (CACO3), TOTAL	24	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2540C	08/26/2015	TOTAL DISSOLVED SOLIDS	52	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 4500-H-B	08/26/2015	PH	7.5	1.00		
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	HEXACHLOROBUTADIENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1,2-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TRICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	DIISOPROPYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	2,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TETRACHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	ETHYL TERT-BUTYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	O-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CHLOROFORM	0.90	0.500	UG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CARBON TETRACHLORIDE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2,4-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	STYRENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	METHYL TERTIARY BUTYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	P-ISOPROPYLTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	DIBROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	DICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BROMOBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2,4-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	O-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TERT-AMYL METHYL ETHER	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	M-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	N-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2,3-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	ACETONE	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1,1,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TETRAHYDROFURAN	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	N-PROPYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	ISOPROPYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	XYLENES (TOTAL)	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CHLORODIBROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TERT-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	DICHLORODIFLUOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	VINYL CHLORIDE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	P-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,3,5-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TRANS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	FLUOROTRICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BROMOFORM	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	ETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	TERT-BUTYL ALCOHOL	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CIS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1,1-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2,3-TRICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,2-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	SEC-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	NAPHTHALENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,3-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	CHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BROMODICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	PARA-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	BROMOCHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	MONOCHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,1,2,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/23/2015	1,3-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 180.1	07/26/2016	TURBIDITY	0.25	0.100	NTU	

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	MAGNESIUM	2.8	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	ZINC	0.014	0.002	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	SILVER	ND	0.003	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	IRON	0.019	0.003	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	MANGANESE	ND	0.002	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	CALCIUM	7	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	COPPER	0.024	0.003	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	ALUMINUM	ND	0.020	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/26/2016	POTASSIUM	0.40	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/26/2016	CHLORIDE	2.7	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/26/2016	SULFATE	5.7	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/26/2016	NITRATE	ND	0.050	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	SM 2120B	07/26/2016	COLOR	0	1.00	C UNITS	
2147006	01G	FINISHED: FAC WELL 1	SM 2150B	07/26/2016	ODOR	1.0	1.00	TON	
2147006	01G	FINISHED: FAC WELL 1	SM 2320B	07/26/2016	ALKALINITY (CACO3), TOTAL	30	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2340B	07/26/2016	HARDNESS (CACO3), TOTAL	29	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2540C	07/26/2016	TOTAL DISSOLVED SOLIDS	52	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 4500-H-B	07/26/2016	PH	7.6	1.00		
2147006	01G	FINISHED: FAC WELL 1	EPA 180.1	07/17/2017	TURBIDITY	1.4	0.100	NTU	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	SODIUM	3.9	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	CALCIUM	6.8	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	MANGANESE	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	ALUMINUM	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	SILVER	ND	0.001	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	COPPER	0.036	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	ZINC	0.014	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	POTASSIUM	1	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	IRON	0.11	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	07/17/2017	MAGNESIUM	2.70	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/17/2017	NITRATE	0.20	0.050	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/17/2017	NITRITE	ND	0.020	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/17/2017	SULFATE	5.20	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	07/17/2017	CHLORIDE	2.80	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 314.0	07/17/2017	PERCHLORATE	0.097	0.050	UG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2120B	07/17/2017	COLOR	2.0	1.00	C UNITS	
2147006	01G	FINISHED: FAC WELL 1	SM 2150B	07/17/2017	ODOR	1.0	1.00	TON	
2147006	01G	FINISHED: FAC WELL 1	SM 2320B	07/17/2017	ALKALINITY (CACO3), TOTAL	27	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2340B	07/17/2017	HARDNESS (CACO3), TOTAL	28	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2540C	07/17/2017	TOTAL DISSOLVED SOLIDS	54	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 4500-H-B	07/17/2017	PH	7.5	1.00		
2147006	01G	FINISHED: FAC WELL 1	EPA 180.1	09/19/2018	TURBIDITY	1.4	0.100	NTU	

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	IRON	0.11	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	MAGNESIUM	2.70	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	ALUMINUM	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	COPPER	0.023	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	CALCIUM	6.80	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	ZINC	0.017	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	MANGANESE	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	SILVER	0.002	0.001	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	09/19/2018	POTASSIUM	0.60	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	09/19/2018	NITRATE	0.26	0.050	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	09/19/2018	CHLORIDE	3.10	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	09/19/2018	SULFATE	5.50	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,3,5-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TERT-BUTYL ALCOHOL	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	N-PROPYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	VINYL CHLORIDE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	XYLENES (TOTAL)	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1,1-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	DIISOPROPYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BROMODICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TETRACHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2,3-TRICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CARBON TETRACHLORIDE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	ETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	P-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TRANS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	M-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2,4-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	STYRENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BROMOCHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1,2,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BROMOBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	NAPHTHALENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2,3-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TERT-AMYL METHYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	MONOCHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BENZENE	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	DICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TETRAHYDROFURAN	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2,4-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1,1,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TRICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	P-ISOPROPYLTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	SEC-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,3-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	ISOPROPYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CIS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	FLUOROTRICHLOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	N-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BROMOFORM	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	O-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	TERT-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CHLOROFORM	1.40	0.500	UG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	2,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	PARA-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	CHLORODIBROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,3-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	METHYL TERTIARY BUTYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	O-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	DICHLORODIFLUOROMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	ETHYL TERT-BUTYL ETHER	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,1,2-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	1,2-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	ACETONE	ND	10.0	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	DIBROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	BROMOMETHANE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 524.2	09/19/2018	HEXACHLOROBUTADIENE	ND	0.500	UG/L	U
2147006	01G	FINISHED: FAC WELL 1	SM 2120B	09/19/2018	COLOR	0	1.00	C UNITS	
2147006	01G	FINISHED: FAC WELL 1	SM 2150B	09/19/2018	ODOR	1.0	1.00	TON	
2147006	01G	FINISHED: FAC WELL 1	SM 2320B	09/19/2018	ALKALINITY (CACO3), TOTAL	27	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2340B	09/19/2018	HARDNESS (CACO3), TOTAL	28	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2540C	09/19/2018	TOTAL DISSOLVED SOLIDS	54	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 4500-H-B	09/19/2018	PH	7.3	1.00		
2147006	01G	FINISHED: FAC WELL 1	EPA 180.1	08/13/2019	TURBIDITY	0.90	0.100	NTU	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	MAGNESIUM	2.60	0.100	MG/L	

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	ZINC	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	CALCIUM	5.80	0.200	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	POTASSIUM	0.50	0.100	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	IRON	0.045	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	MANGANESE	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	ALUMINUM	ND	0.004	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	COPPER	0.016	0.004	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 200.7	08/13/2019	SILVER	ND	0.003	MG/L	U
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/13/2019	NITRATE	0.25	0.050	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/13/2019	SULFATE	5.10	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	EPA 300.0	08/13/2019	CHLORIDE	2.30	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2120B	08/13/2019	COLOR	0	1.00	C UNITS	
2147006	01G	FINISHED: FAC WELL 1	SM 2150B	08/13/2019	ODOR	1.0	1.00	TON	
2147006	01G	FINISHED: FAC WELL 1	SM 2320B	08/13/2019	ALKALINITY (CACO3), TOTAL	26	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2340B	08/13/2019	HARDNESS (CACO3), TOTAL	25	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 2540C	08/13/2019	TOTAL DISSOLVED SOLIDS	48	1.00	MG/L	
2147006	01G	FINISHED: FAC WELL 1	SM 4500-H-B	08/13/2019	PH	8.1	1.00		
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 180.1	08/26/2015	TURBIDITY	0.65	0.100	NTU	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	COPPER	0.003	0.003	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	CALCIUM	7.10	0.200	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	ZINC	0.13	0.002	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	IRON	0.084	0.003	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	MANGANESE	0.003	0.002	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	MAGNESIUM	2.00	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	POTASSIUM	0.40	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	SILVER	ND	0.003	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/26/2015	ALUMINUM	ND	0.020	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/26/2015	NITRATE	0.42	0.050	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/26/2015	CHLORIDE	2.80	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/26/2015	SULFATE	6.00	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2120B	08/26/2015	COLOR	0	1.00	C UNITS	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2150B	08/26/2015	ODOR	3.0	1.00	TON	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2320B	08/26/2015	ALKALINITY (CACO3), TOTAL	26	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2340B	08/26/2015	HARDNESS (CACO3), TOTAL	26	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2540C	08/26/2015	TOTAL DISSOLVED SOLIDS	48	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 4500-H-B	08/26/2015	PH	6.9	1.00		
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	VINYL CHLORIDE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	DICHLORODIFLUOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CHLOROFORM	0.60	0.500	UG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	M-DICHLOROBENZENE	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	ETHYL TERT-BUTYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BROMOCHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	DIBROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	2,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1,2-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	FLUOROTRICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TERT-AMYL METHYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	HEXACHLOROBUTADIENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2,4-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	DICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TERT-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2,3-TRICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	P-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CARBON TETRACHLORIDE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,3-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	XYLENES (TOTAL)	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	STYRENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	PARA-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	P-ISOPROPYLTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2,3-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	O-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,3,5-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TETRAHYDROFURAN	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	SEC-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	MONOCHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TRICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	DIISOPROPYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	N-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BROMOBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	O-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,2,4-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	ACETONE	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TRANS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	METHYL TERTIARY BUTYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BROMODICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1,2,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	ETHYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TETRACHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1,1-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CIS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,1,1,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	ISOPROPYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BROMOFORM	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	TERT-BUTYL ALCOHOL	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	CHLORODIBROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	NAPHTHALENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	N-PROPYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	BROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/23/2015	1,3-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 180.1	07/26/2016	TURBIDITY	0.20	0.100	NTU	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	IRON	0.032	0.003	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	ALUMINUM	ND	0.020	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	MAGNESIUM	1.80	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	CALCIUM	6.20	0.200	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	COPPER	0.008	0.003	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	SILVER	ND	0.003	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	MANGANESE	ND	0.002	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	ZINC	0.12	0.002	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	07/26/2016	POTASSIUM	0.40	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	07/26/2016	CHLORIDE	2.60	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	07/26/2016	SULFATE	5.20	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	07/26/2016	NITRATE	0.61	0.050	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2120B	07/26/2016	COLOR	0	1.00	C UNITS	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2150B	07/26/2016	ODOR	200%	1.00	TON	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2320B	07/26/2016	ALKALINITY (CACO3), TOTAL	24	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2340B	07/26/2016	HARDNESS (CACO3), TOTAL	23	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2540C	07/26/2016	TOTAL DISSOLVED SOLIDS	42	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 4500-H-B	07/26/2016	PH	7.2	1.00		
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 180.1	12/13/2017	TURBIDITY	1.8	0.100	NTU	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	SILVER	ND	0.001	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	POTASSIUM	0.70	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	MANGANESE	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	ALUMINUM	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	CALCIUM	7.40	0.200	MG/L	

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	COPPER	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	ZINC	0.13	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	MAGNESIUM	2.10	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	IRON	0.24	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	12/13/2017	SODIUM	3.30	0.200	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	12/13/2017	NITRITE	ND	0.020	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	12/13/2017	CHLORIDE	3.40	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	12/13/2017	SULFATE	5.50	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	12/13/2017	NITRATE	0.44	0.050	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 314.0	12/13/2017	PERCHLORATE	0.44	0.050	UG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2120B	12/13/2017	COLOR	2.0	1.00	C UNITS	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2150B	12/13/2017	ODOR	2.0	1.00	TON	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2320B	12/13/2017	ALKALINITY (CACO3), TOTAL	27	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2340B	12/13/2017	HARDNESS (CACO3), TOTAL	27	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2540C	12/13/2017	TOTAL DISSOLVED SOLIDS	48	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 4500-H-B	12/13/2017	PH	7.3	1.00		
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 180.1	09/19/2018	TURBIDITY	0.15	0.100	NTU	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	MANGANESE	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	SILVER	ND	0.001	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	ALUMINUM	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	ZINC	0.23	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	CALCIUM	7.40	0.200	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	COPPER	0.024	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	MAGNESIUM	2.20	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	POTASSIUM	0.60	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	09/19/2018	IRON	0.077	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	09/19/2018	SULFATE	5.60	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	09/19/2018	CHLORIDE	3.00	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	09/19/2018	NITRATE	0.43	0.050	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,3-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2,4-TRIMETHYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	METHYL TERTIARY BUTYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	FLUOROTRICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	ACETONE	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	P-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2,4-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CHLOROMETHANE	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	N-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	NAPHTHALENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1,1,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2,3-TRICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	P-ISOPROPYLTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BROMOCHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	DIBROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CARBON TETRACHLORIDE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2-DICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	DICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	HEXACHLOROBUTADIENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TETRAHYDROFURAN	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	ISOPROPYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	VINYL CHLORIDE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	MONOCHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	DIISOPROPYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CHLOROFORM	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TERT-BUTYL ALCOHOL	ND	10.0	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	ETHYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	ETHYL TERT-BUTYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	STYRENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	XYLENES (TOTAL)	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	O-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TETRACHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CIS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	M-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	N-PROPYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	PARA-DICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TERT-AMYL METHYL ETHER	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	SEC-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1,2-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	CHLORODIBROMOMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BROMOBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	2,2-DICHLOROPROPANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TERT-BUTYLBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	O-CHLOROTOLUENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,3,5-TRIMETHYLBENZENE	ND	0.500	UG/L	U

TABLE E-8
SUMMARY OF DRINKING WATER DATA
2147006-01G 2147006-02G
SPIA FORT DEVENS RESERVE FORCES TRAINING AREA

PWS ID	Location ID	Location Name	Method	Collected Date	Chemical Name	Result	Detection Limit	Units	Qualifier
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BROMOFORM	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,2,3-TRICHLOROBENZENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1,2,2-TETRACHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TRICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	TRANS-1,2-DICHLOROETHYLENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	DICHLORODIFLUOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,1,1-TRICHLOROETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	1,3-DICHLOROPROPENE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 524.2	09/19/2018	BROMODICHLOROMETHANE	ND	0.500	UG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2120B	09/19/2018	COLOR	0	1.00	C UNITS	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2150B	09/19/2018	ODOR	1.0	1.00	TON	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2320B	09/19/2018	ALKALINITY (CACO3), TOTAL	26	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2340B	09/19/2018	HARDNESS (CACO3), TOTAL	28	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2540C	09/19/2018	TOTAL DISSOLVED SOLIDS	52	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 4500-H-B	09/19/2018	PH	6.9	1.00		
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 180.1	08/13/2019	TURBIDITY	0.35	0.100	NTU	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	SILVER	ND	0.003	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	ZINC	0.26	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	CALCIUM	5.50	0.200	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	COPPER	0.009	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	ALUMINUM	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	IRON	0.089	0.004	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	MAGNESIUM	2.00	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	MANGANESE	ND	0.004	MG/L	U
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 200.7	08/13/2019	POTASSIUM	0.60	0.100	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/13/2019	NITRATE	0.63	0.050	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/13/2019	SULFATE	4.50	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	EPA 300.0	08/13/2019	CHLORIDE	2.20	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2120B	08/13/2019	COLOR	0	1.00	C UNITS	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2150B	08/13/2019	ODOR	2.0	1.00	TON	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2320B	08/13/2019	ALKALINITY (CACO3), TOTAL	24	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2340B	08/13/2019	HARDNESS (CACO3), TOTAL	22	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 2540C	08/13/2019	TOTAL DISSOLVED SOLIDS	44	1.00	MG/L	
2147006	02G	FINISHED: SOUTHPOST D1 WELL 2	SM 4500-H-B	08/13/2019	PH	7.7	1.00		

Source: https://eeaonline.eea.state.ma.us/portal#!/home

Notes:
ND - non-detect
MG/L - milligram per liter
UG/L - microgram per liter
U - non-detect

Table E-9 Drinking Water Analytical Results Devens Reserve Forces Training Area June 2016

Method	Analyte	CAS Number	Units	Project Action Limit[1]	Well-01G-062016-1100	Q	Well-02G-062016-1020	Q	Well-03G-062016-1132	Q	DUP-062016-1025[2]	Q	FB-062016-1034	Q
Perfluorinated Compounds (SW537)	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	µg/L	0.07	0.041	U	0.041	U	0.047	U	0.043	U	0.047	UJ
	Perfluorooctanoic acid (PFOA)	335-67-1	µg/L	0.07	0.021	U	0.021	U	0.023	U	0.021	U	0.024	UJ
	Perfluorononanoic acid (PFNA)	375-95-1	µg/L	NE	0.021	U	0.021	U	0.023	U	0.021	U	0.024	UJ
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	µg/L	NE	0.031	U	0.031	U	0.035	U	0.032	U	0.035	UJ
	Perfluoroheptanoic acid (PFHpA)	375-85-9	µg/L	NE	0.010	U	0.010	U	0.012	U	0.011	U	0.012	UJ
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	µg/L	NE	0.095	U	0.095	U	0.110	U	0.098	U	0.110	UJ

Notes
Q = Qualifier
U = Undetected at the Limit of Detection
UJ = Undetected Estimate
NE = Not Established
µg/L = Micrograms per Liter
[1] Project Action Limits shown are USEPA Health Advisory Levels as specified in the May 2016 USEPA Health Advisories for PFOS and PFOA (EPA 822-R-16-004 & EPA 822-R-16-005).
[2] Duplicate sample "DUP-062016-1025" was collected from Well 02G.

TABLE E-10
PFAS ANALYTICAL RESULTS
DEVENS RESERVE FORCES TRAINING AREA

November 2017 PFAS Sampling Event

Method	Analyte	CAS Number	Units	Project Action Limit[1]	SPM-93-06X-20171114	Q	SPM-93-08X-20171113	Q	SPM-93-10X-20171114	Q	SPM-93-12X-11272017	Q	SPM-93-16X-20171114	Q	SPM-97-23X-20171114	Q	SPM-97-24X-20171113	Q	DUPLICATE-20171114	Q	FIELD BLANK-20171114	Q	GW-RINSATE-20171114	Q
Per- and Polyfluoroakyl Substances (SW537)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	2991-50-6	ng/L	NE	19	U	20	U	21	U	20	U	20	U	20	U	19	U	19	U	20	U	19	U
	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	2355-31-9	ng/L	NE	19	U	20	U	21	U	20	U	20	U	20	U	19	U	19	U	20	U	19	U
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorodeodecanoic acid (PFDoA)	307-55-1	ng/L	NE	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorohaxanoic acid (PFHxA)	307-24-4	ng/L	NE	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/L	70	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L	70	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L	NE	1.9	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U	1.9	U	1.9	U	2.0	U	1.9	U
	Perfluorotridecanoic acid (PFTriA)	72629-94-8	ng/L	NE	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U
	Perfluoroundecanoic acid (PFUnA)	2058-94-8	ng/L	NE	3.9	U	4.1	U	4.2	U	4.0	U	4.0	U	4.1	U	3.8	U	3.8	U	4.0	U	3.9	U

February 2018 PFAS Sampling Event

Method	Analyte	CAS Number	Units	Project Action Limit[1]	SPM-93-05X-02222018	Q	SPM-93-07X-02222018	Q	SPM-93-09X-02222018	Q	SPM-93-11X-02222018	Q	DUPLICATE-02222018	Q	FIELD BLANK-02222018	Q	RINSATE-02222018	Q
Per- and Polyfluoroakyl Substances (SW537)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	2991-50-6	ng/L	NE	20	UJ	20	UJ	20	UJ	20	UJ	16	U	20	UJ	20	UJ
	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	2355-31-9	ng/L	NE	20	UJ	20	UJ	20	UJ	20	UJ	16	U	20	UJ	20	UJ
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorodeodecanoic acid (PFDoA)	307-55-1	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorohaxanoic acid (PFHxA)	307-24-4	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/L	70	4.0	UJ	4.0	UJ	4.0	UJ	4.0	UJ	3.3	U	4.0	UJ	4.0	UJ
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L	70	2.5	J	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L	NE	4.0	UJ	4.0	UJ	4.0	UJ	4.0	UJ	3.3	U	4.0	UJ	4.0	UJ
	Perfluorotridecanoic acid (PFTriA)	72629-94-8	ng/L	NE	4.0	UJ	4.0	UJ	4.0	UJ	4.0	UJ	3.3	U	4.0	UJ	4.0	UJ
	Perfluoroundecanoic acid (PFUnA)	2058-94-8	ng/L	NE	2.0	UJ	2.0	UJ	2.0	UJ	2.0	UJ	1.6	U	2.0	UJ	2.0	UJ

November 2018 PFAS Sampling Event

Method	Analyte	CAS Number	Units	Project Action Limit[1]	SPM-93-05X-11262018	Q	DUPLICATE-11262018	Q	FIELD BLANK-11262018	Q	RINSATE-11262018	Q
Per- and Polyfluoroakyl Substances (SW537)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	2991-50-6	ng/L	NE	2.5	U	2.6	U	2.5	U	2.6	U
	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	2355-31-9	ng/L	NE	2.5	U	2.6	U	2.5	U	2.6	U
	Perfluorobutanesulfonic acid (PFBS)	375-73-5	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluorodeodecanoic acid (PFDoA)	307-55-1	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L	NE	1.7	U	1.7	U	1.7	U	0.51	J
	Perfluorohexanesulfonic acid (PFHxS)	355-46-4	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluorohaxanoic acid (PFHxA)	307-24-4	ng/L	NE	1.7	U	1.7	U	1.7	U	0.58	J
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L	NE	1.7	U	1.7	U	1.7	U	0.50	J
	Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/L	70	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L	70	1.7	U	1.7	U	1.7	U	0.48	J
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluorotridecanoic acid (PFTriA)	72629-94-8	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U
	Perfluoroundecanoic acid (PFUnA)	2058-94-8	ng/L	NE	1.7	U	1.7	U	1.7	U	1.7	U

Legend
Q = Qualifier
U = Undetected at the Limit of Detection
J = Estimated
NE = Not Established

Notes
[1] Project Action Limits shown are USEPA Health Advisory Levels as specified in the May 2016 USEPA Health Advisories for PFOS and PFOA (EPA 822-R-16-004 & EPA 822-R-16-005).
[2] Duplicate sample "Duplicate-20171114" was collected from Well SPM-93-06X.
[3] Duplicate sample "Duplicate-02222018" was collected from Well SPM-93-07X.
[4] The November 2017 samples were collected between November 13 and November 27, 2017. The February 2018 samples were collected on February 22, 2018.

Table E-11
Drinking Water Analytical Results Devens Reserve Forces Training Area
June 2019

Location	DW-01G	DW-02G	DW-03G
ID	01G-61019	02G-61019	03GR-61019
Date Sampled	6/10/2019	6/10/2019	6/10/2019
Parameter	**Result (ng/l)**	**Result (ng/l)**	**Result (ng/l)**
Perfluorobutanesulfonic Acid (PFBS)	1.86 U	1.87 U	1.86 U
Perfluorohexanoic Acid (PFHxA)	1.86 U	1.87 U	1.86 U
Perfluoroheptanoic Acid (PFHpA)	1.86 U	1.87 U	1.86 U
Perfluorohexanesulfonic Acid (PFHxS)	1.86 U	1.87 U	1.86 U
Perfluorooctanoic Acid (PFOA)	1.86 U	1.87 U	1.86 U
Perfluorononanoic Acid (PFNA)	1.86 U	1.87 U	1.86 U
Perfluorooctanesulfonic Acid (PFOS)	1.86 U	1.87 U	1.86 U
Perfluorodecanoic Acid (PFDA)	1.86 U	1.87 U	1.86 U
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	1.86 U	1.87 U	1.86 U
Perfluoroundecanoic Acid (PFUnA)	1.86 U	1.87 U	1.86 U
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	1.86 U	1.87 U	1.86 U
Perfluorododecanoic Acid (PFDoA)	1.86 U	1.87 U	1.86 U
Perfluorotridecanoic Acid (PFTrDA)	1.86 U	1.87 U	1.86 U
Perfluorotetradecanoic Acid (PFTA)	1.86 U	1.87 U	1.86 U
PFOA/PFOS, Total	1.86 U	1.87 U	1.86 U

Notes:
U - Not detected at the reporting limit (RL)
ng/L - nanogram per liter

TABLE E-12
EXCEEDANCES OVER TIME - SOUTH POST IMPACT AREA
1992 to 2019
FORT DEVENS RESERVE FORCES TRAINING AREA

Well Number	1992	1993	1993	1993	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	May 2009	Nov 2009	Feb 2010	July 2010	Oct 2010	Oct 2011	Nov 2012	Nov 2013	Nov 2014	Jan 2015	Dec 2015	Nov 2016	Mar 2017	May 2017	Aug 2017	Nov 2017	Nov 2018	May 2019	Nov 2019
Area of Contamination 26																																							
RDX - 1 µg/L GW-1 Standard																																							
26M-92-03X	75	83.4	58	NC	NC	NC	NC	NC	23	8.9	97	12	62	260	6.7	18	17	7.79	12.9	12.5	NC	17.3	NC	NC	16.3	10.7	9.75	3.62	NC	19.3	23.2	27.4	7.4	4.9	2.7	5.3	2.9	6.5	23.8
26M-92-04X	270	390	198	NC	NC	NC	NC	NC	NC	227.4	240	260	200	180	210	260	210	196	184	165	NC	170	NC	NC	170	157	181	1,010	NC	318	499	476	455	190	168	273	151	291	380
26M-97-08X	NC	NC	NC	NC	NC	NC	NC	NC	29	28.5	46	30	57	63	37	45	41	45.1	44	32.8	NC	26.7	NC	NC	27.6	25.8	43.2	20.9	NC	26.5	20.5	16.3	18.3	14.1	5.5	16.8	34.2	11.5	16.9
26WP-06-01(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	190	NC	137	162 J	98.1	126	116	65.2	76	NC	ND	94.4	55.4	17.4	21.8	30	7.8	5.1	24.3	22.6
Perchlorate - 2 µg/L GW-1 Standard																																							
26WP-06-01(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3.1	5.6	133	305	114	93.7	64.1	89.2	68.3	19.1	19.4	4.4	NC	3.3	2.1	2.7	(1.8)	(1.1)	(1.3)	(1.3)	(0.62)	2.0 J
26M-14-11X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	(0.16)	ND	(0.15)	NC	NC	NC	NC	(0.22)	(0.20)	NC	(0.17 J)
26M-92-03X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	(1.5)	(0.72)	(0.19)	(0.21)	(0.23)	(0.16)	(0.13)	(0.18 J)	(0.19 J)
26M-92-04X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3.1	NC	2.3	(1.8)	(1.7)	(1.5)	2.98	NC	NC	47.5	332	49.2	142	34.6	NC	41.5	21.5	21.5	30	18.5	20.5	13.3	13.0	27.1
26M-97-08X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3.84	NC	(0.39)	NC	(0.35)	(0.38)	(0.4)	(0.35)	(0.13)	(0.15)	(0.25)	(0.17 J)	(0.35)
Arsenic, Dissolved - 10 µg/L GW-1 Standard; 10.5 µg/L Background Level																																							
26M-92-02X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	(6)	(6)	(5)	(5)	(3.4)*	NC	(3.5)*	(4.7)*	NC	NC	NC	(2.6)*	(2.6)*	NC	(5.2 J*)
26M-92-04X	100	[7.46]	[6.61]	NC	NC	NC	NC	NC	NC	ND	(1.5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	ND	ND	ND	ND	ND*	NC	ND*	ND*	ND*	ND*	ND*	ND*	ND*	ND*	ND*
26M-14-10X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	ND*	NC	ND*	NC	NC	NC	NC	ND*	ND*	NC	19.9*
26WP-08-02(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	128	NC	46	NC	NC	64	62	68	53	53.5*	NC	58.1*	NC	NC	NC	NC	31.9*	27.1*	NC	16.6*
Lead - 15 µg/L GW-1 Standard; 4.25 µg/L Background Level																																							
26M-92-04X	27	(6.4)	ND	NC	NC	NC	NC	NC	NC	ND	ND	ND	ND	ND	ND	[1.7]	ND	ND	ND	ND	NC	ND	NC	NC	ND	ND	ND	ND	ND*	NC	ND*	ND*	ND*	ND*	ND*	ND*	ND*	ND*	ND*
26M-14-10X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	ND*	NC	ND*	NC	NC	NC	NC	ND*	ND*	NC	(7.4*)
26WP-08-02(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	20	NC	ND	NC	NC	(6.0 J)	ND	(6.0 J)	(14)	ND*	NC	ND*	ND*	NC	NC	NC	ND*	ND*	NC	ND*
Zinc - 5000 µg/L GW-1 Standard; 21.1 µg/L Background Level																																							
26WP-06-01(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2850	1220	NC	NC	NC	NC	100	45 J	44 J	117	26.6	NC	ND*	NC	ND*	ND*	ND*	ND*	9.5 J*	6.1 J*	ND*
26M-14-10X	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	ND*	NC	ND*	NC	NC	NC	NC	ND*	ND*	NC	(66.2*)
26WP-08-02(R)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2610	NC	NC	NC	NC	6960	6750	9790	6720	3390	NC	3240*	NC	NC	NC	NC	ND*	ND*	NC	ND*
Area of Contamination 27																																							
RDX -1 µg/L GW-1 Standard																																							
27M-92-01X	12.1	12.3	NC	NC	NC	NC	NC	NC	4.6	2.8	3.0	2.6	3.0	1.8	ND	1.3	ND	ND	NC	ND	NC	NC	NC	NC	ND	NC	ND	NC	NC	NC	NC	ND	NC	NC	NC	NC	ND	NC	NC
27M-93-06X	NC	1.56	1.77	NC	NC	NC	NC	NC	2.2	2.2	1.3	(0.96)	(0.91)	(0.95)	(0.75)	(0.91)	1.50	3.4	NC	1.8	NC	NC	NC	NC	2.12 J	NC	ND	NC	NC	ND	NC	(0.39)	NC	NC	NC	NC	(0.40)	NC	NC
Arsenic, Dissolved - 10 µg/L GW-1 Standard; 10.5 µg/L Background Level																																							
27M-92-01X	25.3	25.9	NC	NC	NC	NC	NC	NC	ND	ND	ND	(6.5)	(4.5)	ND	ND	ND	ND	(3.0)	NC	ND	NC	NC	NC	NC	ND	NC	ND	NC	ND*	NC	NC	ND*	NC	NC	NC	NC	ND*	NC	NC
27M-93-05X	NC	[4.96]	[5.22]	10.8	(6.64)	NC	NC	NC	ND	ND	[3.3]	[6.6]	[4.1]	ND	ND	ND	ND	(7.0)	NC	ND	NC	NC	NC	NC	(7.0)	NC	(4 J)	NC	(5.1)	NC	NC	(3.1)*	NC	NC	NC	NC	(1.8)*	NC	NC
27M-93-06X	NC	ND	ND	ND	(1.03)	NC	NC	NC	ND	ND	ND	ND	(2.2)	ND	ND	ND	ND	(2.8)	ND	ND	NC	NC	NC	NC	ND	NC	15.0	NC	ND*	NC	NC	ND*	NC	NC	NC	NC	ND*	NC	NC
Lead - 15 µg/L GW-1 Standard; 4.25 µg/L Backgroud Level																																							
27M-92-01X	17.4	15.3	NC	NC	NC	NC	NC	NC	ND	ND	[1.6]	[2.2]	[2.2]	[2.2]	ND	[2.3]	ND	ND	NC	[2.3]	NC	NC	NC	NC	(3.5 J)	NC	(4 J)	NC	ND*	NC	NC	ND*	NC	NC	NC	NC	ND*	NC	NC
1,3-Dintrobenzene - No Groundwater Standard																																							
27M-93-05X	NC	NC	NC	0.288	1.3	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	NC	NC	ND	NC	ND	NC	NC	ND	NC	ND	NC	NC	NC	NC	ND	NC	NC
27M-93-06X	NC	NC	NC	NC	1.09	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	NC	NC	ND	NC	ND	NC	NC	ND	NC	ND	NC	NC	NC	NC	ND	NC	NC
27M-93-08X	NC	NC	NC	(1.82)	1.03	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	NC	NC	ND	NC	ND	NC	NC	ND	NC	ND	NC	NC	NC	NC	ND	NC	NC
Area of Contamination 41																																							
Vinyl Chloride - 2 µg/L GW-1 Standard																																							
41M-93-04X	NC	NC	NC	NC	NC	NC	NC	NC	ND	ND	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	NC	NC	NC	ND	ND	ND	ND	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TCE - 5 µg/L GW-1 Standard																																							
41M-93-04X	NC	NC	NC	NC	NC	1.3	<0.5	NC	<0.5	1 J	<1.0	<1.0	0.24 J	<1.0	<5.0	<1.0	<1.0	9.1	ND	ND	NC	NC	NC	NC	ND	(0.21 J)	ND	ND	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
South Post Monitoring Wells																																							
Arsenic, Dissolved - 10 µg/L GW-1 Standard; 10.5 µg/L Background Level																																							
SPM-93-06X	NC	33.6	21.7	33.3	19.8	NC	NC	NC	ND	ND	[8.1]	15.4	[7.4]	[9.8]	11.7	10.9	35.2	24	31	27	NC	11	NC	NC	13	13	ND	12	12.5*	NC	13.9*	16.1*	NC	NC	NC	14.7*	14.7*	NC	13.3*
SPM-93-10X	NC	ND	ND	ND	ND	NC	NC	NC	ND	ND	[6.4]	[5.6]	[5.8]	[3.7]	[7.8]	[5.2]	13.2	[7.0]	(5.0)	(7.0)	NC	ND	NC	NC	(6.0)	10	(4.7 J)	(7)	(6.1)*	NC	(6.2)*	(6.3)*	NC	NC	NC	(6.1)*	(5.7)*	NC	(4.2 J)*
SPM-97-24X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	(5.0)*	(5.8)*	NC	NC	NC	(3.0*	(2.0)*	NC	(4.9 J)*
1,3-Dintrobenzene - No Groundwater Standard																																							
SPM-93-08X	NC	NC	NC	ND	3.84	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	ND	ND	ND	ND	NC	ND	ND	ND	NC	NC	NC	ND	ND	NC	ND
SPM-93-10X	NC	NC	NC	3.25	ND	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	ND	ND	ND	ND	NC	ND	ND	ND	NC	NC	NC	ND	ND	NC	ND
SPM-93-16X	NC	NC	NC	4.37	2.06	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NC	ND	NC	NC	ND	ND	ND	ND	NC	ND	ND	ND	NC	NC	NC	ND	ND	NC	ND
Antimony, Dissolved- 6 µg/L GW-1 Standard; 3.03 µg/L Background Level																																							
SPM-93-06X	NC	ND	ND	ND	ND	NC	NC	NC	ND	ND	ND	ND	(2.2)	ND	ND	ND	ND	ND	7.8	ND	NC	ND	NC	NC	ND	ND	(0.16 J)	1.848	ND*	NC	ND*	ND*	NC	NC	NC	(0.44)*	(0.32)*	NC	(0.42 J)*
SPM-93-16X	ND	ND	ND	ND	ND	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	13.8	ND	ND	ND	NC	8.5 J	NC	NC	ND	ND	ND	0.312	ND*	NC	ND*	ND*	NC	NC	NC	ND*	(0.30)*	NC	ND*
RDX - 1 µg/L GW-1 Standard																																							
SPM-93-06X	N/A	NC	NC	ND	ND	NC	NC	NC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	(0.248)	1.23	ND	NC	ND	ND	ND	NC	NC	NC	ND	ND	NC	ND

Notes:
Number in parentheses denotes that concentration is below GW-1 standard.
Number in brackets denotes that concentration is below background level.
* = Dissolved metals, not total metals.
NC - Not Collected
ND - Not Detected
Wellpoints 26WP-06-01 and 26WP-08-02 were removed in January 2017 and replaced with 26WP-06-01R and 26WP-08-02R, respectively.

E.4 South Post Impact Area Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Fort Devens Reserve Forces Training Area	**Date of inspection: 14 February 2020**
Location and Region: Devens, Massachusetts	**EPA ID: MA7210025154**
Agency, office, or company leading the five-year review: KOMAN Government Solutions, LLC	**Weather/temperature: Cleary Skies, 32 deg F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☑ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____Not Applicable_____

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

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 _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____Not Applicable_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____Not Applicable_ _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____Not Applicable_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____Not Applicable_____

4. **Other interviews** (optional) ☐ Report attached.

KGS spoke with Range Control during the South Post LUC Inspection about planned construction activities at Hotel Range. Range Control stated the construction plans are to shift existing buildings and structures back closer to the roadway in order to extend the length of the range. No new structures or drinking water supply wells are planned.

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_____

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_____

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
   ☐ Other_____Not Applicable_____

2. **O&M Cost Records**
   ☐ Readily available ☐ Up to date
   ☐ Funding mechanism/agreement in place
   Original O&M cost estimate_____ ☐ Breakdown attached

   Total annual cost by year for review period if 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: _____Not Applicable_____

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

A. Fencing

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

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☑ N/A
   Remarks____Gates into the ranges are locked and monitored daily for access restrictions to the sites.

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
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

_____
_____
_____
_____

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☑ N/A
Remarks_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident
Remarks_____
_____

2. **Land use changes on site** ☐ N/A
Remarks__No changes to on site land use noted during inspection – still an active range area._____
_____

3. **Land use changes off site** ☐ N/A
Remarks___No changes to off site land use noted during inspection – still part of the Army Impact Area.
_____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☑ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☑ N/A
Remarks_____
_____

B. Other Site Conditions

Remarks _____Not Applicable_____

VII. LANDFILL COVERS ☐ Applicable ☑ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____Not Applicable_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____Not Applicable_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____Not Applicable_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent_____ Depth_____
Remarks_____
_____Not Applicable_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____Not Applicable_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
Remarks_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent_____ Height_____
Remarks_____
_____Not Applicable_____

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_____
_____Not Applicable_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____Not Applicable_____
_____

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_____Not Applicable_____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____Not Applicable_____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____Not Applicable_____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____Not Applicable_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____Not Applicable_____

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_____Not Applicable_____

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_____Not Applicable_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____Not Applicable_____

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_____Not Applicable_____

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_____Not Applicable_____

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_____Not Applicable_____

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_____Not Applicable_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____Not Applicable_____

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_____Not Applicable_____

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

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

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks_____Not Applicable_____

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

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

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ 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_____Not Applicable_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____Not Applicable_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____Not Applicable_____

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

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

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

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

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____Annual sampling, monitoring, and maintenance performed by others._____

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.

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.).
No issues with remedy performance noted during inspection._____

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.
Not Applicable_____

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. The site inspection for the 5-year review did not reveal any early indicators for potential remedy problems in the future. "The overall results of the annual LTM event indicate that there is no migration of contaminants beyond the SPIA Monitored Area. Perchlorate and RDX groundwater concentrations at AOC26, AOC27, and throughout the SPIA Monitored Area remain consistent with or lower than concentrations detected in past years…" (2018 Annual Report LTM SPIA, Renovia, September 2019)

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The site inspection for the 5-year review did not identify any opportunities for optimization in monitoring tasks.

01082 KGS - Devens, MA

Zulu I
Range
Light Demolition

CONTROL
TOWER

BLDG. 4246

01082 KGS - Devens, MA

01082 KGS - Devens, MA

APPENDIX F –Barnum Road Maintenance Yards

F.1 Barnum Road Maintenance Yards

Additional Background Information

Chronology of Events, Barnum Road Maintenance Yards (AOCs 44 and 52)

Event	Date
Motor vehicle gasoline (MOGAS); 20 gallons released at Cannibalization Yard. Four cubic yards (cy) contaminated soil removed	April 1985
Exploratory test pits for spill containment basin in the Table of Distribution and Allowances (TDA) Maintenance Yards; petroleum contaminated soil detected (0-12 inches depth)	July 1991
Contaminated soil removed from TDA Maintenance Yard during spill containment basin construction	December 1991
Waste oil underground storage tank (UST) removed at Cannibalization Yard (120 cy of contaminated soil removed)	May 1992 July 1992
SI completed	April 1993
SSI completed, SAs designated as AOCs	June 1993
FS issued	January 1994
ROD signature and Remedial Design issued	March 1995
Remedial Actions	August 1995 – April 1996
Groundwater Monitoring Plan issued	April 1998
Round 1 Annual Groundwater Sampling Report issued	October 1998
Round 2 Annual Groundwater Sampling Report issued with recommendations to discontinue groundwater sampling	October 1999
First Five-Year Review	September 2000
Round 3 Groundwater Sampling Report	April 2004
Draft Remedial Action Report issued	May 2004
Second Five-Year Review	September 2005
Final Remedial Action Report	September 2005
Real Property Master Plan Long Range Component - Addendum	September 2007
Devens RFTA MMRP Site Inspection	May 2008
Environmental Protection Plan AFRC Fort Devens	April 2009
AFRC construction activities begin	March 2009
Third Five Year Review	September 2010
Fourth Five Year Review	September 2015
Fifth Five Year Review	September 2020

Background

Prior to base closure, AOC 44 was known as the Cannibalization Yard, an area where vehicles were stored before being dismantled for usable parts. AOC 52 was a maintenance yard where vehicles were stored awaiting repairs. AOC 52 was historically known as the TDA Maintenance Yard. Northwest of the Cannibalization Yard was a separately fenced vehicle storage yard known as the Regional Training Site Yard. An area that was fenced off southeast of the main portion of the TDA Maintenance Yard was known as K-Yard. All four of these yards had a long and continuing history of vehicle storage; hence at the direction of the Army, they were all included as AOCs 44 and 52 and combined as one operable unit. They are referred to collectively in the ROD and this Five-Year Review as the Maintenance Yards.

The groundwater in the aquifer underlying the Maintenance Yards has been assigned to Class 1 under Commonwealth of Massachusetts regulations. Class 1 consists of groundwater that is designated as a source of potable water supply. Based on a 1992 SI water level survey, inferred groundwater flow from the Maintenance Yards is northeast toward Grove Pond. The town of Ayer currently owns and maintains two water supply wells within 150 feet (ft) of the south side of Grove Pond and approximately ½ mile from the yards. There is no evidence that contamination found in the Maintenance Yards has or is affecting groundwater quality.

The soils of the site have been exposed to possible vehicle crankcase releases over a long duration. Gasoline, motor oil, and other automotive fluids have also likely been released during vehicle dismantling operations in the Cannibalization Yard. Individual releases were not likely to have been of significant volume, but numerous releases during the period in which the yard was used account for the soil contamination problem. The only recorded significant vehicle release was an estimated 20 gallons of MOGAS and hydraulic fluid released near the center of the Cannibalization Yard in 1985 during the cannibalization process. Approximately 4 cy of visibly contaminated soils were excavated immediately and containerized by Army personnel.

In July 1991, exploratory test pits were excavated for construction of a concrete spill- containment basin in the southeast corner of the TDA Maintenance Yard. The test pits revealed zones of petroleum-contaminated soil below the surface. In November and December 1991, the 100 by 160-foot proposed spill-containment basin area was excavated to begin construction. Excavation continued until field screening and visual observation indicated that contaminated soils had been removed. The contaminated layer was present from the ground surface to 12 inches below ground surface (bgs). The contaminated soil was believed to be asphalt treated, gravel road base. Field screening of soil samples collected from the proposed basin's subgrade at the bottom of the excavation indicated total petroleum hydrocarbon (TPH) compounds concentrations ranging from non-detect to 7 parts per million (ppm).

A 1,000-gallon UST formerly used to store waste oil was removed from the Cannibalization Yard in May 1992. Laboratory analysis of soil samples detected TPH compound concentrations of 17,600 ppm and 9,780 ppm. After over-excavation of the tank site in July 1992, residual soil TPH compound concentrations ranged up to 2,740 ppm at the limits of the excavation. In total, an estimated 120 cy of contaminated soil was removed from the waste oil storage tank area and shipped to an off-site facility.

Groundwater Monitoring

The objective of the groundwater monitoring required by the ROD was to provide assurance to the public and regulatory agencies that the groundwater in the aquifer underlying the facility remains unaffected by past Maintenance Yard activities and that it has not been adversely affected by remedial activities.

The need to investigate groundwater directly downgradient of the former waste oil tank and MOGAS spill was discussed during a draft FS review meeting held at Fort Devens on May 5, 1993 (ROD, Barnum Road Maintenance Yards, ABB-ES, 1995a). In response to comments, the Army installed two monitoring wells positioned to readily detect the full impact of the tank and spill contamination sources on the groundwater. The two monitoring wells, G3M-93-10X and G3M-93-11X, were installed at the edge of the Cannibalization Yard. G3M-93-10X was located approximately 50 ft downgradient of the former tank area and G3M-93-11X was located approximately 50 ft downgradient of the MOGAS spill area.

Two rounds of samples were collected from wells G3M-93-10X and G3M-93-11X and analyzed for volatile organic compounds (VOC), semi-volatile organic compound (SVOC), TPH, and inorganics. Results from Round 1 (June 1991) showed no detections of TPH or VOCs.

In Round 2 (September 1993), trace concentrations of toluene (2.6 µg/L and 1.25 µg/L in G3M-93-10X and -11X, respectively) and tetrachloroethene (PCE) (2.6 µg/L G3M-93-10X) were detected in the groundwater. Concentrations for these analytes were below state and federal drinking water MCLs and below MCP GW-1 standards. The only detected SVOC was bis (2-ethylhexyl) phthalate, a suspected laboratory contaminant, at 22 µg/L in the Round 1 sample from G3M-93-10X. No significant contamination was detected supporting the conclusion that surface soil contaminants at the Cannibalization Yard had not affected the aquifer and indicated that the waste oil UST and the MOGAS spill were not significant contributors to groundwater contamination. Based on these results, the ROD did not require installation of additional monitoring wells.

The SAP for groundwater LTM required by the ROD was issued in April 1998 (Weston, 1998a). This plan specified that annual sampling would be performed at three existing monitoring wells G3M-92-04X, G3M-92-05X, and MNG-1, for two years. These wells were located within the maintenance yard fence at the downgradient edge of the maintenance yards (G3M-92-04X), downgradient and outside the maintenance yard fence (MNG-1), and cross- gradient of the maintenance yards (G3M-92-05X). Monitoring well MHG-1, located on MANG property north of the Maintenance Yards, could not be located during sampling rounds and was likely destroyed during previous construction activities.

The first annual round of samples was collected at monitoring wells G3M-92-04X and G3M 92-05X in May 1998, and no concentrations of extractable petroleum hydrocarbons (EPH), volatile petroleum hydrocarbons (VPH) or lead were detected above MCP Method 1 GW-1 Standards. The analytical results were presented in the 1998 Annual Groundwater Sampling Report along with recommendation to discontinue monitoring if the 1999 sampling showed similar results (Weston, 1998b). The second annual round of sampling was completed in June 1999 with no reported exceedances of MCP GW-1 standards. Because 2 years of monitoring had been completed as planned and there were no exceedances of the standards, the 1999 Annual Groundwater Sampling Report recommended that groundwater monitoring be discontinued (Weston, 1999).

In response to the recommendations of the sampling reports, USEPA provided a letter of concurrence to the Army agreeing that groundwater monitoring was no longer needed at the site. USEPA stated that one more round of sampling would satisfy the ROD requirement that sampling be performed "…for a period of five years upon commencement of remedial activities" (USEPA, 1999). MassDEP questioned the recommendation to discontinue sampling and the matter was discussed at a BRAC Cleanup Team (BCT) meeting in April 2000. Meeting minutes indicate brief discussion with the outcome that the need for additional sampling was left to the discretion of the Army. The decision to terminate sampling was documented in the First Five-Year Review (HLA, 2000).

Subsequently, a third round of groundwater monitoring was performed in December 2003 to verify that the aquifer remained unaffected. Some PAHs were detected in the groundwater samples, but all reported detections were below MCP GW-1 standards. This final round was completed more than five years after issuance of the Groundwater SAP and more than eight years after commencement of remedial activities. The requirements of both the SAP and ROD for the duration

of groundwater monitoring were thereby satisfied. No additional groundwater sampling has been performed after the December 2003 event. Comparison of the 2003 data to current USEPA drinking water standards and MCP Method 1 GW-1 cleanup standards revealed no COC exceedance.

F.2 Barnum Road
Maintenance Yards

Figure

Figure F-1
Site Layout
Barnum Road Maintenance Yards
AOC 44 & 52

Legend

- LTM Sample Well
- G3M-92-07X Well Location Identification
- Maintenance Yard Boundary
- Former Yard or Basin
- Existing Building

References:
HGL. LTMMP 2012.

Aerial Sources: 2011, Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2020 Five-Year Review
AOC 44 and 52

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 75 150
Feet

Date:
04/04/2020

Figure
F-1

File: AOC44_52_2015_Figure2_2_BRMA.mxd

F.3 Barnum Road Maintenance Yards

Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: AOC 44 / 52	**Date of inspection:** 02/12/20
Location and Region: Devens, MA	**EPA ID:**
Agency, office, or company leading the five-year review: Kaman Government Solutions.	**Weather/temperature:** 36°F Partial clouds, cold

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other [illegible]
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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 N/A

1. **O&M Organization**
   - ☐ State in-house
   - ☐ Contractor for State
   - ☐ PRP in-house
   - ☐ Contractor for PRP
   - ☐ Federal Facility in-house
   - ☐ Contractor for Federal Facility
   - ☐ Other _____

2. **O&M Cost Records** NA
   - ☐ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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**~~ NA
   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 _____

B. Other Access Restrictions

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

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) _____

Frequency _____

Responsible party/agency _____

Contact _____ _____ _____

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

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

Remarks _____

D. General

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

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☑ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☑ N/A

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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 N/A

1 Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

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

D. Monitored Natural Attenuation

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.

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.).

NA

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.

NA

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. NA

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. NA

View Army National Guard building and AOC 44

View of paved area southwest of AOC 44

View of AOC 44

View of Army Reserve Maintenance shed located between AOC 44/52
View of paved road west of AOC 44/52

View of the western paved area of AOC 52

View of the northeastern paved area of AOC 52

View of the southern paved area of AOC 52

View of the central paved area of AOC 52

View of paved northwestern paved area of AOC 52

View of paved western paved area of AOC 52

View of paved eastern paved area of AOC 52

F.4 Barnum Road Maintenance Yards

ARARs

TABLE F-1
SYNOPSIS OF LOCATION-SPECIFIC FEDERAL AND STATE ARARS
ALTERNATIVE 5; ASPHALT BATCHING SITE/ASPHALT BATCHING HOT SPOT AREAS

AOCS 44 AND 52 SOILS
FORT DEVENS, MASSACHUSETTS

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal Regulatory Authority	Wetland	National Environmental Policy Act: [40 CFR Part 6]	Applicable	Requires that Federal agencies minimize the degradation, loss, or destruction of wetlands, and preserve and enhance natural and beneficial values of wetlands under Executive Orders 11990 and 11988.	Wetlands adjacent to AOCs 44 and 52 may currently be impacted by surface water runoff via the storm water system. This alternative covers the site with pavement, thus reducing potential off-site runoff of contaminants in surface water from AOCs 44 and 52 soils to the wetlands. The remedy will also be designed and constructed to manage the increased flow from the paved surface in a manner that will minimize impact to adjacent wetlands.
State Regulatory Requirements	Air	Massachusetts Air Pollution Control Regulations; [310 CMA 6.00 - 7.00]	Applicable	Establishes the standards and requirements for air pollution control in the Commonwealth. Specifically, Section 6.04 provides ambient air quality criteria such as particulate matter standards which is pertinent to AOCs 44 and 52 activity. As a minimum, respirable particulate matter (PM_{10}) for treatment and excavation activities must be maintained at an annual mean arithmetic concentration of 50µg/m^3 and a maximum 24-hour concentration of 150µg/m^3. Section 7.02 provides emissions limitations from facilities and operations and requires BACT. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered in limiting fugitive emissions (VOCs) and total suspended particulates during treatment and excavation activities.	The emissions limits for particulate matter and fugitive emissions will be managed through engineering controls during excavation and treatment activities.
	Soil	Massachusetts Hazardous Waste Management Rules (MHWMA) Identification and Listing of Hazardous Wastes [310 CMR 30.100]	Applicable	Waste oil is a listed as a hazardous waste under this rule and is therefore subject to 310 CMA 30.000 (i.e., the Massachusetts Hazardous Waste Management Rules).	The wastes found at this site were determined not to be characteristic hazardous wastes; however, waste oil is a listed hazardous waste under this rule.

TABLE F-1
(continued)
SYNOPSIS OF LOCATION-SPEC1FIC FEDERAL AND STATE ARARS
ALTERNATIVE 5: ASPHALT BATCHING SITE/ASPHALT BATCHING HOT SPOT AREAS

AOCS 44 AND 62 SOILS
FORT DEVENS, MASSACHUSETTS

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State Regulatory Requirements	Soll	MHWMR Provisions tor Recyclable Materials and for Waste Oil [310 CMR 30.200)	Applicable	This regulation contains procedural and substantive requirements for handling regulated recyclable materials. The substantive requirements include preventing and reporting releases to the environment, proper maintenance of treatment and control systems, and handling of regulated recyclable materials.	Asphalt batching of soil on site will comply with the substantive requirements of this regulation.
	Soll	MHWMR • Waste Piles; [310 CMR 30.640 - 30.649]	Applicable	A waste pile facility must install a liner, provide a leachate collection system, provide a run-on/run-off control system, comply with the groundwater monitoring requirements, perform inspections, and close the facility properly.	These requirements will be addressed In the design of an area tor stockpiling of wastes tor on-site treatment.
	Groundwater	MHWMR Groundwater Protection; [310 CMR 30.660 - 30.679]	Relevant and Appropriate	Groundwater monitoring should be conducted during and following remedial actions. Concentration limits for the hazardous constituents are specified in 310 CMR 30.667.	Although cleanup of groundwater, if required, will be handled as a separate operable unit, groundwater monitoring will be conducted as a component of the remedy.
	All	Standards for Analytical Data for Remedial Response Action [WSC-300-89]	To Be Considered	This policy describes the minimum standards for analytical data submitted to the Department.	All sampling plans will be designed with consideration of the analytical methods provided in this policy.

Note: Table reproduced from Final Feasibility Study Report, Data Item A009, Fort Devens Feasibility Study AOCs 44 and 52, January 1994. The ARAR table in the pdf of the 1995 ROD (EPA/ROD/R01-95/112) is illegible.

APPENDIX G – Defense Reutilization and Marketing Office

G.1 Defense Reutilization and Marketing Office Additional Background Information

Site Chronology

Chronology of Events for AOC 32

Event	Date
Final NPL Listing	November 1989
SI initiated	1991
RI completed	1994
FS completed	1997
ROD signature	1998
First Five-Year Statutory Review	September 2000
MNA Assessment	2000
Replacement monitoring well and piezometer installation	2001
Groundwater LTM	2002 to present
Second Five-Year Review	2005
Draft Technical Memorandum: Analysis of Bedrock Structure, Implications to LTM	May 2006
LTMP	November 2008
Persulfate Injection Work Plan	January 2009
Persulfate Injection	February 2009
Persulfate Injection Evaluation Report	June 2009
Draft Final Technical Memorandum, Sampling and Evaluation of Vapor Intrusion	August 2009
Annual LTM	2005-2009
Third Five-Year Review	September 2010
Annual LTM	2010-2014
Fourth Five-Year Review	September 2015
Annual LTM	2015 -2019
Fifth Five-Year Review	September 2020

Chronology of Events for AOC 43A

Event	Date
Final NPL Listing	November 1989
SI initiated	1991
RI completed	1994
FS completed	1997
ROD signature	1998
First Five-Year Statutory Review	September 2000
MNA Assessment	2000
Replacement monitoring well and piezometer installation	2001
Groundwater LTM	2002 to 2005
Second Five-Year Review	September 2005
Groundwater Monitoring Discontinued	October 2005
Semiannual water level gauging	2005-2009
Third Five-Year Review	September 2010
Semiannual water level gauging	2010-2015
Fourth Five-Year Review	September 2015
Annual LTM	2015 -2019
Fifth Five-Year Review	September 2020

Physical Characteristics

AOCs 32 and 43A are historically contaminated locations within the former Fort Devens property. AOC 32, the Defense Reutilization and Marketing Office Yard (DRMO) was located on the west side of Cook Street (West Yard) in the northeast portion of the former Main Post. AOC 43A, the former petroleum, oils, and lubricants (POL) Storage Area was located to the south of AOC 32, across from the former Market Street. The warehouse is currently occupied by O'Reilly Auto Parts.

Interpretive water table elevation maps prepared for AOCs 32 and 43A show the presence of a groundwater divide that dissects the sites. Groundwater on one side of the divide flows to the east and groundwater on the other side of the divide flows to the south.

The groundwater gradient to the south-southwest for overburden wells was 0.023 ft/ft and 0.027 ft/ft to the southeast during the during the April 2019 monitoring event. The groundwater gradient for bedrock wells was 0.017 ft/ft to the south-southwest and 0.032 ft/ft to the southeast during the April 2019 event. The flow lines used to calculate the gradient are believed to be representative of groundwater flow at the site.

Land and Resource Use

In 2000, AOCs 32 and 43A underwent significant redevelopment. The two AOCs, now lot 10, were modified by the construction of a large warehouse that was completed in 2001. Bedrock outcrops east of the DRMO East Yard and east of the POL Storage Area were removed to accommodate the construction of the distribution warehouse. The warehouse and pavement cover major portions of both AOCs, thereby altering local recharge patterns to overburden and bedrock which potentially altered the site hydrology. The ROD included LUCs to limit exposure to contaminated groundwater under current and future site use.

History of Contamination

AOC 32 was known as the Defense Reutilization and Marketing Office (DRMO) Yard and consisted of three fenced areas. The West Yard, located on the west side of Cook Street, was a paved area used for the storage of used equipment with lead-acid batteries, and telecommunications and administrative equipment. The East Yard, located on the east side of Cook Street, was a paved area used for disassembling vehicles for reusable parts. This yard previously contained scrap metal, tires, stored items for sale, and used photographic solutions. The third fenced area was an unpaved area located just north of the East Yard. It was used for the storage and recycling of tires. AOC 32 also contains a former UST site (UST #13) located just northeast of Building T-204 (DRMO Office) that was incorporated into AOC 32. The UST was used to store waste oil. Operational records indicated that the facility was active from at least 1964 to 1995.

AOC 43A, known as the POL (petroleum, oils and lubricants) Storage Area at the time of base closure in 1996, was located across Market Street from AOC 32. AOC 43A consisted of a fenced lot located within an industrial area and served as the distribution point for all gasoline and other fuels at Devens during the 1940s and 1950s.

The former distribution facility consisted of a main gasoline station building (T250), a pump house, four 12,000-gallon USTs, one 10,000-gallon UST, two 12,000-gallon above ground storage tanks (ASTs), and two 8,000-gallon ASTs. Gasoline was delivered to the facility via railroad and was transferred to the storage tanks. The railroad tracks formerly used to transport fuels to the site, formed the site's northern boundary. An asphalt driveway led into the POL

storage area from Antietam Street. The driveway was bermed to contain potential spills. A pump station was located in the center of the fenced area and the USTs were located on the eastern side of the site.

Initial Response

In 1991, the Army performed a SI at AOC 32 and reported contamination exceeding screening concentrations for soil and groundwater. A RI was initiated to determine the nature and distribution of contamination at AOC 32, assess the risk to human health, and provide a basis for performing a FS. The final RI report, issued in 1994, concluded that soil contamination and groundwater contamination required a remedial action evaluation. A FS designed to develop and analyze potential remedial alternatives for cleanup at AOC 32 was issued in January 1997.

In 1992, the Army performed a SI at AOC 43A. Field screening and confirmation sampling indicated that a low level of xylene and an elevated level of petroleum hydrocarbons existed within the subsurface soils. An RI was performed, and the final report concluded that groundwater contamination required a remedial action evaluation. A FS, performed to develop and assess potential remedial alternatives for cleanup at AOC 43A, was issued in January 1997.

Polycyclic Aromatic Hydrocarbons Screening Level Risk Review

Table G-7 illustrates that for the carcinogenic PAH soil cleanup levels are within EPA's acceptable risk range for residential use. The cleanup levels were calculated using benzo(a)pyrene 2020 RSL (most toxic carcinogenic PAH).

G.2 Defense Reutilization and Marketing Office Figures

Figure G-1
Site Layout
Area of Contamination 32 and 43A

Legend

- LTM Sample Well
- LTM Well - Periodic Gauge Only
- DEP Approved Wellhead Protection Areas (Zone II)
- 32M-92-01X — Well Identification
- Former Storage Tank(s)
- Former Building
- T-247 — Former Building Number
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on April 2002 to October 2008 analytical data) (2008 Annual Report, HGL, 2009)
- Remaining Bedrock Outcrop
- Topographic Contour (Ft AMSL)

Notes:
AST = Above ground storage tank
UST = Underground storage Tank
DRMO = Defense Reutilization and Marketing Office
LTM = Long-term monitoring
TPHC = Total petroleum hydrocarbons

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2020 Five Year Review
AOC 32 and 43A

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 80 160
Feet

Date: 02/03/2020

Figure G-1

File: AR2019_MP_F5-1_AOC32-43A.mxd

G.3 Defense Reutilization and Marketing Office Tables

Table G-1
Groundwater Analytical Results
Areas of Contamination 32 and 43A
June 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	Cleanup Goal [1,3]	GW-3 Groundwater Standard[3]	32M 01 13XBR	Q	32M 01 14XOB	Q	32M 01 17XBR	Q	32M 01 18XBR	Q
Metals (SW6010B)	Arsenic, Total	µg/L	10	900	2.0	U	93.1		**3.1**	J	24.9	
	Arsenic, Dissolved	µg/L	10	900	2.0	U	90.1		**3.7**	J	**4.0**	
	Manganese, Total	µg/L	3,500	NS	**20**		**3,420**		**14.1**	J	**2,140**	
	Manganese, Dissolved	µg/L	3,500	NS	7.5	U	**3,390**		**112**		**1,720**	
VOCs (SW8260C)	1,1,1 Trichloroethane	µg/L	52	20,000	0.50	U	0.50	U	0.50	U	0.50	U
	1,1,2 Trichloroethane	µg/L	5	50,000	0.50	U	0.50	U	0.50	U	0.50	U
	1,2 Dichlorobenzene	µg/L	600	2,000	0.50	U	0.50	U	0.50	U	**407**	
	1,3 Dichlorobenzene	µg/L	100	50,000	0.50	U	0.50	U	0.50	J	**80.3**	
	1,4 Dichlorobenzene	µg/L	5.0	8,000	0.50	U	0.50	U	0.50	U	51.1	
	cis 1,2 Dichloroethene	µg/L	552	50,000	0.50	U	0.50	U	0.50	U	0.50	U
	trans 1,2 Dichloroethene	µg/L	100	50,000	0.50	U	0.50	U	0.50	U	0.50	U
	Benzene	µg/L	5	10,000	0.50	U	0.50	U	0.50	U	0.50	U
	Chlorobenzene	µg/L	100	1,000	0.50	U	0.50	U	0.50	U	**87.6**	
	Ethylbenzene	µg/L	700	5,000	0.50	U	0.50	U	0.50	U	0.50	U
	Tetrachloroethene	µg/L	5	30,000	0.50	U	0.50	U	0.50	U	0.50	U
	Toluene	µg/L	1,000	40,000	0.50	U	0.50	U	0.50	U	0.50	U
	Trichlorethene	µg/L	5	5,000	0.50	U	0.50	U	0.50	U	0.50	U
	Vinyl Chloride	µg/L	2	50,000	0.50	U	0.50	U	0.50	U	0.50	U
VPH (MADEP)	C5 C8 Aliphatics (Adjusted)	µg/L	300	50,000	50.0	U	50.0	U	50.0	U	50.0	U
	C9 C10 Aromatics	µg/L	200	50,000	50.0	U	50.0	U	50.0	U	360	
	C9 C12 Aliphatics (Adjusted)	µg/L	700	50,000	50.0	U	50.0	U	50.0	U	50.0	U
	Benzene	µg/L	5	10,000	0.50	U	0.50	U	0.50	U	0.50	U
	Ethylbenzene	µg/L	700	5,000	0.50	U	0.50	U	0.50	U	0.50	U
	Toluene	µg/L	1,000	40,000	0.50	U	0.50	U	0.50	U	0.50	U
	m,p Xylene	µg/L	NS	NS	1.0	U	1.0	U	1.0	U	1.0	U
	o Xylene	µg/L	NS	NS	0.50	U	0.50	U	0.50	U	0.50	U
	Total Xylenes	µg/L	10,000	5,000	2.0	U	2.0	U	2.0	U	2.0	U

Table G-1
Groundwater Analytical Results
Areas of Contamination 32 and 43A
June 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	Cleanup Goal [1,3]	GW-3 Groundwater Standard[3]	32M 01 13XBR	Q	32M 01 14XOB	Q	32M 01 17XBR	Q	32M 01 18XBR	Q
EPH (MADEP)	C9 C18 Aliphatics	µg/L	700	50,000	82	UJ	80	U	82	UJ	**112**	
	C19 C36 Aliphatics	µg/L	5000 [2]	50,000	82	UJ	80	U	82	UJ	82	U
	C11 C22 Aromatics	µg/L	200	5,000	82	UJ	**88.9**	**J**	82	UJ	**88.9**	J
Field Parameters	Temperature	°Celcius	NS	NS	16.89		15.15		14.75		15.9	
	pH	pH	NS	NS	6.20		6.33		7.24		6.75	
	Specific Conductance	us/cm	NS	NS	430		418		684		540	
	ORP	mV	NS	NS	71.6		13.7		-18.2		113.5	
	Dissolved Oxygen	mg/L	NS	NS	3.29		0.70		1.25		1.40	
	Turbidity	NTU	NS	NS	4.23		49.00		2.74		2.03	

Notes:
NA Not analyzed
[1] Cleanup goal is based upon the lower of the site-specific cleanup goal or the MCP GW-1 Standard (310 CMR 40 Subpart P).
[2] The site-specific cleanup goal is lower than the groundwater standard.
[3] GW-1 or GW-3 standard effective June 2014
U/UJ = non-detect/estimated non-detect
J = Estimated Result

Table G-2
AOCs 32/43A Groundwater Analytical Results - June 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

			Cleanup Goal [1]	Monitoring Criteria	32M 01 13XBR_ SPR16	Q	32M 01 14XOB _SPR16	Q	32M 01 17XBR _SPR16	Q	32M-DUP-1 (32M 01 17XBR)	Q	32M 01 18XBR _SPR16	Q
Method	**Analyte**	**Units**			06/10/2016		06/10/2016		06/10/2016		06/10/2016		06/10/2016	
SW6010C	Arsenic, Dissolved	µg/L	10	--	3.0	U	**13**		3.0	U	3.0	U	**2.8**	J
SW6020A	Manganese, Dissolved	µg/L	3,500	--	3.0	U	**1,800**		3.0	U	3.0	U	**1,100**	
VOCs (SW8260B)	1,1,1 Trichloroethane	µg/L	5.0 [2]	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	1,1,2 Trichloroethane	µg/L	--	5.0	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	1,2 Dichlorobenzene	µg/L	600	--	1.0	U	**0.75**	J	1.0	U	1.0	U	**340**	
	1,3 Dichlorobenzene	µg/L	100	--	1.0	U	1.0	U	1.0	U	1.0	U	**58.0**	
	1,4 Dichlorobenzene	µg/L	5.0	--	1.0	U	1.0	U	1.0	U	1.0	U	**38**	
	cis 1,2 Dichloroethene	µg/L	55	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	trans 1,2 Dichloroethene	µg/L	100	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Benzene	µg/L	--	5.0	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Chlorobenzene	µg/L	--	100	1.0	U	1.0	U	1.0	U	1.0	U	**81.0**	
	Ethylbenzene	µg/L	--	700	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Tetrachloroethene	µg/L	5.0	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Toluene	µg/L	1,000	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Trichlorethene	µg/L	5.0	--	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
	Vinyl Chloride	µg/L	--	2.0	1.0	U	1.0	U	1.0	U	1.0	U	5.0	U
VPH (MADEP)[3]	C5 C8 Aliphatics	µg/L	--	300	100	U	100	U	100	U	100	U	100	U
	C9 C10 Aromatics	µg/L	--	200	100	U	100	U	100	U	100	U	**450**	
	C9 C12 Aliphatics	µg/L	--	700	100	U	100	U	100	U	100	U	**190**	J
	Benzene	µg/L	--	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
	Ethylbenzene	µg/L	--	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Toluene	µg/L	--	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	m,p Xylene[4]	µg/L	--		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
	o Xylene[4]	µg/L	--		5.0	U	5.0	U	5.0	U	**0.66**	**J**	5.0	U
Field Parameters	Temperature	°Celsius	NS		14.29		12.95		12.97		NA		15.29	
	pH	pH	NS		6.41		5.92		7.18		NA		6.90	
	Specific Conductance	us/cm	NS		678		441		751		NA		669	
	ORP	mV	NS		119.1		62.4		200.1		NA		162.7	
	Dissolved Oxygen	mg/L	NS		5.73		0.93		1.36		NA		5.31	
	Turbidity	NTU	NS		6.43		3.79		0.01		NA		12.9	

Notes:

0.333 = Exceedance

[1] The cleanup goal for arsenic is the MCL; the cleanup goal for manganese is the background level.

[2] The site-specific cleanup goal is lower than the groundwater standard.

[3] VPH carbon range concentrations are evaluated against MassDEP standards for comparison purposes.

[4] The monitoring criteria for total xylenes is 10,000 µg/L.

NS = No standard

µg/L = microgram per liter

U = Non-detect

J = Estimated Result

NA = not analyzed

Table G-3
AOCs 32/43A Groundwater Analytical Results, June 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR	Q	32M-01-14XOB	Q	32M-01-17XBR	Q	32M-01-18XBR	Q	32M-DUP01 32M-01-18XBR	Q
				6/26/2017		6/28/2017		6/28/2017		6/26/2017		6/26/2017	
Total and Dissolved Metals (SW6010C)													
Arsenic, Dissolved	µg/L	10	NS	3.0	U	**30**		3.0	U	**2.4**	J	**3.3**	J
Arsenic, Total	µg/L	10	NS	**1.7**	J	**33**		**2.6**	J	**4.7**		**4.4**	
Total and Dissolved Metals (SW6020A)													
Manganese, Dissolved	µg/L	3,500	NS	**52**		**2,900**		**1.3**	J	**2,700**		**2,900**	
Manganese, Total	µg/L	3,500	NS	**64**		**2,900**		**3.9**	J	**2,300**		**1,800**	
VOCs (SW8260B)													
1,1,1-Trichloroethane	µg/L	NS	5.0	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
1,1,2-Trichloroethane	µg/L	NS	5.0	0.50	U	0.50	U	0.50	U	2.5	U	0.50	U
1,2-Dichlorobenzene	µg/L	600	NS	1.0	U	1.0	U	1.0	U	**390**		**410**	
1,3-Dichlorobenzene	µg/L	100	NS	1.0	U	1.0	U	**0.56**	J	**70**		**83**	
1,4-Dichlorobenzene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	**46**		**52**	
cis -1,2-Dichloroethene	µg/L	55	NS	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
trans -1,2-Dichloroethene	µg/L	100	NS	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
Benzene	µg/L	NS	5.0	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
Chlorobenzene	µg/L	NS	100	0.50	U	0.50	U	0.50	U	***170***		***180***	
Ethylbenzene	µg/L	NS	700	0.50	U	0.50	U	0.50	U	2.5	U	0.50	U
Tetrachloroethene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
Toluene	µg/L	1,000	NS	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
Trichlorethene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
Vinyl Chloride	µg/L	NS	2.0	1.0	U	1.0	U	1.0	U	5.0	U	1.0	U
VPH (MADEP)[2]													
C5-C8 Aliphatics	µg/L	NS	300	100	U	100	U	100	U	100	U	100	U
C9-C10 Aromatics	µg/L	NS	200	100	U	100	U	100	U	***410***		***400***	
C9-C12 Aliphatics	µg/L	NS	700	100	U	100	U	100	U	100	U	100	U
Benzene	µg/L	NS	5.0	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Ethylbenzene	µg/L	NS	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	µg/L	NS	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylene[3]	µg/L	NS	NS	10	U	10	U	10	U	10	U	10	U
o -Xylene[3]	µg/L	NS	NS	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U

Table G-3
AOCs 32/43A Groundwater Analytical Results, June 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR	Q	32M-01-14XOB	Q	32M-01-17XBR	Q	32M-01-18XBR	Q	32M-DUP01 32M-01-18XBR	Q
				6/26/2017		6/28/2017		6/28/2017		6/26/2017		6/26/2017	
Field Parameters													
Temperature	°Celsius	NS	NS	**15.31**		**11.71**		**12.34**		**14.87**		**14.87**	
pH	pH	NS	NS	**6.97**		**6.73**		**7.16**		**7.06**		**7.06**	
Specific Conductance	us/cm	NS	NS	**1,658**		**381**		**733**		**850**		**850**	
ORP	mV	NS	NS	**92.6**		**51.3**		**75.1**		**134.4**		**134.4**	
Dissolved Oxygen	mg/L	NS	NS	**4.87**		**1.47**		**1.93**		**5.42**		**5.42**	
Turbidity	NTU	NS	NS	**9.78**		**11.2**		**11.4**		**11.9**		**11.9**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NS = No Standard
Q = Qualifier
U = Non-detect
µg/L = microgram per liter

[1] The cleanup goal for arsenic and select VOCs is the MCL; the cleanup goal for manganese is the background level.
[2] VPH carbon range concentrations are evaluated against MassDEP standards for comparison purposes.
[3] The monitoring criteria for total xylenes is 10,000 µg/L.

Table G-4
AOCs 32/43A Groundwater Analytical Results, April 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR		32M-01-14XOB		32M-01-17XBR		32M-01-18XBR		32M-DUP01 32M-01-18XBR	
				4/10/2018	Q	4/10/2018	Q	4/9/2018	Q	4/9/2018	Q	4/9/2018	Q
Total Metals (SW6020A)													
Arsenic, Total	µg/L	10	NS	3.0	U	**32**		3.0	U	**6.5**		**6.1**	
Total Metals (SW6010B)													
Manganese, Total	µg/L	3,500	NS	**110**		**2,700**		**1.1**	J	**8,400**		**7,900**	
VOCs (SW8260B)													
1,1,1-Trichloroethane	µg/L	NS	5.0	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1,2-Trichloroethane	µg/L	NS	5.0	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dichlorobenzene	µg/L	600	NS	1.0	U	1.0	U	1.0	U	**840**		**850**	
1,3-Dichlorobenzene	µg/L	100	NS	1.0	U	1.0	U	1.0	U	**150**		**140**	
1,4-Dichlorobenzene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	**97**		**89**	
cis -1,2-Dichloroethene	µg/L	55	NS	1.0	U	1.0	U	1.0	U	**1.0**		**0.94**	**J**
trans -1,2-Dichloroethene	µg/L	100	NS	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Benzene	µg/L	NS	5.0	1.0	U	1.0	U	1.0	U	**0.79**	**J**	**0.69**	**J**
Chlorobenzene	µg/L	NS	100	0.50	U	0.50	U	0.50	U	***440***		***450***	
Ethylbenzene	µg/L	NS	700	0.50	U	0.50	U	0.50	U	**0.47**	**J**	**0.42**	**J**
Tetrachloroethene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Toluene	µg/L	1,000	NS	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Trichlorethene	µg/L	5.0	NS	1.0	U	1.0	U	1.0	U	**0.92**	**J**	**0.82**	**J**
Vinyl Chloride	µg/L	NS	2.0	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VPH (MADEP)[2]													
C_5-C_8 Aliphatics	µg/L	NS	300	100	U	100	U	100	U	100	U	100	U
C_9-C_{10} Aromatics	µg/L	NS	200	100	U	100	U	100	U	***760***		***790***	
C_9-C_{12} Aliphatics	µg/L	NS	700	100	U	100	U	100	U	**370**	**J**	**400**	
Benzene	µg/L	NS	5.0	3.0	U	3.0	U	3.0	U	**0.81**	**J**	**0.78**	**J**
Ethylbenzene	µg/L	NS	700	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	µg/L	NS	1,000	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p -Xylene[3]	µg/L	NS	NS	10	U	10	U	10	U	10	U	10	U
o -Xylene[3]	µg/L	NS	NS	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U

Table G-4
AOCs 32/43A Groundwater Analytical Results, April 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR		32M-01-14XOB		32M-01-17XBR		32M-01-18XBR		32M-DUP01 32M-01-18XBR	
				4/10/2018	Q	4/10/2018	Q	4/9/2018	Q	4/9/2018	Q	4/9/2018	Q
Field Parameters													
Temperature	°Celsius	NS	NS	**9.42**		**10.10**		**11.49**		**10.67**		**10.67**	
pH	pH	NS	NS	**6.52**		**6.09**		**7.01**		**6.51**		**6.51**	
Specific Conductance	us/cm	NS	NS	**1,568**		**545**		**1,081**		**1,333**		**1,333**	
ORP	mV	NS	NS	**112.9**		**77.1**		**129.4**		**128.1**		**128.1**	
Dissolved Oxygen	mg/L	NS	NS	**5.10**		**1.24**		**1.36**		**4.63**		**4.63**	
Turbidity	NTU	NS	NS	**4.88**		**1.29**		**1.91**		**4.22**		**4.22**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NS = No Standard
Q = Qualifier
U = Non-detect
µg/L = microgram per liter

[1] The cleanup goal for arsenic and select VOCs is the MCL; the cleanup goal for manganese is the background level.
[2] VPH carbon range concentrations are evaluated against MassDEP standards for comparison purposes.
[3] The monitoring criteria for total xylenes is 10,000 µg/L.

Table G-5
AOCs 32/43A Groundwater Analytical Results, Spring and Fall 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

				Spring 2019										Fall 2019			
	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR		32M-01-14XOB		32M-01-17XBR		32M-01-18XBR		32M-DUP01 32M-01-18XBR		32M-01-15XBR		32M-01-16XBR	
				4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	11/20/2019	Q	11/20/2019	Q
Total Metals (SW6020A)																	
Arsenic, Total	µg/L	10	NS	3.0	U	**29**		3.0	U	**3.4**		**3.6**		NA		NA	
Total Metals (SW6010B)																	
Manganese, Total	µg/L	3,500	NS	**50**		**2,200**		**3.0**	J	**2,200**	J	**3,100**	J	NA		NA	
VOCs (SW8260B)																	
1,1,1-Trichloroethane	µg/L	NS	5.0	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
1,1,2-Trichloroethane	µg/L	NS	5.0	0.50	UJ	0.50	UJ	0.50	UJ	1.0	UJ	10	UJ	0.50	UJ	0.50	UJ
1,2-Dichlorobenzene	µg/L	600	NS	1.0	UJ	1.0	UJ	1.0	UJ	**250**	J	**260**	J	1.0	UJ	1.0	UJ
1,3-Dichlorobenzene	µg/L	100	NS	1.0	UJ	1.0	UJ	**0.45**	J	**41**	J	**42**	J	1.0	UJ	1.0	UJ
1,4-Dichlorobenzene	µg/L	5.0	NS	1.0	UJ	1.0	UJ	1.0	UJ	**29**	J	**31**	J	1.0	UJ	1.0	UJ
cis -1,2-Dichloroethene	µg/L	55	NS	1.0	UJ	1.0	UJ	**0.91**	J	2.0	UJ	**26**	J	1.0	UJ	1.0	UJ
trans -1,2-Dichloroethene	µg/L	100	NS	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Benzene	µg/L	NS	5.0	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Chlorobenzene	µg/L	NS	100	0.50	UJ	0.50	UJ	0.50	UJ	***180***	J	***170***	J	0.50	UJ	0.50	UJ
Ethylbenzene	µg/L	NS	700	0.50	UJ	0.50	UJ	0.50	UJ	1.0	UJ	10	UJ	0.50	UJ	0.50	UJ
Tetrachloroethene	µg/L	5.0	NS	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Toluene	µg/L	1,000	NS	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Trichlorethene	µg/L	5.0	NS	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Vinyl Chloride	µg/L	NS	2.0	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
VPH (MADEP)[2]																	
C_5-C_8 Aliphatics	µg/L	NS	300	75	U	75	U	75	UJ	75	UJ	75	U	75	U	75	U
C_9-C_{10} Aromatics	µg/L	NS	200	75	U	75	U	75	UJ	**160**	J	***230***		75	U	75	U
C_9-C_{12} Aliphatics	µg/L	NS	700	75	U	75	U	75	UJ	**110**	J	**190**		75	U	75	U
Benzene	µg/L	NS	5.0	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
Ethylbenzene	µg/L	NS	700	0.50	UJ	0.50	UJ	0.50	UJ	1.0	UJ	10	UJ	0.50	UJ	0.50	UJ
Toluene	µg/L	NS	1,000	1.0	UJ	1.0	UJ	1.0	UJ	2.0	UJ	20	UJ	1.0	UJ	1.0	UJ
m,p -Xylene[3]	µg/L	NS	NS	7.5	U	7.5	U	7.5	UJ	7.5	UJ	7.5	U	7.5	U	7.5	U
o -Xylene[3]	µg/L	NS	NS	3.8	U	3.8	U	3.8	UJ	3.8	UJ	3.8	U	3.8	U	3.8	U

Table G-5
AOCs 32/43A Groundwater Analytical Results, Spring and Fall 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

				Spring 2019										Fall 2019			
	Units	Cleanup Goal [1]	Monitoring Criteria	32M-01-13XBR		32M-01-14XOB		32M-01-17XBR		32M-01-18XBR		32M-DUP01 32M-01-18XBR		32M-01-15XBR		32M-01-16XBR	
				4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	4/9/2019	Q	11/20/2019	Q	11/20/2019	Q
Field Parameters																	
Temperature	°Celsius	NS	NS	**8.0**		**9.8**		**10**		**9.5**		**9.5**		**11.16**		**13.17**	
pH	pH	NS	NS	**6.2**		**6.3**		**7.0**		**6.8**		**6.8**		**6.95**		**7.16**	
Specific Conductance	us/cm	NS	NS	**1,500**		**620**		**1,300**		**1,600**		**1,600**		**6,347**		**1,083**	
ORP	mV	NS	NS	**180**		**-14**		**190**		**170**		**170**		**179**		**160.9**	
Dissolved Oxygen	mg/L	NS	NS	**6.4**		**0.54**		**1.2**		**5.3**		**5.3**		**8.42**		**6.83**	
Turbidity	NTU	NS	NS	**12**		**11**		**3.2**		**3.8**		**3.8**		**3.86**		**1.91**	

Notes:

0.333	= Detection
0.333	= Above monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NS = No Standard
Q = Qualifier
U = Non-detect
UJ = Estimated non-detect because of QC outliers.
µg/L = microgram per liter
[1] The cleanup goal for arsenic and select VOCs is the MCL; the cleanup goal for manganese is the background level.
[2] VPH carbon range concentrations are evaluated against MassDEP standards for comparison purposes.
[3] The monitoring criteria for total xylenes is 10,000 µg/L.

Table G-6
Summary of Historical Groundwater Cleanup Goal Exceedances for Well 32M-01-18XBR in AOCs 32/43A
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria [2]	April 2002	October 2002	June 2003	December 2003	May 2004	October 2004	June 2005	October 2005	June 2006	October 2006	May 2007	October 2007	June 2008	October 2008	May 2009
Arsenic, Total	µg/L	10	NS	ND	ND	**3.5**	**8.8**	**10**	**6.2**	**24.4**	ND	**30**	**15**	**51**	**3.1**	**38**	**34**	**51**
Arsenic, Dissolved	µg/L	10	NS	ND	ND	**3.0**	NA	**10**	**6.3**	NA	NA	**33**	NA	NA	NA	NA	NA	NA
Manganese, Total	µg/L	3,500	NS	**7,730**	**9,260**	**14,100**	**11,000**	**17,400**	**13,400**	**16,700**	**11,600**	**18,000**	**16,000**	**18,200**	**10,200**	**14,800**	**18,900**	**29,400**
Manganese, Dissolved	µg/L	3,500	NS	**7,500**	**8,960**	**14,200**	**13,900**	**18,100**	**12,500**	NA	NA	**19,000**	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	µg/L	600	NS	**5,900**	**2,500**	**3,800**	**3,900**	**6,200**	**4,200**	**4,500**	**1,450**	**5,900**	**2,800**	**6,100**	**690**	**2,700**	**4,100**	**1,700**
1,3-Dichlorobenzene	µg/L	100	NS	**660**	**300**	**460**	**430**	**730**	**530**	**590**	**209**	**750**	**360**	**850**	**120**	**450**	**580**	**270**
1,4-Dichlorobenzene	µg/L	5.0	NS	**450**	**200**	**310**	**280**	**470**	**320**	**370**	**120**	**490**	**210**	**550**	**67**	**270**	**390**	**180**
Trichloroethene (TCE)	µg/L	5.0	NS	**19**	ND	ND	**3.4**	**5.2**	**3.4**	ND	**0.6**	ND	ND	**4.2**	ND	ND	ND	ND
Bromodichloromethane	µg/L	3.0	NS	NA	NA	NA	ND	ND	ND	ND	ND	**19**	ND	ND	ND	ND	ND	ND
VPH C_9-C_{12} Aliphatics	µg/L	NS	700	***5,000***	ND	**350**	**511**	***5,100***	***4,480***	**470**	**686**	ND	ND	**2.5**	ND	ND	ND	**132 J**
VPH C_9-C_{10} Aromatics	µg/L	NS	200	***9,100***	***2,900***	***1,700***	***2,600***	***#####***	***4,400***	***260***	***1,150***	***5,850***	***4,120***	***6,050***	***952***	***3,230***	***3,660***	***1,890***
EPH C_9-C_{18} Alphatics	µg/L	NS	700	***920***	**240**	**620**	***940***	***2,300***	***1,100***	***1,400***	**228**	***1,340***	***785***	***854***	**158**	**430**	**455**	**470**
Field Parameters - ORP	mV	NS	NS	**120.4**	**216.3**	**111.9**	**45.1**	NA	**17.6**	**24.7**	**33.8**	**-2.0**	**14.9**	**-30.9**	**1.5**	**-40.1**	**60.9**	**437.7**
Field Parameters -	NTU	NS	NS	NA	NA	NA	**0.91**	NA	**1.63**	**0.51**	**0.50**	**0.10**	**0.65**	**1.9**	**0.40**	**0**	**3**	**17.7**

Notes:

0.333	= Detection
0.333	= Above monitoring criteria
0.333	= Above cleanup goal

J = Estimated result

NA = Not analyzed

ND = Non-detect

NS = No Standard

UJ = Estimated non-detect because of QC outliers.

µg/L = microgram per liter

[1] The cleanup goal for arsenic and the VOC compounds is the MCL.

[2] VPH/EPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table G-6
Summary of Historical Groundwater Cleanup Goal Exceedances for Well 32M-01-18XBR in AOCs 32/43A
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal [1]	Monitoring Criteria [2]	October 2009	May 2010	October 2010	June 2011	October 2011	May 2012	October 2012	May 2013	October 2013	June 2014	June 2015	June 2016	June 2017	April 2018	April 2019
Arsenic, Total	µg/L	10	NS	**18**	**18**	**3.5 J**	**3 J**	**5**	**5**	**4 J**	**2 J**	**6.0**	**3 J**	**25**	NA	**4.7**	**6.5**	**3.4**
Arsenic, Dissolved	µg/L	10	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.0**	**2.8**	**2.4**	NA	NA
Manganese, Total	µg/L	3,500	NS	**6,970**	**2,360**	**4,510**	**2,300**	**1,150**	**4,100**	**1,540**	**27**	**137**	**1,990 J**	**2,140**	NA	**2,300**	**8,400**	**2,200 J**
Manganese, Dissolved	µg/L	3,500	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1,720**	**1,100**	**2,700**	NA	NA
1,2-Dichlorobenzene	µg/L	600	NS	**730**	**300**	**570**	**340**	**260**	**640 J**	**340**	**7.46 J**	**7.30**	**598**	**407**	**340**	**390**	**840**	**250 J**
1,3-Dichlorobenzene	µg/L	100	NS	**150**	**59**	**100**	**86**	**64**	**120 J**	**70**	**7.10 J**	**2.12 J**	**106**	**80**	**58**	**70**	**150**	**41 J**
1,4-Dichlorobenzene	µg/L	5.0	NS	**100**	**26**	**62**	**50**	**37**	**69**	**42**	**1.19 J**	**1.14 J**	**71**	**51**	**38**	**46**	**97**	**29 J**
Trichloroethene (TCE)	µg/L	5.0	NS	ND	ND	ND	ND	ND	**0.60**	ND	ND	ND	ND	ND	ND	ND	0.92 J	**2.0 UJ**
Bromodichloromethane	µg/L	3.0	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
VPH C_9-C_{12} Aliphatics	µg/L	NS	700	**250**	ND	ND	**104**	**108**	**486**	ND	ND	ND	ND	ND	**190**	ND	370	**110 J**
VPH C_9-C_{10} Aromatics	µg/L	NS	200	***837***	***300***	***541***	***444***	***272***	***728***	***322***	ND	ND	***730***	***360***	***450***	***410***	***760***	**160 J**
EPH C_9-C_{18} Alphatics	µg/L	NS	700	NA	ND	ND	ND	ND	**175**	ND	ND	ND	ND	112	NA	NA	NA	NA
Field Parameters - ORP	mV	NS	NS	**120.7**	**-177.8**	**137.2**	**408.1**	**158.8**	**163.4**	**223.8**	**298.8**	**192**	**111.1**	**113.5**	**162.7**	**134.4**	**128.1**	**170**
Field Parameters -	NTU	NS	NS	**2.4**	**244.0**	**3.07**	**2.68**	**3.53**	**2.22**	**1.26**	**1.36**	**3.5**	**1.21**	**2.0**	**12.9**	**11.9**	**4.2**	**3.8**

Notes:

0.333	= Detection
0.333	= Above monitoring criteria
0.333	= Above cleanup goal

J = Estimated result

NA = Not analyzed

ND = Non-detect

NS = No Standard

UJ = Estimated non-detect because of QC outliers.

µg/L = microgram per liter

[1] The cleanup goal for arsenic and the VOC compounds is the MCL.

[2] VPH/EPH concentrations are evaluated against MassDEP standards for comparison purposes.

Table G-7
PAH Cleanup Level Review

Analyte	1999 Cleanup Goal[a] (mg/kg)	Residential RSL (E-06)[b] (mg/kg)	Cancer Risk using BAP[c]
Benz[a]anthracene	1.00	1.1E-01	9.1E-06
Benzo[a]pyrene	0.70	1.1E-01	6.4E-06
Benzo[b]fluoranthene	1.00	1.1E-01	9.1E-06
Benzo[k]fluoranthene	10	1.1E-01	9.1E-05
Chrysene	10	1.1E-01	9.1E-05
Dibenz[a,h]anthracene	0.70	1.1E-01	6.4E-06
Indeno[1,2,3-cd]pyrene	1	1.1E-01	9.1E-06
Naphthalene	4	1.1E-01	3.6E-05

a = from Table 3-1 of the Final Soils Remedial Action Operable Unit Completion Report Soil, Asphalt, and Debris Removal at Area of Contamination (AOC) 32, Devens, Massachusetts (Weston, 2000).
b = Residential RSL for the most toxic carcinogenic PAH [benzo(a)pyrene] used.

c = The cancer risk was calculated using the following equation, because RSLs are derived based on 1 x 10-6 risk: cancer risk = (cleanup level / cancer based RSL) x 10-06.

RSL = regional screening level
mg/kg = milligram per kilogram

G.4 Defense Reutilization and Marketing Office Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Devens, MA	**Date of inspection:** 02/10/20
Location and Region: AOC 32 43A	**EPA ID:**
Agency, office, or company leading the five-year review: Human Government Solutions	**Weather/temperature:** 35°F Rain wind cloudy

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other LUC
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached NA during site visit

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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

N/A during site visit

1. **O&M Organization**
   - ☐ State in-house
   - ☐ Contractor for State
   - ☐ PRP in-house
   - ☐ Contractor for PRP
   - ☐ Federal Facility in-house
   - ☐ Contractor for Federal Facility
   - ☐ Other _____

2. **O&M Cost Records**
   - ☐ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____

Frequency _____

Responsible party/agency _____

Contact _____ _____ _____ _____

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

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

Remarks Land use concerns unchanged

D. General

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

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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_____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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

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

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

D. Monitored Natural Attenuation

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.

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.).

See 2015 Annual Report for Remedy Information

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.

See 2019 Annual Report

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. See 2019 Annual Report

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

View of O'Reilly's Auto parts distribution center in AOC 32

View of O'Reilly's central western paved area

Western parking lot of O'Reilly's Auto parts distribution center.

View of O'Reilly's northern paved area

View of O'Reilly's eastern paved area

View of Cook Street along AOC 43A

View if Monitoring Well 32M-01-17X

View of wooded area with Monitoring Well in AOC 43A

View of the storage yard in the southern area of AOC 43A

View of the storage in the northern area of AOC 43A

G.5 Defense Reutilization

and Marketing Office

ARARs

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Authority	Location Specific	Location Specific Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Chemical Specific

Authority	Chemical Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11-141.16 and 141.50-141.521]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		
State Regulatory Authority	Groundwater(Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.01].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43 A
Devens, Massachusetts

Action Specific

Authority	Action Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standard.	
State Regulatory Authority	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR)Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

Table 25
Synopsis of Federal and State ARARs for Excavation and Off-site Disposal
Area of Contamination 32 and 43A
Devens, Massachusetts

Location Specific

Location Specific Authority	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	There are no location specific ARARs for the DRMO Yard.			
State Regulatory Authority	There are no location specific ARARs for the DRMO Yard.			

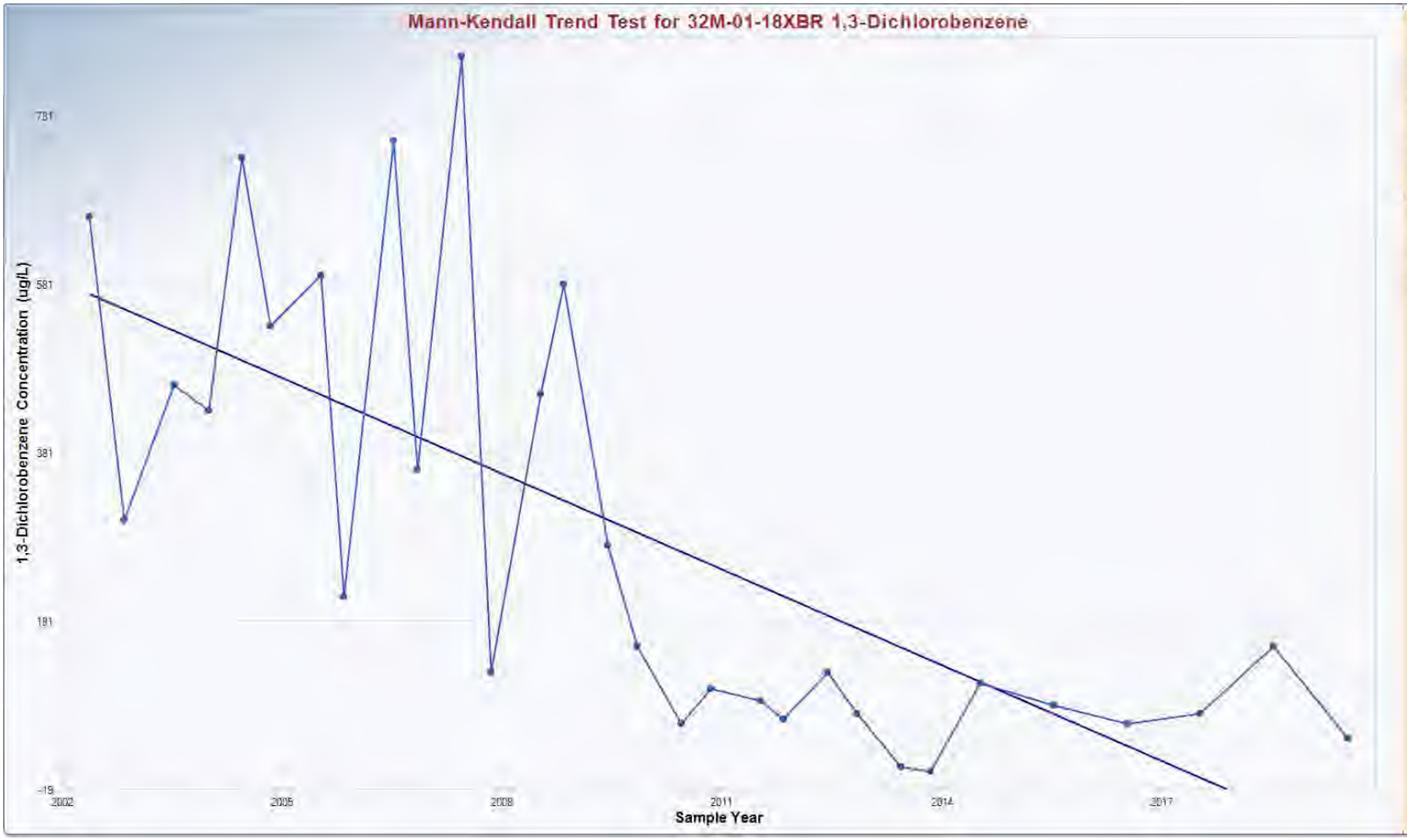
Table 25
Synopsis of Federal and State ARARs for Excavation and Off-site Disposal
Area of Contamination 32 and 43A
Devens, Massachusetts

Chemical Specific

Authority	Chemical Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	For surface soil (0 to 10 inches)	Toxic Substance Control Act (TSCA) 40 CFR 761.125(c)(4)	TBC	Unrestricted access with less than 1 mg/kg PCBs.	
	For subsurface soil (below 10 inches)			Unrestricted access with less than 10 mg/kg PCBs.	
Federal Regulatory Authority	Soil	EPA Region III Risk Based Concentration Table	TBC	Exposure levels to numerous chemicals under specific scenarios.	
Federal Regulatory Authority	Soil	Resource Conservation and Recovery Act (RCRA) Corrective Action Levels 55 FR 30798, July 1990.	TBC	To establish the need for a corrective measure study. Numerous chemicals.	
Federal Regulatory Authority	Soil	Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. EPA OSWER Directive 9355.4-12, July 1994	TBC		
State Regulatory Authority	Soil	Background levels for soil.	TBC		
State Regulatory Authority	Soil	Massachusetts Contingency Plan (MCP) 310 CMR 40.09705(6)(a)	TBC	Total petroleum hydrocarbons not to exceed 500 mg/kg.	

G.6 Defense Reutilization and Marketing Office Statistical Analysis

Mann-Kendall Trend Test for 32M-01-14XOB Arsenic (total)
As Concentration (ug/L)
Sample Year
2006
2008
2010
2012
2014
2016
2018
Mann-Kendall Trend Analysis
n 17
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 24.2998
Standardized Value of S -1.1544
M-K Test Value (S) -28
Tabulated p-value 0.1350
Approximate p-value 0.1242
OLS Regression Line (Blue)
OLS Regression Slope -1.8351
OLS Regression Intercept 3,745.8408
Insufficient statistical evidence
of a significant trend at the
specified level of significance.



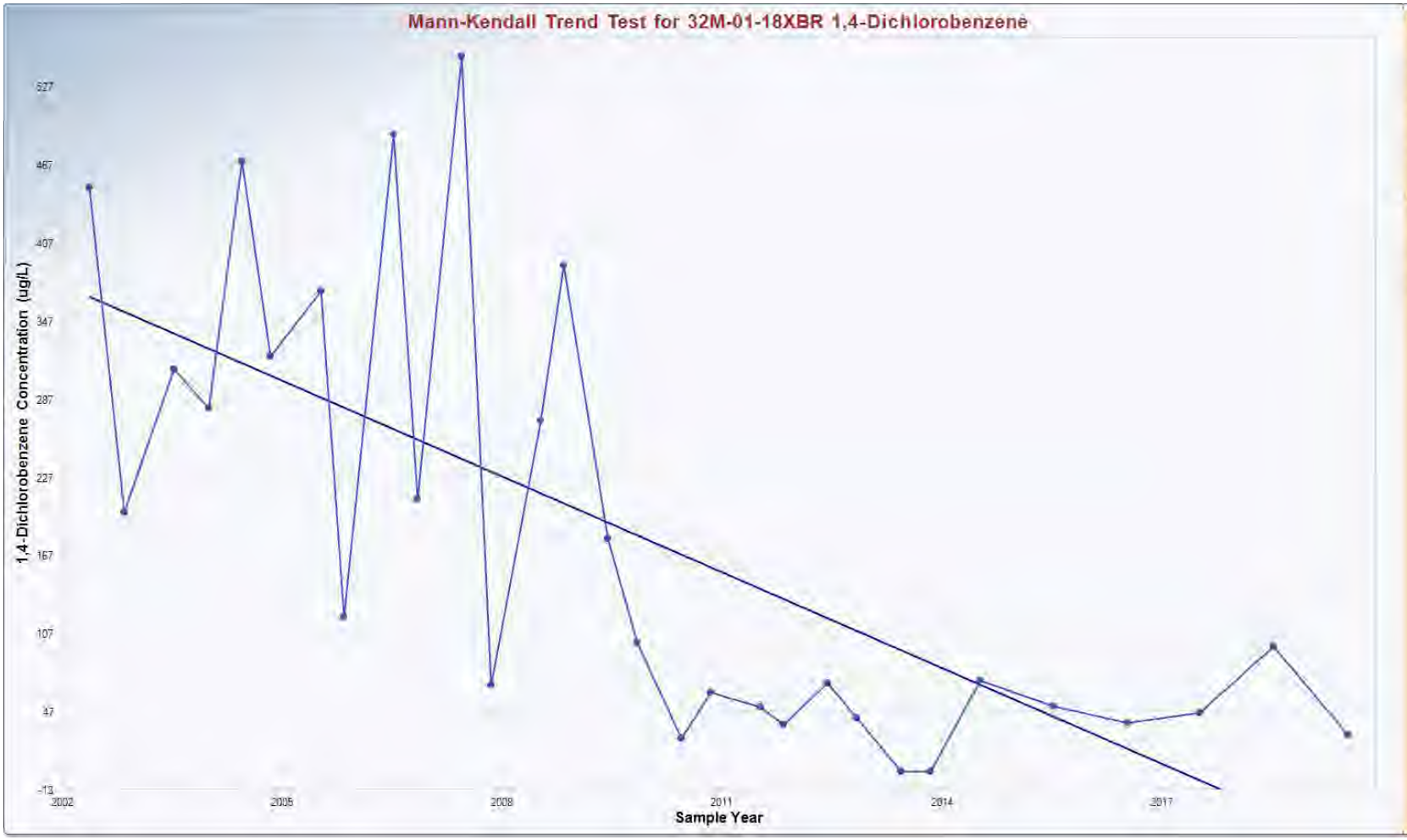
Mann-Kendall Trend Analysis

n	30
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	56.0239
Standerdized Value of S	-4.4088
M-K Test Value (S)	-248
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-37.9334
OLS Regression Intercept	76,523.8817

Statistically significant evidence of a decreasing trend at the specified level of significance.



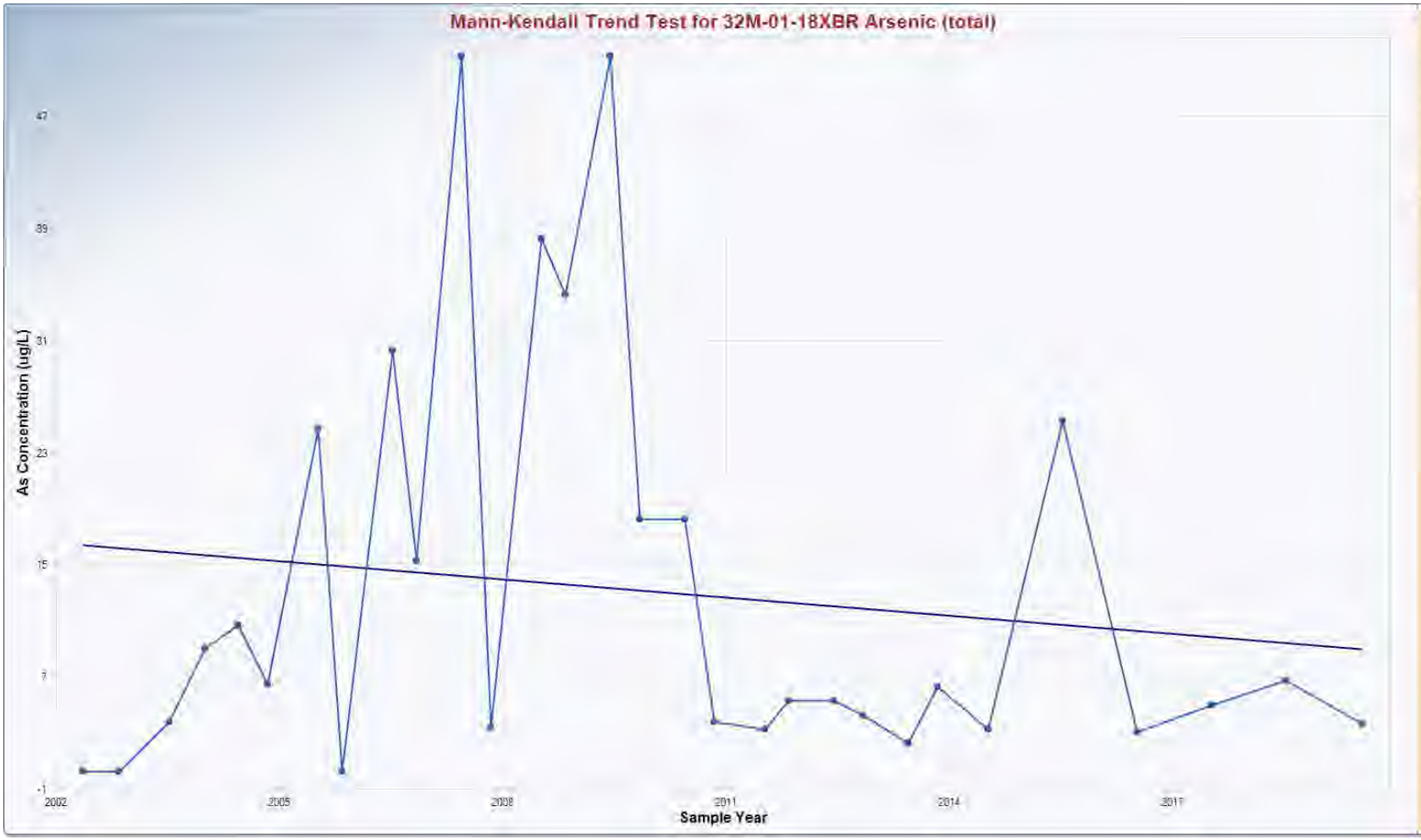
Mann-Kendall Trend Analysis

n	30
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	56.0506
Standerdized Value of S	-4.1748
M-K Test Value (S)	-235
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-24.5519
OLS Regression Intercept	49,526.8891

Statistically significant evidence of a decreasing trend at the specified level of significance.



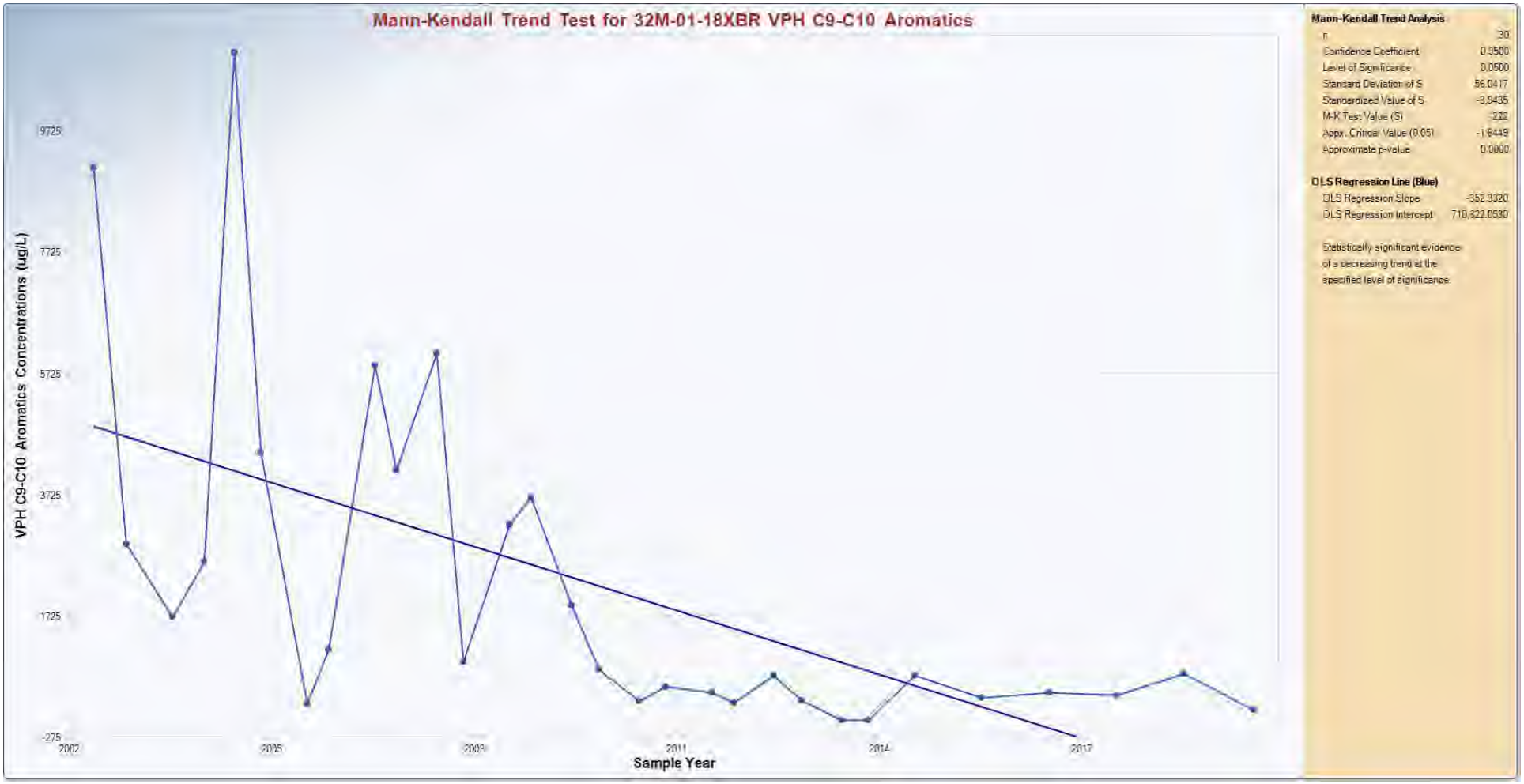
Mann-Kendall Trend Analysis

n	30
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	56.9732
Standardized Value of S	-0.3216
M-K Test Value (S)	-18
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.3739

OLS Regression Line (Blue)

OLS Regression Slope	-0.4318
OLS Regression Intercept	880.8804

Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test for 32M-01-18XBR VPH C9-C10 Aromatics
VPH C9-C10 Aromatics Concentrations (ug/L)
9725
7725
5725
3725
1725
-275
2002
2005
2008
2011
2014
2017
Sample Year
Mann-Kendall Trend Analysis
n 30
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 56.0417
Standardized Value of S -3.9435
M-K Test Value (S) -222
Appx. Critical Value (0.05) -1.6449
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -352.3320
OLS Regression Intercept 710,822.0530
Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX H – Historic Gas Station

H.1 Historic Gas Station

Additional Background Information

Site Chronology

Chronology of Events for AOC 43G

Event	Date
Final NPL Listing	November 1989
Five gasoline USTs removed at Area 2	October 1990
One waste oil UST removed at Area 3	May 1992
SI Report issued	August 1992
SSI completed – NFA for Area 1, SA 43G designated as an AOC	January 1994
RI/FS completed for Areas 2 and 3	June 1996
Three replacement USTs (Area 2) and a sand and gas trap (Area 3) removed	August 1996
ROD signature	October 1996
Devens Public Water Supply Zone II and III were finalized	September 1997
Intrinsic Remedial Assessment completed	November 1999
Groundwater LTM initiated	December 1999
First Five-Year Review	September 2000
Second Five-Year Review	September 2005
Revised LTMMP	November 2008
Third Five-Year Review	September 2010
Annual LTM	2005-2009
Annual LTM	2010-2014
Fourth Five-Year Review	September 2015
Annual LTM	2015-2019
2020 Supplemental Sampling	February 2020
Fifth Five-Year Review	September 2020

Chronology of Events for AOC 43J

Event	Date
Final NPL Listing	November 1989
Abandoned gasoline UST discovered	May 1992
Waste oil UST removed	May 1992
Gasoline UST removed	August 1992
SI Report complete	May 1993
Supplemental SI (SSI) completed – SA 43J designated as an AOC	January 1994
RI/FS completed	June 1996
Three replacement USTs (Area 2) and a sand and gas trap (Area 3)	August 1996
ROD signature	October 1996
Devens Public Water Supply Zone II and III were finalized	September 1997
Intrinsic Remedial Assessment completed	November 1999
Groundwater LTM Initiated	December 1999
First Five-Year Review	September 2000
Second Five-Year Review	September 2005
Environmental Baseline Survey	May 2006
Grant of Environmental Restriction and Easement (GERE)	June 2006
Approval of Covenant Deferral Request (USEPA)	June 2006
Approval of Nomination of AOC 43J, AREE 61AF, AREE 61J and AREE	June 2006
Technical Update to the 1996 Risk Characterization Parcel C – AOC 43J	June 2006
Environmental Assessment for the Commercial Redevelopment of Parcel	June 2006
Explanation of Significant Differences for ROD AOC 43J	June 2006
Finding of Suitability for Early Transfer (FOSET) Parcel C	June 2006
Site transferred to MassDevelopment	June 2006
AOC 43J ESD prepared by Army BRAC incorporating ICs in deed	June 2006
Test Pit Investigation	July 2006
Monitoring Well Installation (four well pairs)	2006-2007
Quarterly Groundwater Monitoring	2007
Annual LTM	2005-2009
Sulfate Injection Pilot Test/Well Installation (two injection wells, two monitoring wells)	December 2009
Monthly Pilot Study Performance Monitoring	January 2010
Follow up sulfate injection	Fall 2010
Third Five-Year Review	September 2010
Annual LTM	2010-2014
OBC™ injection	May 2012
Monitoring rounds	April, November,
2014 Devens Annual Report and Remedial Strategy Evaluation	April 2015
Fourth Five-Year Review	September 2015

Event	Date
Annual LTM	2015-2019
Oxygen Emitter Pilot Testing and Monitoring	2017 - 2019
Fifth Five-Year Review	September 2020

Land and Resource Use

The AOC 43G property remains owned and under the control of Army. AOC 43J property was transferred from the Army to MassDevelopment in June 2006. All ROD and ESD requirements were included in the June 2006 Grant of Environmental Restriction and Easement (GERE) issued by MassDEP and recorded with the deed at the appropriate Registry of Deeds. The AOC 43J property is currently owned by Bristol Myers Squibb.

History of Contamination

AOC 43G

AOC 43G consists of a decommissioned Army Air Force Exchange Service (AAFES) gas station and historic gas station G. For purposes of field investigation, AOC 43G was divided into three areas. Area 1 is the former location of historic gas station G. Areas 2 and 3 are associated with the AAFES gas station and represent the locations of former gasoline USTs and the former waste oil UST/sand and gas trap, respectively.

The original study area (SA 43G [Area 1]) was the historic gas station, which was used as a motor vehicle pool to support military operations during World War II. Operations concerning the motor pool were halted during the late 1940s or early 1950s. The reported location of the historic gas station was to the southwest of the AAFES gasoline station (Building 2008) and to the southwest of Building 2009. Based on the results of the 1992 SI and 1993 SSI, NFA was recommended for Area 1. Therefore, all further discussions in this Five-Year Review pertain only to Areas 2 and 3.

The location of the former AAFES gasoline station is approximately 120 ft northeast of the site of historic gas station G. At the time of the 1992 SI and 1993 SSI, it consisted of a service station (Building 2008), which housed three vehicle service bays and the AAFES store. It also included three 10,000-gallon USTs, associated pump islands, and a sand and gas trap (Area 3).

AOC 43J

At the time of base closure in 1996, the area around AOC 43J was used as a vehicle storage yard and maintenance facility (former Buildings T-2446 and T-2479) for a Special Forces Unit of the Army. The former maintenance facility used a 1,000-gallon UST for storage of maintenance wastes. This UST was located just south of former Building T-2446. The yard and maintenance facility are paved with asphalt and surrounded by a chain-link fence with a locked gate located at the northern side of the yard. AOC 43J is within the Shabokin Supply Well Zone III.

Prior to construction of the vehicle maintenance facility, this area was used as a gas station/motor pool (historic gas station J) during the 1940s and 1950s. The structures of this historic gas station consisted of a pump island and a small gasoline pump house. This gas station was reported to be a Type A station, with one 5,000-gallon UST located between the gasoline pump house and

pump island. The station was used during World War II as a vehicle motor pool to support military operations. The motor pool operations were discontinued during the late 1940s or early 1950s. No records were available on the decommissioning of this motor pool or the removal of the associated UST.

Initial Response

AOC 43G

SA 43G was expanded to include the former AAFES gas station (Areas 2 and 3) as part of the 1993 SSI. The AAFES gas station was added to investigate the distribution of contamination observed during the removal of three former 9,000-gallon (removed in 1990) and two former 10,000-gallon gasoline USTs (removed in 1996). Although soil samples were collected from the walls of the excavation, no samples were collected from the base of the excavation. Contamination was also identified during the removal of a 500-gallon waste oil UST (completed in 1992). Impacted soils were not removed due to the close proximity of Building 2008.

The 1993 SSI identified fuel related compounds, principally benzene, toluene, ethylbenzene, and xylenes (BTEX), in site soil and groundwater within Area 2 and 3. Due to the presence of soil and groundwater impacts, a RI and subsequent FS were recommended for Areas 2 and 3.

The HHRA completed for the RI identified no unacceptable threats to human health from exposure to contaminated soil, but did find potential threats to human health from future exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives for the groundwater contamination at AOC 43G.

AOC 43J

During the 1992 SI, an abandoned 5,000-gallon UST was found at historic gas station J. This UST was added to the Devens UST removal program and removed in 1992. The former waste oil UST was also removed during the same year. During both UST removals, contaminated impacted soil was removed and disposed of by the Army. Based on the data and the findings of the 1992 SI, additional investigation was recommended.

In 1993, an SSI was performed to investigate the soil impacts observed during the SI and to install groundwater monitoring wells. The 1993 SSI investigations detected fuel related compounds, principally BTEX, in site soil and groundwater. Because of the presence of soil and groundwater contamination, a RI and subsequent FS were recommended. The site designation for SA 43J was administratively changed to AOC 43J at that time. The HHRA completed for the RI identified no unacceptable threats to human health from exposure to contaminated soil, but did find potential threats to human health from future exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives that addressed the groundwater contamination at AOC 43J. In October1996, the ROD was signed.

Another site, AREE 61 AF, also known as the 10th Special Forces Headquarters Motor Pool Buildings is located directly adjacent to AOC 43J. Various studies and removal actions have been previously performed at the site. The monitoring wells included in the AOC 43J LTMP are

distributed across a major portion of AREE 61 AF. An NFA designation was approved by the USEPA in late 2003.

H.2 Historic Gas Station

Figures

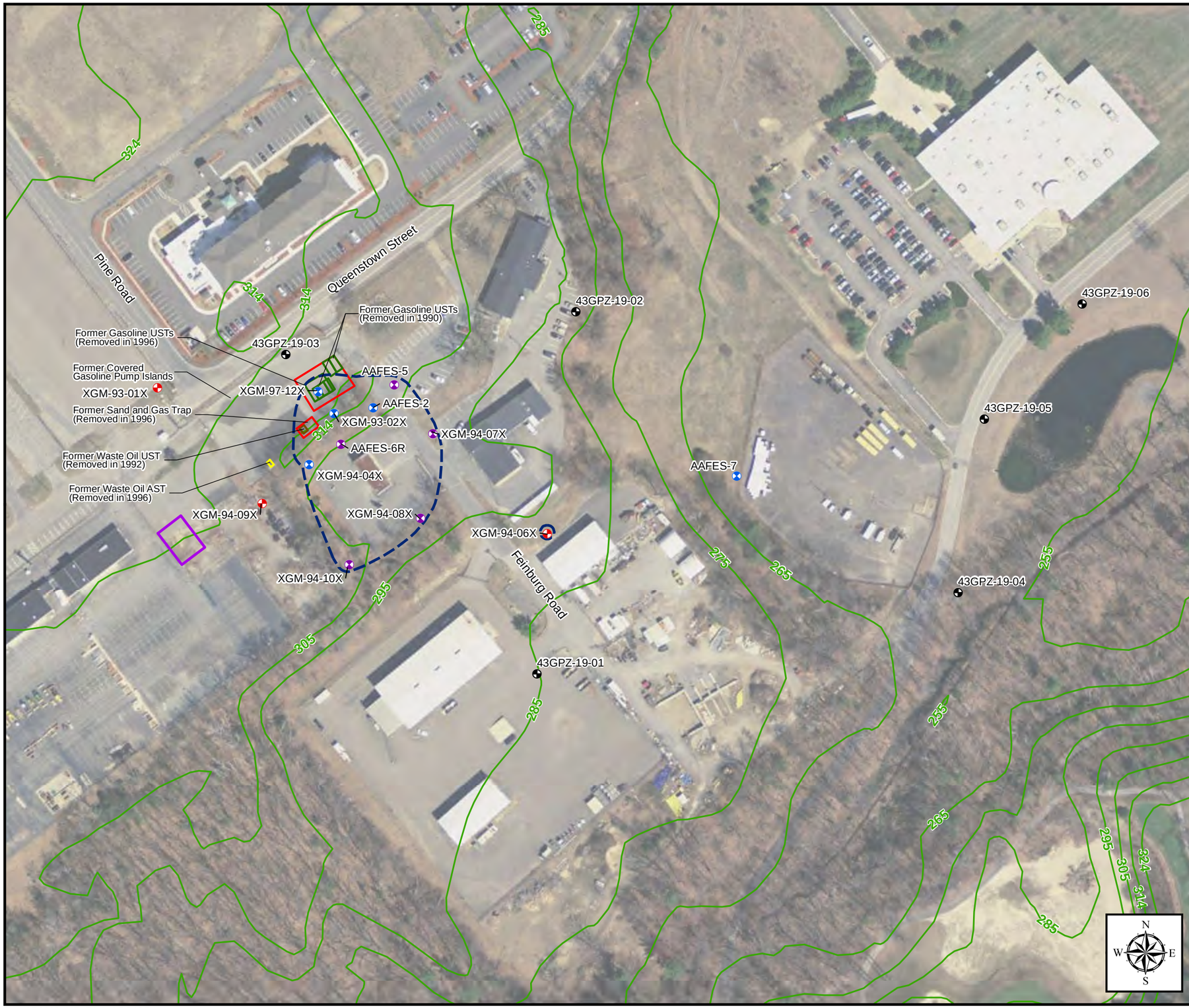


Figure H-1
Site Layout
Area of Contamination 43G

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Monitoring Well
- Piezometer
- XGP-94-04X Well/Piezometer Identification
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on 1999 to 2008 analytical data) (2008 Annual Report, HGL, 2009)
- Area 1
- Former Gasoline UST(s)
- Former Waste Oil UST
- Former Waste Oil AST
- Former UST Area
- Topographic Contour (Ft

Notes:
AST = Above ground storage tank
UST = Underground storage Tank
LTM = Long-term monitoring

Aerial Sources: 2013, USGS, MassGIS

2020 Five Year Review
AOC 43G

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 75 150
Feet

Date: 01/14/2020

Figure H-1

File: AR2019_MP_F4-1_AOC43G.mxd

Legend

- Monitoring Well
- (281.48) Groundwater Elevation (ft NAVD88)
- Groundwater Elevation Contour (ft NAVD88) (Contour Interval = 2 ft)
- Groundwater Flow Direction

Aerial Source: USGS, MassGIS Orthoimagery 2019

Interpretive Water Table Elevation Area
of Contamination 43G
February 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

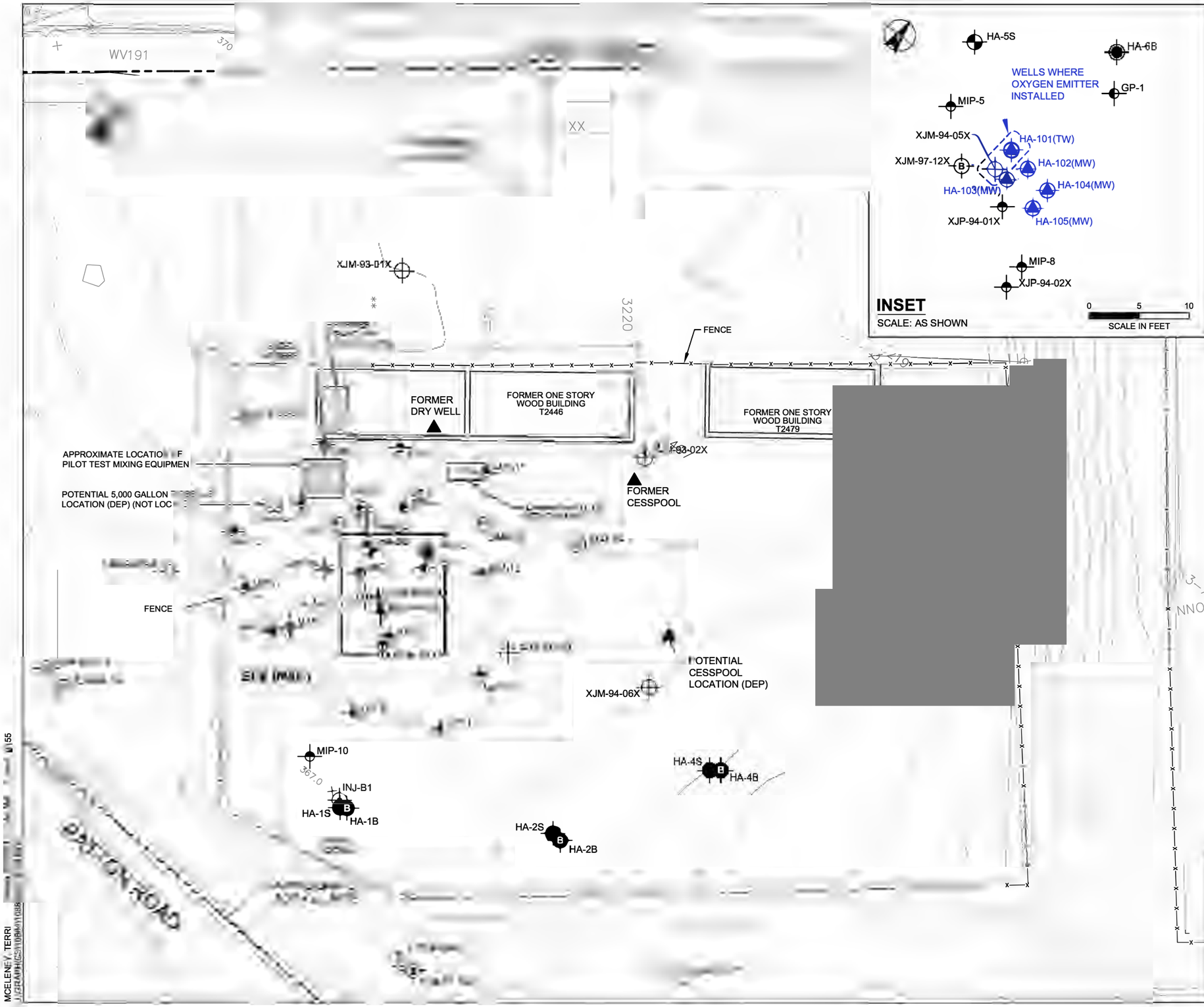
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 75 150
Feet

Date:
04/10/2020

Figure
H-2

File: MP_SuppSampling_F3-2_AOC43G_GWC0220.mxd



LEGEND

HA-101(TW)	DESIGNATION AND LOCATION OF OXYGEN EMITTER TEST WELL (TW) AND MONITORING WELLS (MW) INSTALLED BY CRAWFORD DRILLING SERVICES ON 14 NOVEMBER 2017 AND MONITORED BY HALEY & ALDRICH STAFF
MIP-1	DESIGNATION AND LOCATION OF MEMBRANE INTERFACE PROBE BY STONE ENVIRONMENTAL, DURING THE PERIOD 21 THROUGH 22 JUNE 2011
GP-01	DESIGNATION AND LOCATION OF DIRECT- PUSH BORING BY STONE ENVIRONMENTAL,DURING THE PERIOD 21 THROUGH 22 JUNE 2011
HA-6B	DESIGNATION AND LOCATION OF BEDROCK MONITORING WELL INSTALLED BY GEOLOGIC, INC. DURING THE PERIOD 26 THROUGH 28 OCTOBER 2009. INSTALLATION MONITORED BY HALEY & ALDRICH, INC.
INJ-01	DESIGNATION AND LOCATION OF INJECTION WELL INSTALLED BY GEOLOGIC, INC. DURING THE PERIOD 26 THROUGH 28 OCTOBER 2009. INSTALLATION MONITORED BY HALEY & ALDRICH, INC.
HA-5S	DESIGNATION AND LOCATION OF OVERBURDEN MONITORING WELL INSTALLED BY GEOLOGIC, INC. DURING THE PERIOD 26 THROUGH 28 OCTOBER 2009. INSTALLATION MONITORED BY HALEY & ALDRICH, INC.
HA-1S	DESIGNATION AND LOCATION OF MONITORING WELL INSTALLED BY GEOLOGIC, INC. DURING THE PERIOD 22 DECEMBER 2006 THROUGH 5 JANUARY 2007. WELL INSTALLATION MONITORED BY HALEY & ALDRICH, INC.
XJM-93-03X	DESIGNATION AND APPROXIMATE LOCATION OF EXISTING GROUNDWATER MONITORING WELL INSTALLED BY OTHERS.
▲	APPROXIMATE LOCATION OF POTENTIAL FORMER SOURCE AREA INVESTIGATED. "(DEP)" INDICATES LOCATION SUGGESTED BY MADEP FOR INVESTIGATION.
B	"B" INDICATES BEDROCK WELL
	APPROXIMATE LOCATION OF FORMER UST "(DEP)" INDICATES LOCATION SUGGESTED BY MADEP FOR INVESTIGATION.

NOTES

1. BASE PLAN COMPILED FROM AN ELECTRONIC SITE SURVEY FILE PROVIDED BY MASSDEVELOPMENT. SURVEY REFERENCES MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NAD83 AND NGVD 1929.
2. LOCATIONS OF SUBSURFACE UTILITIES SHOWN ARE APPROXIMATE.
3. LOCATIONS OF FORMER USTs AND POTENTIAL SOURCES ARE APPROXIMATE AND BASED ON REVIEW OF SITE ASSESSMENT DATA.

0 50 100
SCALE IN FEET

HALEY ALDRICH

AOC 43J
DEVENS, MASSACHUSETTS

SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
JUNE 2019

FIGURE H-3

MCELENEY, TERRI

H.2 Historic Gas Station

Tables

Table H-1
AOC 43G Groundwater Exceedances Since 1999
Main Post, Former Fort Devens Army Installation, Massachusetts

Sample Location	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003	Fall 2004	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Benzene- 5 µg/L Cleanup Goal																					
AAFES-2	62	36	43	26	9.0	6.6	6.1	1.3	ND	ND	3.93 J	ND	ND	6.60 J	5.04	3.7	4.2	ND	ND	ND	1.5 J
XGM-93-02X	81	32	12	140	24	39	29	18.5	8.8	2.6	0.997 J	ND	ND	ND	ND	0.77 J	ND	ND	0.38 J	0.60 J	ND
XGM-97-12X	270	550	700	780	290	260	35.6	129	22.8	13.7 J	27.4 J	ND	13.8	3.03 J	3.87	1.5	3.8	ND	ND	4.0	ND
Toluene- 1,000 µg/L Cleanup Goal																					
XGM-97-12X	390	1,100	870	1,000	610	460	53.4	239	15.9	11.4 J	5.3 J	ND	ND	ND	2.54	ND	7.4	ND	ND	5.1	1.6 J
Iron, total - 9,100 µg/L Cleanup Goal																					
AAFES-2	24,000	20,000	27,000	26,000	14,000	20,000	21,900	12,000	20,000	18,000	16,000	14,000	22,000	18,000	19,000	19,400	14,400	11,000	10,000	19,000	20,000
AAFES-6/6R	11,000	9,200	13,000	9,400	NS	NS	NS	11,000	11,000	6,500	4,300	3,300	1,100	6,900	9,200	8,240	NA	NA	NA	NS	NS
XGM-93-02X	30,000	18,000	11,000	24,000	15,000	28,000	11,500	13,000	5,800	11,000	8,500	11,000	12,000	6,000	10,000	9,580	13,200	6,000	6,500	20,000	9,300
XGM-94-07X	3,500	2,900	5,800	2,300	1,000	300	1,610	1,400	4,500	9,300	8,800	12,000	13,000	23,000	10,000	6,820	NS	NS	NS	NS	8,300
XGM-94-08X	4,800	13,000	4,500	4,600	3,200	2,500	4,520	6,100	4,600	2,200	1,300	1,000	750	2,300	910	147	NS	NS	NS	NS	1,000
XGM-97-12X	32,000	26,000	33,000	46,000	33,000	32,000	20,100	18,000	22,000	25,000	25,000	16,000	27,000	20,000	24,000	25,800	34,300	25,000	18,000	27,000	6,200
Manganese, total - 375 µg/L Cleanup Goal																					
AAFES-2	4,600	3,900	4,800	3,700	3,100	4,000	3,590	2,700	3,790	3,600	3,320	2,490	3,700	3,100	3,270	3,460	2,740	2,800	2,800	3,100	3,500
AAFES-5	710	180*	190	27	21	89	118	50	34	ND	ND	244	36	206	127	32.5	NS	NS	NS	NS	NS
AAFES-6/6R	2,900	9,200	3,400	3,000	NS	NS	NS	2,900	3,090	3,630	907	1,670	1,830	3,220	2,820	3,000	NS	NS	NS	NS	NS
AAFES-7	NS	NS	NS	NS	NS	NS	NS	NS	NS	106/ND	81	79	5 J	706	2,390	1,640	139	510	330	NS	86
XGM-93-02X	3,900	2,500	1,900	2,500	1,900	2,600	1,450	2,000	1,800	1,420	1,630	737	3,020	612	1,180	1,570	2,020	1,400	1,400	1,900	1,300
XGM-94-04X	2,900	2,200	3,400	2,000	1,400	1,400	1,580	1,100	559	68	2,730	6,490	2,140	2,580	2,730	1,510	1,090	1,500	1,700 J	230	5,500
XGM-94-06X	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1,400
XGM-94-07X	5,700	3,700	6,100	4,500	3,600	1,000	6,120	5,100	4,120	5,100	4,990	3,870	6,060	5,560	5,380	6,940	NS	NS	NS	NS	4,200
XGM-94-08X	4,500	4,600	4,900	3,600	3,600	3,800	7,260	4,200	3,380	3,100	2,150	2,070	2,780	4,620	2,300	3,210	NS	NS	NS	NS	3,500
XGM-97-12X	6,300	4,100	4,200	3,900	4,100	3,000	437	1,800	2,070	3,060	2,390	2,110	3,540	1,640	1,680	2,080	3,460	1,700	1,200	3,800	250
C_5-C_8 Aliphatics - 300 µg/L VPH Standards																					
AAFES-2	ND	1,400	ND	1,200	1,200	ND	2,070	1,430	1,400	ND	ND	859	1,270	1,560 J	1,390	1,250	728	850	890	480 J	1,200
AAFES-6/6R	370	420	290	ND	NA	NA	NA	305	ND	ND	ND	114	ND	215	287	188	NS	NS	NS	NS	NS
XGM-93-02X	ND	570	270	790	410	ND	788	519	ND	ND	ND	124	ND	ND	65	268	101	94	79 J	84 J	210
XGM-94-04X	ND	420	140	ND	ND	ND	ND	ND	ND	ND	ND	533	765	497 J	1,140	186	65	480	360	ND	590
XGM-94-07X	ND	ND B	ND	ND	ND	ND	ND	113	ND	ND	ND	159	ND	66	120	58.8	NS	NS	NS	NS	NA
XGM-94-08X	120	150 B	100	140	120	ND	ND	125	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NA
XGM-97-12X	970	1,300	1,100	1,100	1,100	ND	2,370	1,740	1,230	ND	4,050	644	367	507 J	494	272	515	420	350	360	350
C_9-C_{12} Aliphatics - 700 µg/L VPH Standards																					
AAFES-2	ND	81	ND	200	ND	57	5,220	987	1,000	1,020	950	768	1,080	542 J	1,650	688	85.7	430	530 J	330 J	790
XGM-93-02X	ND	39	ND	58	33	34	1,570	268	94	182	55.5	ND	85.1	ND	100	76.6	ND	56	78 J	ND	79 J
XGM-94-07X	`	ND	ND	ND	ND	ND	ND	ND	ND	ND	89.1	54.5	90.5	ND	66.8	ND	NS	NS	NS	NS	NA
XGM-94-08X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.19 J	ND	ND	ND	ND	ND	NS	NS	NS	NS	NA
XGM-97-12X	96	ND	ND	130	ND	90	7,310	1,340	1,080	2,210	1,450	922	535	275 J	724	162	718	230	170 J	420 J	150 J
C_9-C_{10} Aromatics - 200 µg/L VPH Standards																					
AAFES-2	9,400	7,200	5,300	13,000	6,600	6,700	3,130	3,710	2,420	2,120	2,660	1,870	1,050	1,090	1,940	1,090	827	730	1,100 J	990	1,400
XGM-93-02X	510	2,300	1,100	3,600	1,600	3,700	918	766	228	325	110	73.4	ND	ND	ND	113	62.3	ND	ND	75 J	100
XGM-94-04X	200	570	170	28	ND	ND	ND	ND	ND	ND	ND	243	469	300 J	769	76.8	ND	320	410 J	ND	830
XGM-94-07X	ND	ND	ND	ND	ND	ND	ND	ND	ND	45.1 J	76.4	77.8	ND	ND	ND	ND	NS	NS	NS	NS	NA
XGM-94-08X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NA
XGM-97-12X	4,500	5,500	5,400	7,500	8,700	7,400	3,810	4,010	4,220	5,260	4,110	2,470 J	463	367 J	840	253	1,560	340	430 J	1,000	340

Notes:

0.333	= Detection	µg/L = microgram per liter	NA = Not analyzed
0.333	= Above background or monitoring criteria	J = Estimated result	ND = Non-detect
0.333	= Above cleanup goal	B = Blank Qualified	NS = not sampled

The cleanup goal for iron is the background level. The cleanup goal for manganese is a site-specific goal determined in 2008 (Long-Term Monitoring Plan Former Fort Devens Army Installation, HGL, 2008).
The VPH carbon ranges are not contaminants of concern and are evaluated against MCP GW-1 standards for comparison purposes. Benzene, ethylbenzene, xylenes, and toluene are not contaminants of concern but the cleanup goals are the Maximum Contaminant Levels.

Table H-2
AOC 43G Groundwater Analytical Results - Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Monitoring Criteria[2]	43GPZ-19-03		XGM-20-01A		Dup-01 XGM-20-01A		XGM-20-02A		XGM-20-03A	
				2/24/2020	Q	2/21/2020	Q	2/21/2020	Q	2/21/2020	Q	2/21/2020	Q
Dissolved Metals (Select List)													
Iron, Dissolved	µg/L	9,100	9,100	50	U	50	U	50	U	**22**	**J**	**210**	
Manganese, Dissolved	µg/L	375	291	**1.5**	**J**	**64**		**70**		**360**		***400***	**J**
General Chemistry													
Alkalinity, Total	mg/L	NS	NS	--		--		--		--		--	
Field Parameters													
Temperature	°Celsius	NS	NS	11.87		7.55		--		9.61		10.05	
pH	Std units	NS	NS	6.77		6.69		--		6.83		6.40	
Specific Conductance	µS/cm	NS	NS	1.881		1.79		--		1.832		1.796	
ORP	mV	NS	NS	223		210.8		--		190.3		170.5	
Dissolved Oxygen	mg/L	NS	NS	6.58		8.67		--		6.09		4.76	
Turbidity	NTU	NS	NS	2.41		3.36		--		6.03		5.27	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier

J = Estimated result
U = Non-detect
-- = Not analyzed

[1]The cleanup goal for iron is the background level. The cleanup goal for manganese is a site-specific goal determined in 2008 (Long-Term Monitoring Plan Former Fort Devens Army Installation, HGL, 2008). Benzene, ethylbenzene, xylenes, and toluene are not contaminants of concern but the cleanup goals are the Maximum Contaminant Levels (MCLs).

[2] The monitoring criteria for iron and manganese is the background from the RI (Final Remedial Investigation Report Area of Contamination (AOC) 43G, ABB Environmental Services, Inc., 1996). The monitoring criterion for arsenic is the MCL.

[3]The VPH carbon ranges are not contaminants of concern and are evaluated against Massachusetts Contingency Plan GW-1 standards for comparison purposes.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				2446-02											2446-03											
SAMPLING DATE				04/19/2013	10/30/2013	10/31/2013	04/23/2014	04/23/2014	11/04/2014	10/19/2015	10/05/2016	10/31/2017	11/03/2017	11/01/2018	04/18/2013	10/30/2013	04/23/2014	11/06/2014	10/19/2015	10/19/2015	10/04/2016	10/04/2016	10/31/2017	10/31/2017	11/02/2018	11/02/2018
UNIT SCREENED									OVERBURDEN											OVERBURDEN						
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals						Source Area											Source Area						
LAB IDs				L1307007-03	L1321909-08	L1322048-01	L1408563-02	L1408563-03	L1426386-01	L1526549-02	L1631742-05	L1739679-02	L1740369-01	L1844770-04	L1307011-01	L1321909-02	L1408563-01	L1426685-04	L1526549-03	L1526549-04	L1631468-02 L1632554-01	L1631468-03	L1739679-03	L1739679-04	L1845011-02	L1845011-03
								Duplicate												Duplicate		Duplicate		Duplicate		Duplicate
DTW				4.66	9.98	9.98	3.92	3.92	5.83	10.39	11.46	8.59	7.82	5.78	5.95	10.75	4.91	7.97	11.32	11.32	12.6	12.6	10.92	10.92	7.62	7.62
Ref Elev (RB or PVC)				368.9	368.9	368.9	368.9	368.9	368.9	368.9	368.9	368.9	368.9	368.9	369.2	369.2	369.2	369.2	369.2	369.2	369.2	369.2	369.2	369.2	369.2	369.2
Elevation				364.24	358.92	358.92	364.98	364.98	363.07	358.51	357.44	360.31	361.08	363.12	363.25	358.45	364.29	361.23	357.88	357.88	356.6	356.6	356.6	356.6	356.6	356.6
VPH (ug/L)																										
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	**2010**	**1540**	-	156	139	**1480**	**1030**	**505**	**842**	**1400**	**517**	**1730**	**779**	**587**	**444**	**666**	**589**	**436**	**398**	**649**	**670**	225	221
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	2010	1540	-	156	139	1480	1030	505	842	1400	517	1740	779	587	444	671	593	436	398	653	678	225	221
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	**1610**	**ND (1000)**	-	102	107	**873**	**399**	**ND (250)**	**504**	**ND (500)**	**566**	**740**	**725**	**401**	**503**	**665**	**556**	**448**	**416**	**630**	**632**	**332**	**336**
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	**2700**	**2420**	-	169	177	**1280**	**817**	**716**	384	**1000**	ND (100)	**990**	**1000**	**1000**	555	692	261	**844**	**799**	250	265	62	64
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	5500	2880	-	281	294	2670	1620	773	1500	1600	941	2050	2100	1580	1180	1540	968	1360	1290	1030	1060	403	408
Benzene	5	10000	NA	**ND (10)**	**ND (40)**	-	ND (2)	ND (2)	**ND (10)**	ND (2)	**ND (10)**	**ND (8)**	**ND (5)**	ND (4)	ND (5)	ND (5)	ND (5)	**ND (10)**	ND (2)	ND (2)	**ND (10)**	**ND (10)**	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	526	ND (40)	-	4.14	4.74	484	404	57.2	596	560	256	257	366	170	126	186	151	72.9	74.5	145	148	8	9
m,p-Xylenes	10000 *	5000 *	NA	608	453	-	5.46	5.64	35	3.15	ND (10)	13.8	16.	35.4	49.6	ND (5)	ND (5)	ND (10)	2.42	ND (2)	ND (10)	ND (10)	8.23	8.44	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (15)	ND (60)	-	ND (3)	ND (3)	ND (15)	3.28	ND (15)	ND (12)	ND (5)	ND (6)	8.06	ND (7.5)	ND (7.5)	ND (15)	4.79	4	ND (15)	ND (15)	ND (3)	3.8	ND (3)	ND (3)
Naphthalene	140	20000	NA	**154**	91.7	-	ND (4)	ND (4)	77.4	66.9	ND (20)	22.8	24.	27.8	32.4	13.9	16.2	ND (20)	9.38	4.72	ND (20)	ND (20)	15	15.6	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	48.1	ND (40)	-	ND (2)	ND (2)	ND (10)	ND (2)	ND (10)	ND (8)	ND (5)	ND (4)	10	10.3	ND (5)	ND (10)	ND (2)	ND (2)	ND (10)	ND (10)	ND (2)	2	ND (2)	ND (2)
Toluene	1000	40000	NA	ND (10)	ND (40)	-	ND (2)	ND (2)	ND (10)	ND (2)	ND (10)	ND (8)	ND (5)	ND (4)	ND (5)	ND (5)	ND (5)	ND (10)	ND (2)	ND (2)	ND (10)	ND (10)	3.72	3.8	ND (2)	ND (2)
Inorganic Compounds (mg/L)																										
Arsenic, Dissolved	NA	NA	0.01	-	-	**0.017**	-	-	**0.025**	**0.036**	**0.04**	**0.021**	-	**0.013**	-	**0.041**	-	ND (0.005)	0.008	**0.011**	0.006	0.006	**0.021**	**0.018**	**0.035**	**0.036**
Iron, Dissolved	NA	NA	9.1	-	-	0.05	-	-	**22**	**24**	**9.8**	**12**	-	6.22	-	5.2	-	**9.5**	8.3	8.3	4.1	4.3	**14.1**	**14.2**	**11.6**	**11.7**
Manganese, Dissolved	NA	NA	0.291	-	-	**22.5**	-	-	**50.5**	**25.7**	**8.96**	**10.3**	-	**2.2**	-	**3.5**	-	**9.72**	**8.01**	**7.69**	**3.38**	**3.57**	**3.66**	**3.58**	**2.93**	**2.94**
Other																										
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	-	3600	-	-	2800	3300	4100	1600	-	560	-	3100	-	6700	5300	5000	2800	1700	1500	1400	500	520
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.47	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	60.2	-	-	-	58.8	103	122	498	-	68.5	-	862	-	617	1450	1270	3070	3150	4840	5240	1680	1830
Bromide, Total (mg/L)	NA	NA	NA	-	-	0.475	-	-	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-	ND (0.05)	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	500	-	-	-	-	-	-	-	-	554	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	-	4.4	-	-	2.9	360	430	240	-	24	-	16	-	12	40	58	250	350	200	210	69	71
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	-	0.329	-	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	-	ND (0.032)	-	ND (0.1)	-	ND (1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.179	0.178
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	2600	-	1900	510	520	1500	1000	1300	390	-	190	1400	1300	250	3600	3000	3000	1100	360	550	410	160	180
Field Parameters	NA	NA																								
Temperature, Field (Deg C)	NA	NA	NA	-	-	-	10	10	18.2	-	-	18.1	-	17.5	-	18.5	9.8	16.6	19.24	19.24	20.03	20.03	18.7	18.7	17.7	17.7
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	4.17	-	-	1.78	1.78	0.44	-	-	0.85	-	0.65	-	0.38	0.16	0.08	0.41	0.41	0.48	0.48	0.37	0.37	0.29	0.29
Conductivity, Field (mS/cm)	NA	NA	NA	3.637	-	-	1.13	1.13	2.615	-	-	1.927	-	606	3.011	4	1.27	6.623	4.617	4.617	4.38	4.38	1.857	1.857	0.651	0.651
ORP, Field (mv)	NA	NA	NA	94	-	-	-129	-129	-144	-	-	-230	-	-39.9	-70.9	-220.2	-82	-141.7	-226.4	-226.4	-136	-136	-130	-130	-83.3	-83.3
Turbidity, Field (NTU)	NA	NA	NA	-	-	-	4.99	4.99	4.11	-	-	9.7	-	2.17	-	4.1	3.27	3.82	3.3	3.3	5.4	5.4	3.9	3.9	46.1	46.1
pH, Field (pH units)	NA	NA	NA	6.23	-	-	6.37	6.37	6.67	-	-	6.78	-	6.44	6.72	6.95	6.61	6.91	6.91	6.91	6.97	6.97	6.7	6.7	6.65	6.65

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	2446-04						HA-101	HA-102			HA-103			HA-104			HA-105		
SAMPLING DATE				10/29/2013	11/06/2014	10/20/2015	10/05/2016	10/31/2017	11/02/2018	11/21/2017	11/21/2017	08/17/2018	11/16/2018	11/22/2017	08/17/2018	11/16/2018	11/22/2017	08/16/2018	11/16/2018	11/21/2017	08/16/2018	11/19/2018
UNIT SCREENED				OVERBURDEN						OVERBURDEN	OVERBURDEN			OVERBURDEN			OVERBURDEN			OVERBURDEN		
LOCATION				Downgradient						Source Area	Source Area			Source Area			Downgradient			Downgradient		
LAB IDs				L1321816-02	L1426685-02	L1526658-01	L1631742-06	L1739679-05	L1845011-04	L1742929-01	L1742929-02	L1832548-01	L1847226-01	L1743159-01	L1832548-02	L1847226-02	L1743159-02	L1832246-06	L1847226-03	L1742929-03	L1832246-04	L1847433-01
DTW				11.4	8.35	11.86	3.89	11.39	8.7	8.12	8.07	6.82	-	8.37	7.13	-	8.36	7.3	-	8.25	7.18	-
Ref Elev (RB or PVC)				369.4	369.4	369.4	369.4	369.4	369.4	368.5	368.5	368.5	-	368.5	368.5	-	368.3	368.3	-	368.3	368.3	-
Elevation				358	361.05	357.54	365.51	358.01	360.7	360.38	360.43	361.68	-	360.13	361.37	-	359.94	361	-	360.05	361.12	-
VPH (ug/L)																						
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	**311**	175	252	ND (250)	154	216	**3520**	**9350**	**6190**	**5480**	**5430**	**3690**	**3890**	**3410**	**4640**	**4130**	**672**		**677**
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	311	178	256	ND (250)	154	216	3520	9350	6190	5480	5430	3690	3890	3410	4640	4130	672	932	677
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	**281**	**221**	**290**	**ND (250)**	113	**212**	**4810**	**4590**	**3240**	**2410**	**7530**	**4720**	**5020**	**3580**	**2780**	**2660**	**603**	**539**	**368**
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	229	175	208	581	ND (50)	ND (50)	ND (500)	**ND (1000)**	**896**	356	**ND (1000)**	**889**	326	**ND (1000)**	**705**	ND (250)	118	142	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	510	397	501	581	154	254	6290	7960	6340	4150	10100	7080	7050	6520	5200	4290	1140	1000	656
Benzene	5	10000	NA	ND (2)	3.39	4.76	**ND (10)**	ND (2)	ND (2)	**ND (20)**	**ND (40)**	ND (20)	**ND (10)**	**ND (40)**	ND (20)	**ND (10)**	**ND (40)**	ND (10)	**ND (10)**	ND (4)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	2.23	ND (10)	ND (2)	ND (2)	**702**	**1720**	**1440**	**968**	**1070**	**846**	**970**	**1300**	**967**	**846**	157	171	145
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	544	**1190**	765	397	799	623	730	**1020**	726	632	256	146	108
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (15)	ND (3)	ND (3)	-	-	ND (30)	ND (15)	-	ND (30)	ND (15)	-	ND (15)	ND (15)	-	ND (3)	ND (3)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (20)	ND (4)	ND (4)	-	-	**364**	**261**	-	**225**	**260**	-	**256**	**212**	-	40	25.9
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	ND (20)	ND (40)	ND (20)	12.8	ND (40)	ND (20)	ND (10)	ND (40)	13.9	12.6	6.63	3.14	2.85
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	ND (20)	ND (40)	ND (20)	ND (10)	ND (40)	ND (20)	ND (10)	ND (40)	ND (10)	ND (10)	ND (4)	2.12	ND (2)
Inorganic Compounds (mg/L)																						
Arsenic, Dissolved	NA	NA	0.01	**0.075**	**0.062**	**0.153**	**0.164**	**0.062**	**0.113**	**0.0494**	**0.0759**	**0.0941**	**0.046**	**0.105**	**0.114**	**0.102**	**0.0483**	**0.0742**	**0.064**	0.0075	**0.0187**	**0.016**
Iron, Dissolved	NA	NA	9.1	**41**	**53**	**44**	**43**	**21.8**	**26**	**21.9**	**14.9**	**14.6**	4.68	**30.7**	**29.6**	**27.2**	**24**	**12.9**	**11.3**	2.07	4.43	4.88
Manganese, Dissolved	NA	NA	0.291	**5.94**	**6.13**	**4.47**	**3.9**	**8.35**	**2.94**	**9.29**	**13.4**	**11.5**	**4.77**	**10.5**	**8.37**	**6.25**	**13.3**	**5.35**	**4.15**	**10.6**	**1.7**	**3.63**
Other																						
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	700	1600	1400	1800	1800	1100	1500	1500	-	-	1200	-	-	1300	-	-	1200	-	-
Ethane (ug/L)	NA	NA	NA	ND (0.5)	0.754	-	-	-	-	0.647	1.25	-	-	0.949	-	-	0.991	-	-	1.12	-	-
Methane (ug/L)	NA	NA	NA	990	640	1240	1060	612	1100	154	730	-	-	635	-	-	262	-	-	230	-	-
Bromide, Total (mg/L)	NA	NA	NA	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-	ND (0.05)	ND (0.05)	-	-	ND (0.05)	-	-	0.058	-	-	0.059	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	35	22	37	530	740	310	340	330	-	-	330	-	-	400	-	-	370	-	-
Nitrate (as N), Total (mg/L)	NA	NA	NA	ND (0.1)	ND (1)	ND (0.1)	0.129	ND (0.1)	ND (0.032)	ND (0.1)	ND (0.1)	-	-	ND (0.1)	-	-	ND (0.1)	-	-	ND (0.1)	-	-
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	290	810	580	350	180	190	120	85	-	-	30	-	-	31	-	-	65	-	-
Field Parameters	NA	NA																				
Temperature, Field (Deg C)	NA	NA	NA	-	17	17.68	20.2	18.8	18.5	16.7	16.7	18.92	15	15.6	19.55	14.1	15.6	20.11	14.6	15.1	26.08	14.6
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	0.4	0.06	0.48	0.56	0.39	0.18	1.01	0.37	0.3	0.68	0.46	0.33	0.52	1.06	0.44	0.44	1.11	1.39	1.91
Conductivity, Field (mS/cm)	NA	NA	NA	1.1	2.069	1.67	2.865	2.533	1.173	2.102	2.103	1.883	1.083	1.79	1.58	0.971	1.913	1.518	0.92	1.799	0.131	0.792
ORP, Field (mv)	NA	NA	NA	-92.2	-117	-133.7	-112.5	-43	-119	-90	-78	-24	-93	-104	-42	-140	-60.5	-164	-107	-68.5	-37	-19
Turbidity, Field (NTU)	NA	NA	NA	2.48	7.49	0.8	2.8	4.6	4.17	18.9	4.1	4.4	2.99	1.7	5.	4.1	28.2	4.8	4.02	4.7	4.5	3.77
pH, Field (pH units)	NA	NA	NA	6.51	6.63	6.8	6.45	6.42	6.76	7.07	7.07	6.72	6.67	6.85	6.78	6.78	6.7	6.64	6.73	6.99	5.94	5.75

ABBREVIATIONS:
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ug/L: microgram per liter
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RB: Road Box
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GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	HA-1B								HA-1S												
SAMPLING DATE				04/18/2013	10/28/2013	04/24/2014	11/11/2014	10/26/2015	10/10/2016	11/06/2017	11/09/2018	04/18/2013	04/18/2013	10/25/2013	04/24/2014	11/11/2014	10/26/2015	10/26/2015	10/10/2016	10/10/2016	11/06/2017	11/06/2017	11/09/2018	11/09/2018
UNIT SCREENED								BEDROCK										OVERBURDEN						
LOCATION								Downgradient										Downgradient						
LAB IDs				L1307011-04	L1321712-05	L1408688-03	L1427157-02	L1527320-03	L1632257-04	L1740564-02	L1846106-02	L1307011-03	L1307011-05	L1321626-05	L1408688-02	L1427157-01	L1527320-02	L1527320-04	L1632257-01	L1632257-02	L1740564-03	L1740564-04	L1846106-03	L1846106-04
													Duplicate					Duplicate		Duplicate		Duplicate		Duplicate
DTW				9.95	13.89	4.41	5.4	8.84	15.18	11.71	10.64	10.01	10.01	13.89	4.34	5.4	11.74	11.74	15.38	15.38	11.45	11.45	10.56	10.56
Ref Elev (RB or PVC)				371.51	371.5	371.5	371.5	371.5	371.5	371.5	371.5	371.38	371.38	371.5	371.5	371.5	371.4	371.4	371.4	371.4	371.5	371.5	371.5	371.5
Elevation				361.56	357.61	367.09	366.1	362.66	356.32	359.79	360.86	361.37	361.37	357.61	367.16	366.1	359.66	359.66	356.02	356.02	360.05	360.05	360.94	360.94
VPH (ug/L)																								
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	243	**480**	242	194	**411**	**304**	263	**324**	**1720**	**1700**	**990**	**2120**	**741**	**866**	**766**	**515**	**481**	**636**	**632**	**2590**	**2360**
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	243	486	242	194	411	304	263	324	1760	1740	1010	2150	748	870	766	515	481	644	640	2590	2360
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	67.5	185	81.2	97.4	140	96.3	171	116	**467**	**482**	**495**	**768**	**397**	**362**	**344**	**221**	**208**	**455**	**464**	**658**	**567**
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	109	162	98.8	95.3	171	215	ND (50)	ND (50)	**758**	**766**	441	**814**	378	239	275	449	424	90.1	91.3	122.	110.
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	184	351	180	193	311	311	188	142	1420	1450	965	1700	785	601	619	670	632	647	658	853	744
Benzene	5	10000	NA	ND (2)	2.4	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (4)	ND (4)	3.4	ND (2)	2.76	ND (2)	ND (2)	ND (2)	ND (2)	2.67	2.67	ND (4)	ND (4)
Ethylbenzene	700	5000	NA	8.4	3.19	ND (2)	ND (2)	ND (2)	ND (2)	7.4	3.36	196	200	30	120	9.86	ND (2)	ND (2)	ND (2)	ND (2)	102	102	56	50
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (4)	ND (4)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	18.2	16.4
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	3.12	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	30.4	30.4	9.94	20.4	4.21	3.54	3	ND (3)	ND (3)	ND (3)	ND (3)	ND (6)	ND (6)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	9.84	8.93	4.58	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	11.7	11.5
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (4)	ND (4)	ND (2)	2.23	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (4)	ND (4)
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	8.35	8.58	2.93	4.83	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	4.64	4.66	4.56	4.54
Inorganic Compounds (mg/L)																								
Arsenic, Dissolved	NA	NA	0.01	-	**0.03**	-	**0.022**	**0.038**	**0.034**	**0.032**	**0.028**	-	-	**0.036**	-	**0.037**	**0.053**	**0.054**	**0.047**	**0.046**	**0.05**	**0.052**	**0.037**	**0.036**
Iron, Dissolved	NA	NA	9.1	-	8.7	-	5.4	7.3	8.6	7.96	3.47	-	-	**37**	-	**17**	**18**	**18**	**26**	**25**	**22.3**	**22.7**	5.32	5.42
Manganese, Dissolved	NA	NA	0.291	-	**46.1**	-	**27.2**	**22.3**	**27.1**	**23.4**	**12.7**	-	-	**45.4**	-	**18.7**	**18.6**	**18.8**	**27.4**	**27**	**23.5**	**24**	**6.59**	**7**
Other																								
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	2200	-	1400	1100	1400	1300	1100	-	-	1400	-	710	540	540	930	940	820	860	220	220
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	466	-	0.657	309	380	600	559	-	-	597	-	444	334	327	434	520	1020	971	535	542
Bromide, Total (mg/L)	NA	NA	NA	-	ND (0.05)	-	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-	ND (0.05)	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	186	-	-	-	-	-	-	-	-	291	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	16	-	9.2	41	92	81	55	-	-	13	-	6	49	48	120	120	100	100	15	15
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	ND (0.1)	-	ND (1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.032)	-	-	0.161	-	ND (1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.032)	ND (0.032)
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	1800	1300	2700	800	510	700	550	400	210	200	820	160	270	160	180	280	290	270	260	ND (1.4)	ND (1.4)
Field Parameters	NA	NA																						
Temperature, Field (Deg C)	NA	NA	NA	-	14.2	13.1	14.6	14.57	16.5	13.2	12.9	-	-	-	10.7	15.4	15.73	15.73	13.85	13.85	13.7	13.7	13.5	13.5
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	2.83	0.51	0.17	0.01	0.44	0.92	0.47	1.43	-	-	-	0.09	0.01	0.41	0.41	1.2	1.2	0.43	0.43	1.54	1.54
Conductivity, Field (mS/cm)	NA	NA	NA	3.168	2.17	4.49	1.38	1.132	1.488	1.239	0.800	0.692	0.692	-	0.76	0.986	0.739	0.739	1.312	1.312	0.962	0.962	0.292	0.292
ORP, Field (mv)	NA	NA	NA	19.3	-84.6	-24	-45.4	-157.7	-49.6	-295	-97	-43.4	-43.4	-	-82	-104.8	-134.5	-134.5	-72.2	-72.2	-299	-299	-140	-140
Turbidity, Field (NTU)	NA	NA	NA	-	7.5	14.3	9.23	15	0.7	4.1	3.87	-	-	-	2.99	10	1.5	1.5	0.9	0.9	1.9	1.9	1.11	1.11
pH, Field (pH units)	NA	NA	NA	7.54	6.56	6.55	6.62	6.6	6.49	6.75	6.62	6.87	6.87	-	6.77	6.63	6.67	6.67	6.5	6.5	6.82	6.82	6.84	6.84

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
   Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
   ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				HA-2B						HA-2S						HA-3B					
SAMPLING DATE				10/25/2013	12/05/2014	10/23/2015	10/07/2016	11/03/2017	11/07/2018	10/24/2013	12/05/2014	10/23/2015	10/07/2016	11/03/2017	11/07/2018	10/25/2013	11/07/2014	10/23/2015	10/07/2016	11/03/2017	11/09/2018
UNIT SCREENED				BEDROCK						OVERBURDEN						BEDROCK					
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	Downgradient						Downgradient						Downgradient					
LAB IDs				L1321626-01	L1429266-01	L1527203-05	L1632027-04	L1740370-05	L1845601-04	L1321513-05	L1429266-02	L1527203-04	L1632027-03	L1740370-04	L1845601-03	L1321626-03	L1426838-02	L1527203-02	L1632027-02	L1740370-02	L1846106-06
DTW				10.83	6.98	11.08	12.05	9.12	6.82	9.84	7.84	9.9	10.43	8.11	7.85	10.4	6.9	9.96	8.67	6.88	6.37
Ref Elev (RB or PVC)				366.1	366.1	366.1	366.1	366.1	366.1	366.0	366.0	366	366	366.0	366.0	363.7	363.7	363.7	363.7	363.7	363.7
Elevation				355.27	359.12	355.02	354.05	356.98	359.28	356.16	358.16	356.1	355.57	357.89	358.15	353.3	356.8	353.74	355.03	356.82	357.33
VPH (ug/L)																					
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	67.5	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	67.5	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Benzene	5	10000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Inorganic Compounds (mg/L)																					
Arsenic, Dissolved	NA	NA	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)	ND (0.005)	ND (0.005)	ND (0.005)	0.007	ND (0.005)	ND (0.002)	0.006	0.006	ND (0.005)	0.007	0.006	ND (0.002)
Iron, Dissolved	NA	NA	9.1	0.25	0.27	0.14	0.1	0.121	0.27	0.08	1.4	0.66	0.3	ND (0.05)	ND (0.009)	0.48	0.29	0.29	0.2	0.186	ND (0.009)
Manganese, Dissolved	NA	NA	0.291	**2.78**	**3.51**	**2.59**	**2.22**	**2.49**	**1.88**	**2.8**	**3.24**	**4.79**	**4.79**	0.201	**0.318**	0.238	0.135	0.08	0.062	0.069	0.047
Other																					
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	780	1300	-	980	1200	900	530	1100	-	1600	560	720	160	150	-	200	170	240
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide, Total (mg/L)	NA	NA	NA	0.281	0.166	ND (0.05)	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	181	-	-	-	-	-	252	-	-	-	-	-	132	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	42	34	-	45	66	70	43	16	-	180	110	230	15	15	-	18	18	20
Nitrate (as N), Total (mg/L)	NA	NA	NA	ND (0.1)	ND (0.1)	-	ND (0.1)	ND (0.1)	ND (0.032)	ND (0.1)	ND (0.1)	-	ND (0.1)	0.219	0.354	ND (0.1)	ND (0.1)	-	ND (0.1)	ND (0.1)	ND (0.032)
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	370	690	620	550	590	390	150	490	830	750	120	100	ND (10)	12	17	27	34	43
Field Parameters	NA	NA																			
Temperature, Field (Deg C)	NA	NA	NA	-	-	12.86	14.28	14.3	13.2	-	-	13.94	16.61	16	14.2	-	16.0	15.8	17.14	17.0	15.2
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	-	-	0.62	0.66	0.43	0.42	-	-	0.66	1.29	5.3	2.76	-	0.040	0.79	1.02	0.500	2.13
Conductivity, Field (mS/cm)	NA	NA	NA	-	-	1.458	1.318	1.218	0.924	-	-	1.878	1.95	0.751	1.074	-	0.3129	0.280	0.298	0.300	0.348
ORP, Field (mv)	NA	NA	NA	-	-	-116.5	-43.7	15.6	-119.	-	-	-71.5	-63.6	97	-1.3	-	-160.5	-183.6	-150.2	-157	-87
Turbidity, Field (NTU)	NA	NA	NA	-	-	3.9	1.2	4.1	3.59	-	-	7.4	1.3	6.5	2.31	-	26.5	9.2	3.4	14.1	12.4
pH, Field (pH units)	NA	NA	NA	-	-	6.86	6.91	7.13	6.98	-	-	6.7	6.77	6.73	6.44	-	7.47	7.63	7.44	7.81	7.79

ABBREVIATIONS:
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mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				HA-3S						HA-4B						HA-4S					
SAMPLING DATE				10/24/2013	11/07/2014	10/22/2015	10/06/2016	11/02/2017	11/06/2018	10/25/2013	11/10/2014	10/22/2015	10/06/2016	11/02/2017	11/06/2018	10/24/2013	11/10/2014	10/23/2015	10/07/2016	11/03/2017	11/07/2018
UNIT SCREENED				OVERBURDEN						BEDROCK						OVERBURDEN					
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	Downgradient						Downgradient						Downgradient					
LAB IDs				L1321513-03	L1426838-01	L1527008-03	L1631871-04	L1740179-04	L1845411-03	L1321626-04	L1427012-02	L1527008-02	L1631871-03	L1740179-03	L1845411-02	L1321513-04	L1427012-01	L1527203-01	L1632027-01	L1740370-01	L1845601-01
DTW				11.31	8.31	11.4	11.82	10.31	9.14	10.49	6.88	10.65	11.83	9.03	6.64	10.65	7.35	10.88	11.32	9.45	7.95
Ref Elev (RB or PVC)				363.6	363.6	363.6	363.6	363.6	363.6	366.1	366.1	366.1	366.1	366.1	366.1	366.3	366.3	366.3	366.3	366.3	366.3
Elevation				352.29	355.29	352.2	351.78	353.29	354.46	355.61	359.22	355.45	354.27	357.07	359.46	355.65	358.95	355.42	354.98	356.85	358.35
VPH (ug/L)																					
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Benzene	5	10000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Inorganic Compounds (mg/L)																					
Arsenic, Dissolved	NA	NA	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)	0.009	ND (0.005)	0.008	0.006	0.008	0.007	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.007	ND (0.002)
Iron, Dissolved	NA	NA	9.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.009)	0.06	0.05	0.15	0.07	0.114	ND (0.009)	ND (0.05)	ND (0.05)	0.08	ND (0.05)	ND (0.05)	ND (0.009)
Manganese, Dissolved	NA	NA	0.291	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.002)	0.041	0.077	0.069	0.048	0.075	ND (0.002)	0.019	ND (0.01)	0.021	ND (0.01)	ND (0.01)	ND (0.002)
Other																					
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	350	400	430	1800	2100	1400	-	-	-	-	-	-	-	-	-	-	-	-
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide, Total (mg/L)	NA	NA	NA	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	249	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	24	20	71	810	980	640	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate (as N), Total (mg/L)	NA	NA	NA	0.969	0.737	1.4	2.2	3.44	3.91	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	29	31	25	23	28	26	ND (10)	ND (10)	ND (10)	11	ND (10)	ND (1.4)	20	19	19	23	22	13
Field Parameters	NA	NA																			
Temperature, Field (Deg C)	NA	NA	NA	-	16.7	19.56	20.9	18.9	16.4	-	16.1	16.82	16.27	16.7	15.1	-	15.7	-	19.24	18.0	16.7
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	-	0.43	1.48	2.35	0.18	2.2	-	0.04	0.54	0.84	0.52	0.46	-	4.93	-	3.62	1.47	4.77
Conductivity, Field (mS/cm)	NA	NA	NA	-	0.606	0.637	2.956	2.845	0.999	-	0.276	0.249	0.278	0.326	0.259	-	0.531	-	1.834	1.472	1.681
ORP, Field (mv)	NA	NA	NA	-	47.7	43.3	66	-106	28.1	-	-158.1	-146	-78	-129	-62	-	76.7	-	-13.7	209	67.5
Turbidity, Field (NTU)	NA	NA	NA	-	32.8	1	4.6	4.2	2.33	-	9.31	1.5	4.5	2.1	2.38	-	5.07	-	3.2	2.6	9.17
pH, Field (pH units)	NA	NA	NA	-	7.14	6.93	6.51	6.83	6.64	-	7.73	7.5	7.36	7.61	7.33	-	7.36	-	6.83	7.28	6.22

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				HA-5S												HA-6B						XJM-93-01X					
SAMPLING DATE				10/30/2013	11/04/2014	10/20/2015	10/20/2015	10/05/2016	11/01/2017	11/01/2017	11/03/2017	08/16/2018	08/16/2018	11/05/2018	11/05/2018	10/30/2013	11/06/2014	10/21/2015	10/05/2016	11/01/2017	11/05/2018	10/24/2013	11/10/2014	10/19/2015	10/04/2016	10/31/2017	11/2/2018
UNIT SCREENED				OVERBURDEN												BEDROCK						OVERBURDEN					
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	Source Area												Source Area						Upgradient					
LAB IDs				L1321909-07	L1426395-01	L1526658-04	L1526658-05	L1632554-03	L1739871-03	L1739871-04	L1740369-02	L1832246-01	L1832246-02	L1845198-02	L1845198-03	L1321909-04	L1426685-01	L1526909-01	L1632554-04	L1739871-05	L1845198-04	L1321513-01	L1427012-03	L1526549-01	L1631468-01	L1739679-01	L1845011-01
							Duplicate	L1632554-02		Duplicate			Duplicate		Duplicate				L1631742-03								
DTW				10.28	6.15	10.42	10.42	11.72	8.87	8.87	7.93	6.73	6.73	6.1	6.1	10.51	6.45	10.98	11.91	8.63	6.50	8.99	5.65	11.6	14.01	6.00	6.39
Ref Elev (RB or PVC)				368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.8	368.9	368.9	368.9	368.9	368.9	368.9	371.4	371.4	371.4	371.4	371.4	371.4
Elevation				358.52	362.65	358.38	358.38	357.08	359.93	359.93	360.87	362.07	362.07	362.7	362.7	358.39	362.45	357.92	356.99	360.27	362.4	362.41	365.75	359.8	357.39	365.4	365.01
VPH (ug/L)																											
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	**1790**	**909**	**646**	**664**	**1640**	**1780**	**1700**	**1600**	**2040**	**1790**	**1060**	**1280**	**931**	**715**	**828**	**908**	**2540**	**2680**	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	1820	909	646	664	1640	1780	1700	1600	2040	1790	1060	1280	931	730	841	908	2560	2710	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	**1580**	**872**	**795**	**1010**	**2960**	**4920**	**4940**	**2700**	**4690**	**4600**	**2080**	**2190**	**706**	**450**	**398**	**464**	**690**	**860**	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	**2040**	**1080**	**1060**	**1460**	**6900**	ND (500)	ND (500)	**2200**	**1210**	**1260**	612	388	**1210**	438	368	**903**	258	141	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	4560	2340	2380	3240	11800	7870	8180	7200	8590	8580	3990	3910	2400	930	812	1470	1060	1100	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Benzene	5	10000	NA	**ND (10)**	ND (5)	**ND (10)**	**ND (10)**	**ND (32)**	**ND (20)**	**ND (20)**	**ND (10)**	ND (20)	ND (20)	**ND (10)**	**ND (10)**	**ND (10)**	3.83	3.83	**ND (10)**	**6.83**	**11.6**	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	190	301	486	693	**1250**	**1770**	**1850**	**1500**	**1650**	**1670**	**950**	**964**	480	42.3	45.8	89.2	65.2	59	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
m,p-Xylenes	10000 *	5000 *	NA	586	81.4	41.3	76.9	751	**1030**	**1100**	760	**1050**	**1050**	345	367	ND (10)	ND (2)	ND (2)	16.1	42.5	36	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (15)	ND (7.5)	ND (15)	ND (15)	ND (48)	ND (30)	ND (30)	ND (10)	ND (30)	ND (30)	ND (15)	ND (15)	ND (15)	8.98	9.06	ND (15)	ND (7.5)	15.3	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Naphthalene	140	20000	NA	137	135	**154**	**224**	**402**	**411**	**455**	**350**	**391**	**396**	138	137	ND (20)	4.6	4.8	ND (20)	19.8	17.4	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	162	13.5	ND (10)	ND (10)	ND (32)	ND (20)	ND (20)	ND (10)	ND (20)	ND (20)	ND (10)	ND (10)	ND (10)	ND (2)	ND (2)	ND (10)	ND (5)	ND (5)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	1000	40000	NA	30.7	ND (5)	ND (10)	ND (10)	ND (32)	ND (20)	ND (20)	ND (10)	ND (20)	ND (20)	ND (10)	ND (10)	ND (10)	2.28	ND (2)	ND (10)	8.91	ND (5)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Inorganic Compounds (mg/L)																											
Arsenic, Dissolved	NA	NA	0.01	**0.021**	**0.014**	**0.021**	**0.03**	**0.059**	**0.045**	**0.047**	-	**0.0369**	**0.0368**	**0.016**	**0.017**	**0.046**	0.01	0.009	**0.023**	**0.019**	**0.012**	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)
Iron, Dissolved	NA	NA	9.1	0.05	**9.5**	**12**	**12**	**30**	**24.5**	**24.6**	-	**20.1**	**19.8**	8.82	**9.15**	**73**	6.2	**14**	7.9	8.22	6.9	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.009)
Manganese, Dissolved	NA	NA	0.291	**72**	**22.5**	**21.8**	**21.7**	**17.7**	**13**	**13.3**	-	**9.88**	**9.86**	**6.78**	**6.97**	**54**	**3.86**	**8.07**	**4.86**	**3.8**	**3.08**	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.002)
Other																											
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	140	450	320	140	140
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND (5)	ND (0.5)	ND (1)	2.13	ND (1)	ND (1)
Bromide, Total (mg/L)	NA	NA	NA	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-	-	-	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7	1.7	200	54	15	3
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.401	ND (0.1)	0.214	0.528	ND (0.1)	0.124
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	2800	1100	510	360	380	83	100	-	-	-	210	230	3400	68	77	91	16	ND (1.4)	10	11	16	17	17	11
Field Parameters	NA	NA																									
Temperature, Field (Deg C)	NA	NA	NA	17.6	18	-	-	19.5	17.6	-	-	23.03	23.03	17.0	17.0	16.4	16.2	16.77	18.76	16.6	16.1	-	15.4	12.17	15.66	15.1	14.9
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	0.76	0.11	-	-	2.82	0.48	-	-	0.74	0.74	0.50	0.50	0.4	0.04	0.54	0.45	0.37	0.24	-	4.03	5.4	4.58	6.84	3.06
Conductivity, Field (mS/cm)	NA	NA	NA	5.03	2.114	-	-	1.735	1.444	-	-	1.365	1.365	0.629	0.629	5.43	0.574	1.021	0.806	0.354	0.253	-	0.2084	0.669	0.467	0.168	0.209
ORP, Field (mv)	NA	NA	NA	-41.2	-166.2	-	-	-53.8	-320	-	-	-170.5	-170.5	-81	-81	-131	-127	-151.6	-98	-162	-112	-	103	252.3	120	62.3	87.7
Turbidity, Field (NTU)	NA	NA	NA	44.1	21.6	-	-	8.8	2.7	-	-	9.1	9.1	3.63	3.63	4.17	3.64	1.5	4	3.4	3.18	-	1.96	0.6	4	2.3	0.93
pH, Field (pH units)	NA	NA	NA	6.2	6.63	-	-	6.18	6.78	-	-	6.66	6.66	6.62	6.62	6.39	6.62	6.55	6.44	6.68	6.77	-	6.34	6.55	6.86	6.31	6.53

ABBREVIATIONS:
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ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	XJM-93-02X						XJM-93-03X						XJM-93-04X						XJM-94-05X							
SAMPLING DATE				10/24/2013	11/06/2014	10/20/2015	10/06/2016	11/01/2017	11/06/2018	10/29/2013	11/12/2014	10/22/2015	10/06/2016	11/02/2017	11/06/2018	10/30/2013	11/10/2014	10/16/2015	10/04/2016	10/30/2017	11/01/2018	04/19/2013	10/31/2013	04/23/2014	11/05/2014	10/20/2015	10/05/2016	11/01/2017	11/05/2018
UNIT SCREENED				OVERBURDEN						OVERBURDEN						BEDROCK						OVERBURDEN							
LOCATION				Downgradient						Downgradient						Upgradient						Source Area							
LAB IDs				L1321513-02	L1426685-03	L1526658-03	L1631871-05	L1739871-02	L1845411-05	L1321816-03	L1427292-01	L1527008-01	L1631871-02	L1740179-02	L1845411-01	L1321909-01	L1427012-04	L1526369-02	L1631485-02	L1739433-01	L1844770-02	L1307007-01	L1322048-02	L1408563-05	L1426559-02	L1526658-02	L1631742-01 L1632554-02	L1739871-01	L1845198-01
DTW				13.49	10.91	13.96	14.95	13.56	10.96	9.92	6.52	10.24	11.40	9.44	7.30	11.59	3.14	11.13	9.93	5.91	6.58	5.2	10.19	4.97	6.4	10.39	11.61	8.72	6.55
Ref Elev (RB or PVC)				370.6	370.6	370.6	370.6	370.6	370.6	368.0	368.0	368.0	368.0	368.0	368.0	371.2	371.2	371.2	371.2	371.2	371.2	368.5	368.5	368.5	368.5	368.5	368.5	368.5	368.5
Elevation				357.11	359.69	356.64	355.65	357.04	359.64	358.08	361.48	357.76	356.6	358.56	360.7	359.61	368.06	360.07	361.27	365.29	364.62	363.3	358.31	363.53	362.1	358.11	356.89	359.78	361.95
VPH (ug/L)																													
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	55.5	63.3	ND (50)	71.4	56	68.6	ND (50)	ND (50)	ND (250)	ND (50)	ND (50)	**473**	**303**	270	**748**	**573**	**730**	**2700**	**740**
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	55.5	63.3	ND (50)	71.4	56	68.6	ND (50)	ND (50)	ND (250)	ND (50)	ND (50)	473	303	270	748	573	730	2720	755
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	69.4	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	**ND (250)**	ND (50)	ND (50)	**644**	**479**	175	**760**	**812**	**587**	**1840**	**496**
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	72.3	124	ND (50)	60.7	ND (50)	85.2	ND (50)	ND (50)	ND (250)	ND (50)	ND (50)	**1160**	487	631	**1050**	**791**	**1060**	ND (250)	97.5
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	72.3	124	ND (50)	60.7	ND (50)	87.4	ND (50)	ND (50)	ND (250)	ND (50)	ND (50)	2390	1090	965	2160	1780	1720	2980	752
Benzene	5	10000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	**ND (10)**	ND (2)	ND (2)	**ND (10)**	ND (4)	ND (4)	**ND (10)**	**ND (8)**	**ND (10)**	**ND (10)**	2.81
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	386	128	128	333	168	54	**799**	85.2
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	2.14	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	191	ND (4)	31	21.6	8.87	17.9	198	68
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (15)	ND (3)	ND (3)	ND (15)	ND (6)	ND (6)	ND (15)	ND (12)	ND (15)	ND (15)	5.48
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (20)	ND (4)	ND (4)	82.8	43.8	17.1	62.2	21.8	ND (20)	94.2	21.8
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	ND (10)	ND (4)	ND (4)	ND (10)	ND (8)	ND (10)	ND (10)	5.51
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)	ND (10)	ND (4)	ND (4)	ND (10)	ND (8)	ND (10)	20.6	6.59
Inorganic Compounds (mg/L)																													
Arsenic, Dissolved	NA	NA	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)	0.006	**0.014**	0.01	**0.013**	**0.014**	0.008	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)	-	**0.033**	-	**0.04**	**0.053**	**0.079**	**0.064**	0.005
Iron, Dissolved	NA	NA	9.1	0.78	0.12	0.24	ND (0.05)	ND (0.05)	ND (0.009)	1.6	**14**	2.4	4.3	6.18	4.64	ND (0.05)	ND (0.05)	0.22	ND (0.05)	0.068	ND (0.009)	-	8.5	-	**17**	**10**	**32**	**16**	0.658
Manganese, Dissolved	NA	NA	0.291	**9.87**	**0.652**	**1.11**	ND (0.01)	0.04	ND (0.002)	**0.89**	**5.22**	**7.95**	**2.38**	**5.14**	**2.89**	0.132	ND (0.01)	0.02	ND (0.01)	ND (0.01)	ND (0.002)	-	**7.28**	-	**3.4**	**1.71**	**6.04**	**2.45**	**1.74**
Other																													
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	-	-	-	-	-	140	910	2200	720	1600	1200	-	-	-	-	-	-	-	1500	-	2200	1000	1500	890	430
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.5	-	0.615	767	214	2330	453
Bromide, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	217	-	-	-	-	-	-	-	-	-	-	-	-	-	522	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	11	27	260	80	350	250	-	-	-	-	-	-	-	3.2	-	6.1	140	560	240	49
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.115	-	-	-	-	-	-	-	ND (0.1)	-	ND (0.2)	ND (0.1)	ND (0.1)	ND (0.1)	0.127
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	220	63	58	30	10	ND (1.4)	31	460	1100	360	510	320	-	-	-	-	-	-	1200	540	960	1100	160	130	55	10
Field Parameters	NA	NA																											
Temperature, Field (Deg C)	NA	NA	NA	-	14.8	-	20.72	17.2	16.3	-	17.7	19.12	20.34	18.5	17.3	-	14.2	15.5	16.1	14.7	13.9	-	18.8	10	18.4	19.24	20.45	17.6	15.5
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	-	1.65	-	6.84	3.57	4.00	-	0	3.52	0.48	0.38	0.80	-	3.8	0.93	5.73	4.01	3.78	1.08	1.14	2.07	2.27	0.3	0.37	0.35	24.0*
Conductivity, Field (mS/cm)	NA	NA	NA	-	0.3236	-	2.182	0.322	0.182	-	1.383	2.585	1.069	2.489	0.929	-	0.976	0.283	0.122	0.124	0.114	1.99	1.9	2.33	2.884	1.416	2.646	1.227	0.479
ORP, Field (mv)	NA	NA	NA	-	157.3	-	91.7	-160	109	-	-96.6	-6.8	-189.3	-243	-76	-	113	148.3	165.6	178	128	-16.7	-57.4	2	-111	-158.1	-119.4	-149	27.5
Turbidity, Field (NTU)	NA	NA	NA	-	4.62	-	113	6.4	1.05	-	20.2	53.7	6.9	4.8	13.4	-	4.91	3.6	10.9	2	4.51	-	41.2	19.9	5.22	0.7	12.6	4.5	20.8
pH, Field (pH units)	NA	NA	NA	-	5.92	-	5.72	5.9	5.97	-	6.68	6.59	6.67	6.69	6.54	-	6.33	6.67	6.57	6.72	6.65	6.27	6.58	6.45	6.77	6.75	6.36	6.88	6.83

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				XJM-94-06X						XJM-94-07X						XJM-94-08X					
SAMPLING DATE				10/31/2013	11/05/2014	10/23/2015	10/06/2016	11/03/2017	11/07/2018	10/25/2013	11/07/2014	10/26/2015	10/10/2016	11/06/2017	11/09/2018	10/28/2013	11/11/2014	10/26/2015	10/11/2016	11/07/2017	11/12/2018
UNIT SCREENED				BEDROCK						OVERBURDEN						OVERBURDEN					
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	Downgradient						Downgradient						Downgradient					
LAB IDs				L1322048-03	L1426559-03	L1527203-03	L1631871-06	L1740370-03	L1845601-02	L1321626-02	L1426838-03	L1527320-01	L1632257-05	L1740564-01	L1846106-01	L1321712-01	L1427157-05	L1527320-05	L1632377-01	L1740730-04	L1846294-01
DTW				-	6.7	-	11.12	9.84	7.57	-	7.85	10.12	10.82	8.60	7.65	13.13	11.08	12.75	14.04	12.07	10.51
Ref Elev (RB or PVC)				-	-	-	368.0	368.0	368.0	-	365.0	365.0	365.0	365.0	365.0	369.3	369.3	369.3	369.3	369.3	369.3
Elevation				-	-	-	356.88	358.16	360.43	-	357.15	354.88	354.18	356.4	357.35	356.17	358.22	356.55	355.26	357.23	358.79
VPH (ug/L)																					
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Benzene	5	10000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Inorganic Compounds (mg/L)																					
Arsenic, Dissolved	NA	NA	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.005	ND (0.002)	ND (0.005)	ND (0.005)	0.005	ND (0.005)	ND (0.005)	ND (0.002)	ND (0.005)	ND (0.005)	0.006	ND (0.005)	ND (0.005)	ND (0.002)
Iron, Dissolved	NA	NA	9.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.009)	0.09	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.009)	0.06	ND (0.05)	0.05	ND (0.05)	ND (0.05)	ND (0.009)
Manganese, Dissolved	NA	NA	0.291	ND (0.01)	0.02	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.002)	0.106	0.028	ND (0.01)	0.013	ND (0.01)	ND (0.002)	**1.27**	**0.604**	**0.308**	0.152	**0.712**	0.137
Other																					
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	-	-	-	-	-	790	700	1000	1500	1100	210	-	-	-	-	-	-
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	ND (0.05)	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	121	-	-	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	18	31	92	210	77	22	-	-	-	-	-	-
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	ND (0.1)	ND (0.1)	1.48	ND (0.1)	ND (0.1)	0.13	-	-	-	-	-	-
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	23	22	34	62	57	15	410	360	500	670	560	37	71	10	70	46	29	19
Field Parameters	NA	NA																			
Temperature, Field (Deg C)	NA	NA	NA	-	18	17.87	20.76	19.6	17.5	-	12	12.04	12.16	13.3	12.9	-	14	12.79	12.06	11.4	12.0
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	-	0.06	1.69	2.31	2.34	6.06	-	0.54	2.18	2.37	1.76	3.30	-	0.28	0.64	1.68	0.46	2.52
Conductivity, Field (mS/cm)	NA	NA	NA	-	0.578	1.067	2.554	2.176	0.560	-	0.76	1.166	1.608	1.162	0.277	-	0.688	0.417	0.396	0.31	0.251
ORP, Field (mv)	NA	NA	NA	-	45.8	67.3	-63.7	133.9	52.9	-	13	184.6	189.9	-251	82.0	-	52	-56.6	176.5	-350	52.3
Turbidity, Field (NTU)	NA	NA	NA	-	2.32	2.6	4	4.5	3.71	-	3.56	0.5	4	1.1	1.22	-	3.66	1.6	3.6	3.6	1.82
pH, Field (pH units)	NA	NA	NA	-	6.81	6.72	6.54	6.51	6.33	-	6.49	6.33	6.21	6.33	6.08	-	7.04	6.76	6.79	7.65	6.55

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				XJM-94-09X						XJM-94-10X						XJM-97-11X							
SAMPLING DATE				10/29/2013	11/10/2014	10/16/2015	10/04/2016	10/30/2017	11/01/2018	10/28/2013	11/11/2014	10/27/2015	10/11/2016	11/07/2017	11/12/2018	04/18/2013	10/28/2013	04/24/2014	11/11/2014	10/27/2015	10/11/2016	11/07/2017	11/12/2018
UNIT SCREENED				OVERBURDEN						OVERBURDEN						BEDROCK							
LOCATION	GW-1 MCP Standards	GW-3 MCP Standards	ROD Established Clean-up Goals	Upgradient						Upgradient						Upgradient							
LAB IDs				L1321816-01	L1427012-05	L1526369-01	L1631485-01	L1739679-07	L1844770-01	L1321712-03	L1427157-03	L1527510-02	L1632377-03	L1740730-02	L1846294-05	L1307011-02	L1321712-04	L1408688-01	L1427157-04	L1527510-01	L1632377-04	L1740730-01	L1846294-04
DTW				14.77	8.91	14.48	16.06	10.78	8.40	14.66	10.45	14.4	16.21	13.30	9.02	8.43	14.62	7.7	9.45	14.28	15.01	11.38	8.85
Ref Elev (RB or PVC)				371.6	371.6	371.6	371.6	371.6	371.6	371.4	371.4	371.4	371.4	371.4	371.4	371.5	371.5	371.5	371.5	371.5	371.5	371.5	371.5
Elevation				356.83	362.69	357.12	355.54	360.82	363.2	356.74	360.95	357	355.19	358.1	362.38	363.07	356.88	363.8	362.05	357.22	356.49	360.12	362.65
VPH (ug/L)																							
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	72.9	**610**	ND (50)	72	**993**	**1520**	92.7	ND (50)
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	72.9	621	ND (50)	72	1000	1520	92.7	ND (50)
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	186	ND (50)	ND (50)	199	**292**	54	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	172	ND (50)	ND (50)	228	596	ND (50)	ND (50)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	374	ND (50)	ND (50)	451	947	57.1	ND (50)
Benzene	5	10000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	2.05	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Ethylbenzene	700	5000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	15.8	ND (2)	ND (2)	20.6	46.3	ND (2)	ND (2)
m,p-Xylenes	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	3.82	10.7	ND (2)	ND (2)
Methyl Tert Butyl Ether	70	50000	NA	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	6.15	ND (3)	ND (3)	7.05	ND (3)	ND (3)	ND (3)
Naphthalene	140	20000	NA	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	5.83	ND (4)	ND (4)	5.93	11.1	ND (4)	ND (4)
o-Xylene	10000 *	5000 *	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	2.3	ND (2)	ND (2)
Toluene	1000	40000	NA	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	2.55	ND (2)	ND (2)	ND (2)	3.05	ND (2)	ND (2)
Inorganic Compounds (mg/L)																							
Arsenic, Dissolved	NA	NA	0.01	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.002)	ND (0.005)	ND (0.005)	0.007	ND (0.005)	ND (0.005)	**0.019**	-	ND (0.005)	-	ND (0.005)	0.007	0.005	ND (0.005)	ND (0.002)
Iron, Dissolved	NA	NA	9.1	ND (0.05)	ND (0.05)	0.07	ND (0.05)	ND (0.05)	0.409	ND (0.05)	ND (0.05)	0.05	0.14	ND (0.05)	5.42	-	ND (0.05)	-	0.07	0.78	1.1	ND (0.05)	ND (0.009)
Manganese, Dissolved	NA	NA	0.291	ND (0.01)	**0.778**	**4.76**	**4.61**	0.113	**0.44**	0.023	0.022	0.022	0.259	**0.314**	**3.59**	-	**4.05**	-	**3.11**	**2.85**	**3.76**	**1.94**	ND (0.002)
Other																							
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	-	-	-	-	-	240	200	190	200	250	160	-	-	-	-	-	-	-	-
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	170	-	-	-	-	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	6.8	5.8	6.7	8.6	9.6	16.	-	-	-	-	-	-	-	-
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	ND (0.1)	0.153	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.032)	-	-	-	-	-	-	-	-
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	14	16	14	11	19	ND (1.4)	14	80	18	51	36	34	13	12
Field Parameters	NA	NA																					
Temperature, Field (Deg C)	NA	NA	NA	-	12.8	12.88	12.72	12.7	13.1	-	14.1	11.07	13.51	12.9	12.4	-	12.6	-	13.2	10.99	14.9	11.4	11.7
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	-	2.57	0.19	1	8.21	0.60	-	1.28	3.44	1.61	2	0.52	3.06	0.44	-	0.42	0.72	0.86	0.56	4.19
Conductivity, Field (mS/cm)	NA	NA	NA	-	0.095	0.145	0.121	0.095	0.0684	-	0.3173	0.246	0.295	0.298	0.290	0.2764	0.418	-	0.3456	0.291	0.348	0.21	0.198
ORP, Field (mv)	NA	NA	NA	-	156.5	282.4	143.3	238	142	-	45.3	156.2	-26.2	-362	-108	66	-10.6	-	20.1	-72.7	-27.8	-357	-8.0
Turbidity, Field (NTU)	NA	NA	NA	-	1.5	3	1.7	0.6	4.11	-	2.08	1.1	3	3.5	6.62	-	2.21	-	2.25	1.4	3.8	1.1	1.36
pH, Field (pH units)	NA	NA	NA	-	5.6	6.25	6.3	5.86	5.80	-	7.12	6.86	6.82	7.08	6.71	7.4	6.46	-	6.8	6.72	6.58	6.93	7.43

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-3
GROUNDWATER ANALYTICAL DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO: 10884-092

MONITORING LOCATION NAME				XJM-97-12X										XJM-97-13X						XJP-94-01X		XJP-94-02X	
SAMPLING DATE				04/19/2013	10/30/2013	04/23/2014	11/05/2014	10/21/2015	10/06/2016	11/02/2017	11/03/2017	08/17/2018	11/05/2018	10/28/2013	11/12/2014	10/26/2015	10/11/2016	11/07/2017	11/12/2018	08/17/2018	11/19/2018	08/16/2018	11/19/2018
UNIT SCREENED				BEDROCK										BEDROCK						OVERBURDEN		OVERBURDEN	
LOCATION	**GW-1 MCP Standards**	**GW-3 MCP Standards**	**ROD Established Clean-up Goals**	Source Area										Downgradient						Source Area		Source Area	
LAB IDs				L1307007-02	L1321909-05	L1408563-04	L1426559-01	L1526909-02	L1631871-01 L1632554-05	L1740179-01	L1740369-03	L1832548-04	L1845198-06	L1321712-02	L1427292-02	L1527320-06	L1632377-02	L1740730-05	L1846294-02	L1832548-03	L1847433-02	L1832246-03	L1847433-03
DTW				5.15	10.14	4.54	5.97	10.26	11.35	7.87	7.80	6.21	6.07	13.65	9.47	13.49	14.89	11.41	9.23	6.47	-	6.65	-
Ref Elev (RB or PVC)				368.4	368.4	368.4	368.4	368.4	368.4	368.4	368.4	368.4	368.4	369.3	369.3	369.3	369.3	369.3	369.3	-	-	-	-
Elevation				363.25	358.26	363.86	362.43	358.14	357.05	360.53	360.6	362.19	362.33	355.65	359.83	355.81	354.41	357.89	360.07	-	-	-	-
VPH (ug/L)																							
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	300	50000	NA	**1830**	**658**	**1360**	**1950**	**3110**	**3340**	**3350**	**1400**	**2900**	**4740**	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	**1770**	**2420**	1360	**3460**
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	1840	658	1370	1950	3140	3350	3350	1400	2900	4780	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	1770	2420	1370	3490
MADEP C9-C10 Aromatic Hydrocarbons	200	50000	NA	**892**	**722**	**674**	**865**	**1140**	**1190**	**1700**	**390**	**1150**	**1380**	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	**2580**	**3860**	734	**1550**
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	700	50000	NA	**1790**	**1090**	**1830**	**900**	**1280**	**2280**	**ND (1000)**	510	255	268	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	667	ND (500)	268	ND (250)
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	NA	3510	2200	2860	1930	2890	3840	1900	980	1580	1940	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	4670	5820	1600	2890
Benzene	5	10000	NA	**ND (10)**	**ND (10)**	ND (5)	**ND (10)**	4.7	**ND (10)**	**ND (40)**	4.4	ND (10)	**17.7**	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	**ND (20)**	**ND (20)**	ND (5)	**ND (10)**
Ethylbenzene	700	5000	NA	**781**	393	346	131	314	241	137	58	125	196	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	**975**	**1260**	492	**951**
m,p-Xylenes	10000 *	5000 *	NA	46.9	ND (10)	ND (5)	38.7	144	130	79.8	26	56	99.6	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	442	659	102	225
Methyl Tert Butyl Ether	70	50000	NA	17.6	ND (15)	13.9	ND (15)	12.9	ND (15)	ND (60)	ND (1)	ND (15)	22	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (30)	ND (30)	ND (7.5)	ND (15)
Naphthalene	140	20000	NA	107	47.2	15.3	27.5	58.3	47.5	ND (80)	8.5	31.1	48.6	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	**255**	**323**	58.2	117
o-Xylene	10000 *	5000 *	NA	ND (10)	ND (10)	ND (5)	ND (10)	6.54	ND (10)	ND (40)	2.1	ND (10)	ND (10)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (20)	ND (20)	ND (5)	ND (10)
Toluene	1000	40000	NA	ND (10)	ND (10)	ND (5)	ND (10)	11.4	10.1	ND (40)	2.9	ND (10)	ND (10)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (20)	ND (20)	17.6	27.4
Inorganic Compounds (mg/L)																							
Arsenic, Dissolved	NA	NA	0.01	-	**0.042**	-	**0.011**	**0.027**	**0.032**	**0.03**	-	**0.0211**	**0.037**	-	-	-	-	-	-	**0.0867**	**0.129**	0.0161	**0.018**
Iron, Dissolved	NA	NA	9.1	-	**31**	-	6.5	**22**	**14**	**10.9**	-	**10.2**	**10.9**	-	-	-	-	-	-	**17.6**	**28.2**	9.77	7.98
Manganese, Dissolved	NA	NA	0.291	-	**13.6**	-	**3.68**	**8.37**	**5.12**	**3.95**	-	**3.48**	**3.58**	-	-	-	-	-	-	**4.69**	**6.87**	20	**16.7**
Other																							
Total Dissolved Solids (TDS) (mg/L)	NA	NA	NA	-	2200	-	280	590	420	210	-	-	170	-	-	-	-	-	-	-	-	-	-
Ethane (ug/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane (ug/L)	NA	NA	NA	-	1740	-	1380	1820	2540	1670	-	-	1860	-	-	-	-	-	-	-	-	-	-
Bromide, Total (mg/L)	NA	NA	NA	-	ND (0.05)	-	ND (0.05)	ND (0.05)	ND (0.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium Carbonate, Total (mg/L)	NA	NA	NA	-	-	-	222	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride, Total (mg/L)	NA	NA	NA	-	11	-	5.4	-	120	30	-	-	8.9	-	-	-	-	-	-	-	-	-	-
Nitrate (as N), Total (mg/L)	NA	NA	NA	-	ND (0.1)	-	ND (0.2)	ND (0.1)	ND (0.1)	ND (0.1)	-	-	ND (0.032)	-	-	-	-	-	-	-	-	-	-
Nitrite (as N), Total (mg/L)	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate, Total (mg/L)	NA	NA	NA	1400	1200	1900	20	ND (10)	ND (10)	ND (10)	-	-	ND (1.4)	-	-	-	-	-	-	-	-	-	-
Field Parameters	NA	NA																					
Temperature, Field (Deg C)	NA	NA	NA	-	17.4	-	17.3	16.79	18.52	16.2	-	18.23	15.8	-	12.6	12.05	1.16	-	11.9	20.64	15.1	24.85	15.2
Dissolved Oxygen, Field (mg/L)	NA	NA	NA	0.46	0.43	-	0.23	0.52	0.59	0.48	-	0.35	0.34	-	0.01	0.54	0.7	-	2.67	0.33	0.48	0.82	0.49
Conductivity, Field (mS/cm)	NA	NA	NA	2.528	2.9	-	0.4501	0.992	0.712	0.387	-	0.343	0.240	-	0.2947	0.278	0.328	-	0.334	1.304	0.923	3.321	1.442
ORP, Field (mv)	NA	NA	NA	-92.8	-152	-	-115.9	-163.9	-101.6	-129	-	12.7	-107.	-	-64.3	-136.8	-26.1	-	2.3	-25.4	-150	-169.6	-139
Turbidity, Field (NTU)	NA	NA	NA	-	13.9	-	0.68	1.6	4.8	1.7	-	2.8	3.33	-	1.54	1.9	4.8	-	1.60	5	4	3.1	2.56
pH, Field (pH units)	NA	NA	NA	6.54	6.63	-	6.48	6.48	6.45	6.63	-	6.47	6.73	-	7.66	7.57	7.52	-	7.64	6.8	6.28	6.45	5.97

ABBREVIATIONS:
RB= rpad bopx
mg/L: milligram per liter
ug/L: microgram per liter
DTW: Depth to water
RB: Road Box
PVC: Polyvinyl chloride

NOTES:
1. Table includes only those compounds that were detected in at least one sample.
2. **Bold blue shaded values indicate that the detected value exceeds the ROD established clean-up goal.**
3. **Bold values indicate that the detected value exceeds either the GW-1 or GW-3 MCP Standards.**
   Asterix (*) noted on the GW-1 and GW-3 Standard column indicate that the value shown is the standard for total xylenes.
4. ND (5): Not detected; number in parentheses is the laboratory reporting limit for 1993 through 2017.
   ND (5): Not detected; number in parentheses is the method detection limit for 2018 to present.
5. Field parameters at 2446-02 were not collected in the August sampling round due to well running dry.
6. Asterisk (*) indicates DO Values greater than 12.0 mg/L were recorded but the probe is not accurate at those levels. Instead, DO is considered to be at saturation for those samples due to chemical oxidation by the OBC™ solution.

TABLE H-4
SUMMARY OF SOIL QUALITY DATA
ANNUAL MONITORING EVENTS
AOC43J
DEVENS, MA
FILE NO. 10884-092

Precharacterization Grid	Action Level		Source Area							
Location Name			HA-101(WW)	HA-101A(TW)	HA-101(WW)	HA-101A(TW)	HA-103(MW)	HA-103A(MW)	HA-103(MW)	HA-103A(MW)
Sample Name	MCP	MCP	HA-101 (TW) 6-7	HA-101A (TW) 6-7	HA-101 (TW) 10-11	HA-101A (TW) 10-11	HA-103 (MW) 7-8	HA-103A (MW) 7-8	HA-103 (MW) 11-12	HA-103A (MW) 11-12
Sample Date	Method 1	Method 1	11/14/2017	12/03/2018	11/14/2017	12/03/2018	11/14/2017	12/03/2018	11/14/2017	12/03/2018
Sample Type	S-2/GW-1	S-2/GW-2	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Sample Depth (bgs)	2014	2014	6 - 7 (ft)	6 - 7 (ft)	10 - 11 (ft)	10 - 11 (ft)	7 - 8 (ft)	7 - 8 (ft)	11 - 12 (ft)	11 - 12 (ft)
Soil Description			GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL	GLACIAL TILL
VPH (mg/kg)										
MADEP C5-C8 Aliphatic Hydrocarbons, Adjusted	500	500	179	13.8	431	401	146	219	**1410**	468
MADEP C5-C8 Aliphatic Hydrocarbons, Unadjusted	NA	NA	179	13.8	431	402	146	219	1410	470
MADEP C9-C10 Aromatic Hydrocarbons	300	500	227	51.8	299	235	127	260	**803**	222
MADEP C9-C12 Aliphatic Hydrocarbons, Adjusted	3000	3000	149	33.6	125	176	81.1	189	329	165
MADEP C9-C12 Aliphatic Hydrocarbons, Unadjusted	NA	NA	377	86	437	415	218	458	1180	402
Benzene	2	200	ND (0.566)	ND (0.094)	**ND (2.5)**	1.21	ND (1.12)	ND (0.405)	**ND (10.6)**	1.25
Ethylbenzene	40	1000	ND (0.566)	ND (0.094)	7.13	1.42	4.96	3.08	24.3	7.22
Methyl Tert Butyl Ether	0.1	100	-	ND (0.047)	-	**0.305**	-	**ND (0.202)**	-	**0.72**
Naphthalene	4	20	-	ND (0.187)	-	3.06	-	**6.61**	-	3.79
Toluene	30	1000	ND (0.566)	ND (0.094)	ND (2.5)	ND (0.39)	ND (1.12)	ND (0.405)	ND (10.6)	ND (0.425)
Other										
Total Solids (%)	NA	NA	91	89.4	87.2	89.6	93.8	90.3	87	85.8

ABBREVIATIONS AND NOTES:
-: Not Analyzed
bgs: below ground surface
in: inches
mg/kg: milligram per kilogram
mg/L: milligram per liter
NA: Not Applicable
ND (2.5): Not detected, number in parentheses is the laboratory detection limit
ug/kg: micrograms per kilogram

1. Bold blue shaded values indicate an exceedance of the Method 1 S-2/GW-1 and/or Method 1 S-2/GW-2

TABLE H-5

SUMMARY OF PILOT TEST GROUNDWATER FIELD SCREENING RESULTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO.: 10884-092

Well Designation	Unit Screened Location Proximity to Emitter	Date Measured	YSI FIELD PARAMETERS				
			Temperature (Deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH (pH units)	ORP (mv)
HA-5S	Overburden Source Area 57 ft	11/1/2017	17.6	0.48	1444	6.78	-320
		12/18/2017	13.7	4.16	1007	6.86	30.8
		12/20/2017	14.1	1.92	1567	7.26	-7.5
		12/26/2017	13.4	1.49	1135	6.47	44.2
		12/29/2017	12.2	1.62	1264	7.03	26
		1/5/2018	--	--	--	--	--
		1/11/2018	10.3	0.42	1497	6.73	-91.2
		2/7/2018	7.8	1.23	423	6.3	37.1
		4/6/2018	8.9	0.92	563	5.97	135
		5/9/2018	12.4	0.65	389	6.35	22.9
		6/1/2018	14.5	0.16	350	6.65	-88
		8/16/2018	23.03	0.74	1365	6.66	-170.5
		8/29/2018	20.8	0.39	1389	6.24	-107
		9/26/2018	22	0.18	993	6.41	-70
		10/24/2018	19	0.25	910	6.36	-21.8
		11/5/2018	17	0.5	629	6.62	-81
		12/4/2018	12.7	0.8	563	6.2	-21.9
		2/27/2019	8	0.88	302	6.82	-141
		3/25/2019	7.7	2.37	310	6.53	-40
		4/29/2019	11.2	3.32	419	6.22	-23
XJM-97-12X	Bedrock Downgradient 16.75 ft	11/2/2017	16.2	0.48	387	6.63	-129
		12/18/2017	14.3	2.02	452	7.11	-3.5
		12/20/2017	14.9	0.97	409	7.11	-28.5
		12/26/2017	--	--	--	--	--
		12/29/2017	13.6	1.39	445	7.17	3.4
		1/5/2018	13.6	0.77	392	7.2	23.4
		1/11/2018	12.1	0.79	468	6.93	-78.1
		2/7/2018	13.1	0.75	291	6.89	-85.9
		4/6/2018	11.2	0.14	705	6.45	-37
		5/9/2018	12.8	0.16	779	6.69	-20.3
		6/1/2018	13	0.13	442	6.85	-106
		8/17/2018	18.23	0.35	343	6.47	12.7
		8/29/2018	18.5	0.38	312	5.96	-114
		9/26/2018	17.4	0.22	261	6.65	-108
		10/24/2018	16.2	0.32	317	6.75	-83.4
		11/5/2018	15.8	0.34	240	6.73	-107
		12/4/2018	14.2	0.43	264	6.69	-103
		1/23/2019	12.4	0.7	310	6.94	-93
		2/27/2019	11.2	0.72	247	7.08	-181
		3/25/2019	11.5	0.27	252	6.9	-128
		4/29/2019	11.5	0.57	280	7.04	-148
XJM-94-05X	Emitter Well Overburden Source Area	11/1/2017	17.6	0.35	1227	6.88	-149
		12/18/2017	--	-	--	--	--
		12/20/2017	--	-	--	--	--
		12/26/2017	--	--	--	--	--
		12/29/2017	--	--	--	--	--
		1/5/2018	10.6	16.65	822	7.29	41.1
		1/11/2018	--	--	--	--	--
		2/7/2018	--	--	--	--	--
		6/1/2018	--	--	--	--	--
		8/29/2018	18.8	1.2	785	6.74	-162
		9/26/2018	21.6	24.7	828	6.94	145
		10/24/2018	17.4	21.2	604	7	3.1
		11/5/2018	15.5	24	479	6.83	27.5
		12/3/2018	12.7	32.4	513	6.79	77.5
		1/23/2019	8.6	49.9	490	7.44	113
		2/27/2019	6.1	47.8	250	7.3	21.6
		3/25/2019	7.1	52.1	259	7.16	64.4
		4/29/2019	10.5	48.3	402	7.25	-0.5

TABLE H-5

SUMMARY OF PILOT TEST GROUNDWATER FIELD SCREENING RESULTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO.: 10884-092

Well Designation	Unit Screened Location Proximity to Emitter	Date Measured	YSI FIELD PARAMETERS				
			Temperature (Deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH (pH units)	ORP (mv)
XJM-94-01X	Overburden Upgradient 18.75 ft	10/31/2017	15.1	6.84	1680	6.31	62.3
		12/18/2017	13.6	1.71	1123	6.87	-31.1
		12/20/2017	13.4	1.11	1561	6.83	-42.3
		12/26/2017	12.5	0.85	1273	6.52	9.7
		12/29/2017	12	1.18	1487	6.85	-26.1
		1/5/2018	10.6	0.96	1312	6.86	-17.8
		1/11/2018	10.6	0.53	1712	6.84	-105.1
		2/7/2018	9.3	3.69	240	6.98	-45
		4/6/2018	8.4	0.36	834	6.64	-95
		5/9/2018	11.9	0.45	1035	6.82	-105
		6/1/2018	14.4	0.27	1076	6.73	-135
		8/29/2018	20.9	0.26	1198	6.65	-146
		9/26/2018	21.3	0.22	1304	6.86	-141
		10/24/2018	18.7	0.31	1174	6.93	-114
		11/2/2018	14.9	3.06	209	6.53	87.7
		12/4/2018	13.2	0.51	916	6.87	-151
		1/23/2019	9.6	0.97	811	7.04	-143
		2/27/2019	7.9	0.54	355	7.12	-203
		3/25/2019	7.7	0.7	375	6.88	-143
		4/29/2019	10.1	0.84	535	7.02	-172
XJM-94-02X	Overburden Downgradient 59.5 ft	11/1/2017	17.2	3.57	3220	5.9	-160
		12/18/2017	13.7	1.72	1680	6.87	-36
		12/20/2017	13.8	1.12	2273	6.88	-45
		12/26/2017	13.1	1.46	1879	6.69	-39
		12/29/2017	11.4	1.66	1989	6.61	12
		1/5/2018	--	--	--	--	--
		1/11/2018	10.7	0.68	2550	6.84	-78.1
		2/7/2018	9.3	0.81	628	6.85	-43
		4/6/2018	9	0.49	968	6.44	-51
		5/9/2018	12.8	1.1	1490	6.53	-51
		6/1/2018	13.7	0.57	1254	6.47	-87
		8/29/2018	20.7	0.38	2400	6.53	-150
		9/26/2018	20.7	0.23	1984	6.68	-141
		10/24/2018	18.7	0.33	1565	6.78	-111
		11/6/2018	16.3	4	182	5.97	109
		12/4/2018	13.7	2.32	1538	6.67	-86
		1/23/2019	10.2	1.36	1275	6.74	-97
		2/27/2019	8.5	1.08	644	6.9	-210
		3/25/2019	8.5	0.85	706	6.74	-134
		4/29/2019	10.3	0.82	930	6.82	-143
HA-101(TW)	Emitter Well Overburden Source Area	11/21/2017	16.7	1.01	2500	7.07	-90
		12/18/2017	--	--	--	--	--
		12/20/2017	--	--	--	--	--
		12/26/2017	--	--	--	--	--
		12/29/2017	--	--	--	--	--
		1/5/2018	--	--	--	--	--
		1/11/2018	10.4	25.1	12.32	6.78	24.32
		2/7/2018	--	--	--	--	--
		8/29/2018	18.6	12.1	1501	6.07	22.1
		9/26/2018	21.4	19.26	1075	6.68	-38.8
		10/24/2018	16.1	19.5	799	6.97	-64
		12/3/2018	12.7	37.3	732	7.07	-17
		1/23/2019	8.9	31.6	681	6.9	-6.1
		2/27/2019	6	42.7	300	7.01	-25
		3/25/2019	7.3	45.4	227	6.97	45.2
		4/29/2019	10.5	44.5	460	7.08	-44
HA-102(MW)	Overburden Source Area 12.5 ft	11/21/2017	16.7	0.37	2103	7.07	-78
		12/18/2017	13.8	1.59	1124	7.2	-50.9
		12/20/2017	14.1	1.1	1297	7.16	-47.8
		12/26/2017	12.9	1.85	1069	6.99	-23.4
		12/29/2017	12.5	0.79	1142	6.89	-34
		1/5/2018	12	0.73	1123	7.08	-51.9
		1/11/2018	11.8	0.4	1283	7.03	-98.9
		2/7/2018	9.8	0.71	615	7.02	-94
		3/8/2018	8.9	1.03	928	6.9	-82
		4/6/2018	8.8	0.04	725	6.7	-84
		5/9/2018	11.6	0.21	795	6.82	-85
		6/1/2018	13.7	0.05	791	6.81	-128
		8/17/2018	18.92	0.3	1883	6.72	-24
		8/29/2018	18.4	0.64	1538	6.62	-121
		9/26/2018	20.2	0.32	1478	7.04	-155
		10/24/2018	17.9	0.3	1155	7.03	-133
		11/16/2018	15	0.68	1083	6.67	-93
		12/3/2018	13.4	0.59	1046	6.87	-153
		1/23/2019	10.8	0.67	718	7.06	-122
		2/27/2019	8.6	0.45	354	7.18	-177
		3/25/2019	8.5	0.36	374	6.96	-125
		4/29/2019	10.2	0.36	671	7.02	-165

TABLE H-5

SUMMARY OF PILOT TEST GROUNDWATER FIELD SCREENING RESULTS
AOC43J
DEVENS, MASSACHUSETTS
FILE NO.: 10884-092

Well Designation	Unit Screened Location Proximity to Emitter	Date Measured	YSI FIELD PARAMETERS				
			Temperature (Deg C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH (pH units)	ORP (mv)
HA-103(MW)	Overburden Source Area 8 ft	11/22/2017	15.6	0.46	1790	6.85	-104
		12/18/2017	14.1	1.61	1354	6.99	-48.7
		12/20/2017	14.4	1.21	1543	7.05	-64.6
		12/26/2017	13.3	0.75	1314	6.82	-13.7
		12/29/2017	12.8	0.87	1369	6.83	-43.7
		1/5/2018	12.1	0.9	1345	6.94	-36.8
		1/11/2018	10.9	0.51	1595	6.89	-107.1
		2/7/2018	9.6	1.24	695	6.71	-94.3
		3/8/2018	8.6	0.45	758	6.6	-43.3
		4/6/2018	8.7	0.06	759	6.59	-73.9
		5/9/2018	11.7	0.23	853	6.79	-99
		6/1/2018	13.4	0.13	846	6.67	-118
		8/17/2018	19.55	0.33	1580	6.78	-42
		8/29/2018	18.5	0.52	1273	6.51	-137
		9/26/2018	20.5	0.36	1220	6.83	-140
		10/24/2018	18.2	0.33	971	6.86	-128
		11/16/2018	14.1	0.52	971	6.78	-140
		12/3/2018	13.5	0.55	946	6.9	-161
		1/23/2019	10.1	0.65	668	6.97	-132
		2/27/2019	8.5	0.52	375	7.06	-188
		3/25/2019	8.8	0.66	221	6.65	-76
		4/29/2019	10.5	0.39	514	7	-174
HA-104(MW)	Overburden Source Area 27 ft	11/22/2017	15.6	1.06	2334	6.7	-60.5
		12/18/2017	13.8	1.46	1134	6.93	-34
		12/20/2017	14	1.29	1421	6.99	-41.9
		12/26/2017	13	1.15	661	6.83	14.5
		12/29/2017	12.6	0.93	996	6.72	-13
		1/5/2018	10.4	3.3	1090	6.97	-9
		1/11/2018	11.2	0.5	1045	6.85	-134.3
		2/7/2018	9.8	0.66	587	6.98	-80
		3/8/2018	9	0.19	825	6.84	-85
		4/6/2018	8.7	0.04	734	6.61	-67
		5/9/2018	11.9	0.21	836	6.76	-81
		6/1/2018	13.7	0.07	834	6.67	-105
		8/16/2018	20.11	0.44	1518	6.64	-164
		8/29/2018	18	0.42	889	6.57	-130
		9/26/2018	20.2	0.26	905	6.91	-122
		10/24/2018	17.7	0.88	850	6.97	-91.4
		11/16/2018	14.6	0.44	920	6.73	-107
		12/3/2018	13.7	0.58	894	6.86	-118
		1/23/2019	10.2	1.01	630	7	-103
		2/27/2019	8.3	0.62	392	7.1	-177
		3/25/2019	8.5	1.42	407	6.97	-106
		4/29/2019	10.4	0.36	579	7.06	-167
HA-105(MW)	Overburden Source Area 27 ft	11/21/2017	15.1	1.11	1799	6.99	-68.5
		12/18/2017	13.8	1.92	1204	6.86	-28.7
		12/20/2017	14.3	1.24	1508	6.95	-39
		12/26/2017	12.9	3.46	187	6.96	20.1
		12/29/2017	12	2.19	460	7.07	-18.8
		1/5/2018	11.5	1.08	826	7.08	-22.3
		1/11/2018	11.2	0.83	9.52	6.75	-39.1
		2/7/2018	9.1	0.97	310	6.76	16.1
		3/8/2018	8.8	0.4	888	6.79	-31
		4/6/2018	8.7	0.38	783	6.55	-49
		5/9/2018	12	0.6	1021	6.75	-74
		6/1/2018	13.6	0.32	1016	6.33	-43
		8/16/2018	26.08	1.39	131	5.94	-37
		8/29/2018	18.9	0.4	1005	6.46	-130
		9/26/2018	21	0.47	279	6.4	-80
		10/24/2018	17	3.3	677	6.97	-67
		11/19/2018	14.6	1.91	792	5.75	-19
		12/3/2018	13.5	0.79	933	6.83	-89
		1/23/2019	9.9	1.16	696	6.82	-29
		2/27/2019	8	0.91	272	7.04	-95
		3/25/2019	8.5	0.87	333	6.91	-88
		4/29/2019	10.2	0.78	541	7.03	-171

Notes:
-- : well unable to be located due to ice cover on the ground
1. Blue shaded values are Dissolved Oxygen levels (mg/L)
2. DO values in wells XJM-94-05X aned HA-101(TW) exceed saturation when oxygen emitters were operating in those wells. Values above the saturation limit indicate oxygen saturation of groundwater occurred, but are not reliable values.
3. Field Parameters collected with a YSI

H.4 Historic Gas Station

Site Inspection

0406

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Devens MA	**Date of inspection:** 02/10/20
Location and Region: AOC 43G	**EPA ID:**
Agency, office, or company leading the five-year review: Human Government solutions	**Weather/temperature:** 35°F Rain wind, clouds

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other LUCs
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) [illegible]

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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
   ☐ Other _____

2. **O&M Cost Records**
   ☐ Readily available ☐ Up to date
   ☐ Funding mechanism/agreement in place
   Original O&M cost estimate _____ ☐ Breakdown attached

   Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____

Frequency _____

Responsible party/agency _____

Contact _____ _____ _____ _____

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

_____

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

Remarks _____

D. General

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

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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_____

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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

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

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

D. Monitored Natural Attenuation

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.

XI. OVERALL OBSERVATIONS NA on site visit

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.).

_____

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.

_____

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.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy

View of AOC 43G Area 1

Combined view of AOC 43G paved Areas 2 and 3

Additional View of AOC 43G Area 1

Additional View of AOC 43G Area 2

View of Well XGM-97-12X

Northern view of the inactive carwash

View of building 3587

Southern view of the inactive carwash

View of Monitoring Well AAFES-6R

View of grassy area to the east of Building 3587

View of XGM-94-04X

View of paved area west of building 3587

View of Building 3574

Additional view of Maintenance Storage yard east of building 3587

View of Maintenance Storage yard east of building 3587

0406

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Devens, MA	**Date of inspection:** 02/10/20
Location and Region: AOC 43D	**EPA ID:**
Agency, office or company leading the five-year review: Mission Government Solutions	**Weather/temperature:** 35°F Rain, wind Cloudy

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other LUCs
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached NA on site visit

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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 MASS DEVELOPMENT ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
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

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

D. General

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

2. **Land use changes on site** ☒ N/A
Remarks _____

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 _____

B. Other Site Conditions

Remarks LMC Remain In Place, no [illegible] exposure potential observed.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 _____

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 _____

C. Treatment System ☒ Applicable ☐ N/A Mass Development on Spoilings

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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 N/A, Mass Development

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

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

D. Monitored Natural Attenuation

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.

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.).

NA during site visit

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.

NA during site visit

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. NA during site visit

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. NA during site visit

Northwestern paved area of AOC 43J

View of Southern paved area of AOC 43J

View of the northwestern paved entrance to AOC 43J

View of AOC 43J Remedial area

Additional view of AOC 43J Remedial area

Interior view Remedial area within AOC 43J

View of northern paved area of AOC 43J

View of Well HA-6B

View of the southeastern paved area of AOC 43J

View of the northeastern paved entrance to AOC 43J

H.5 Historic Gas Station

ARARs

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	LOCATION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE, 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCL at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.01].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standard.	
StateGroundwater Regulatory Authority	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCL-s is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION To BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection;[310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR - National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	LOCATION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs {40 CFR Parts 141.11 - 141.16 and 141.50 - 141.521	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Continued	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Disposal of treatment residues	RCRA, Land Disposal Restrictions [40 CFR 268]	Applicable	Land disposal of RCRA hazardous wastes without specified treatment is restricted. LDRs require that wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	SVE carbon would be tested to evaluate characteristics for proper disposal/reactivation.

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Continued	SVE Treatment	Massachusetts Air Pollution Control Regulations [310 CMR 6.00-7.00]	Applicable	SVE system must reduce VOCs in air effluent stream by at least 95% by weight.	Emissions will be managed through engineering controls.

Notes:

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MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	LOCATION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 -141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs/TBC	TBC		

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as-defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standards.	
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

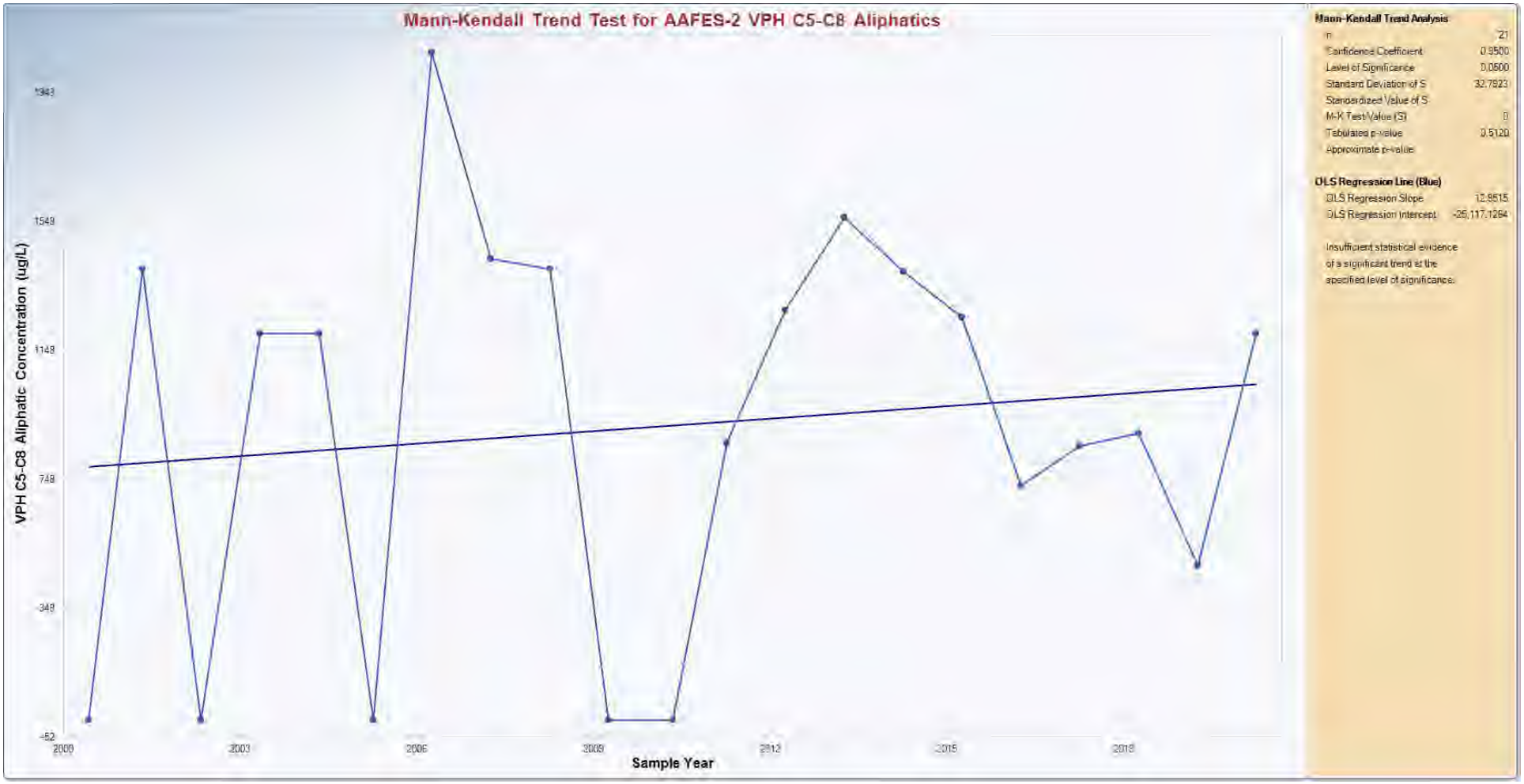
AUTHORITY	ACTION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater Monitoring (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Massachusetts Hazardous Waste Management Rules	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions. progress of remediation.	A long-term groundwater monitoring program is to be implemented to monitor the

Notes:

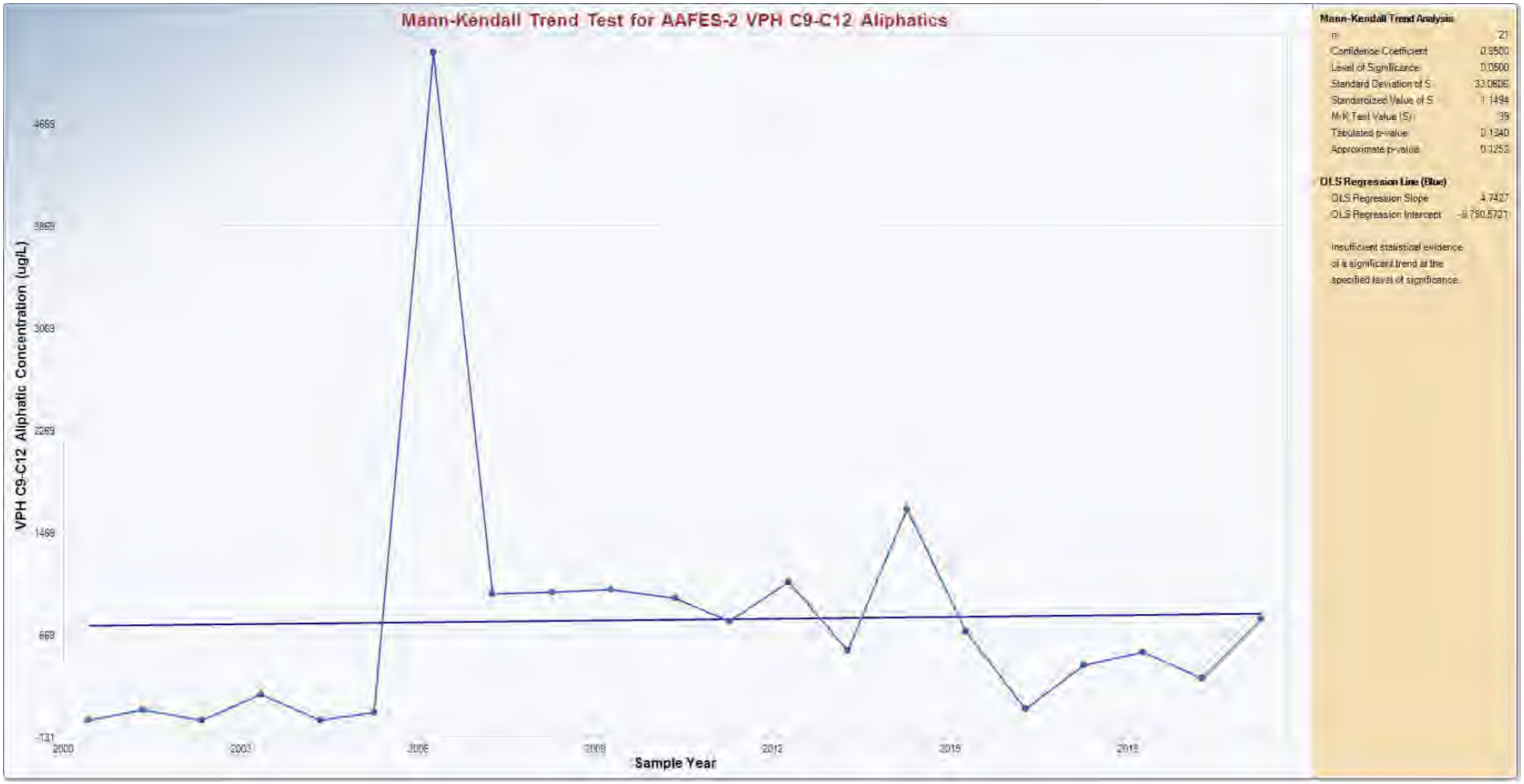
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

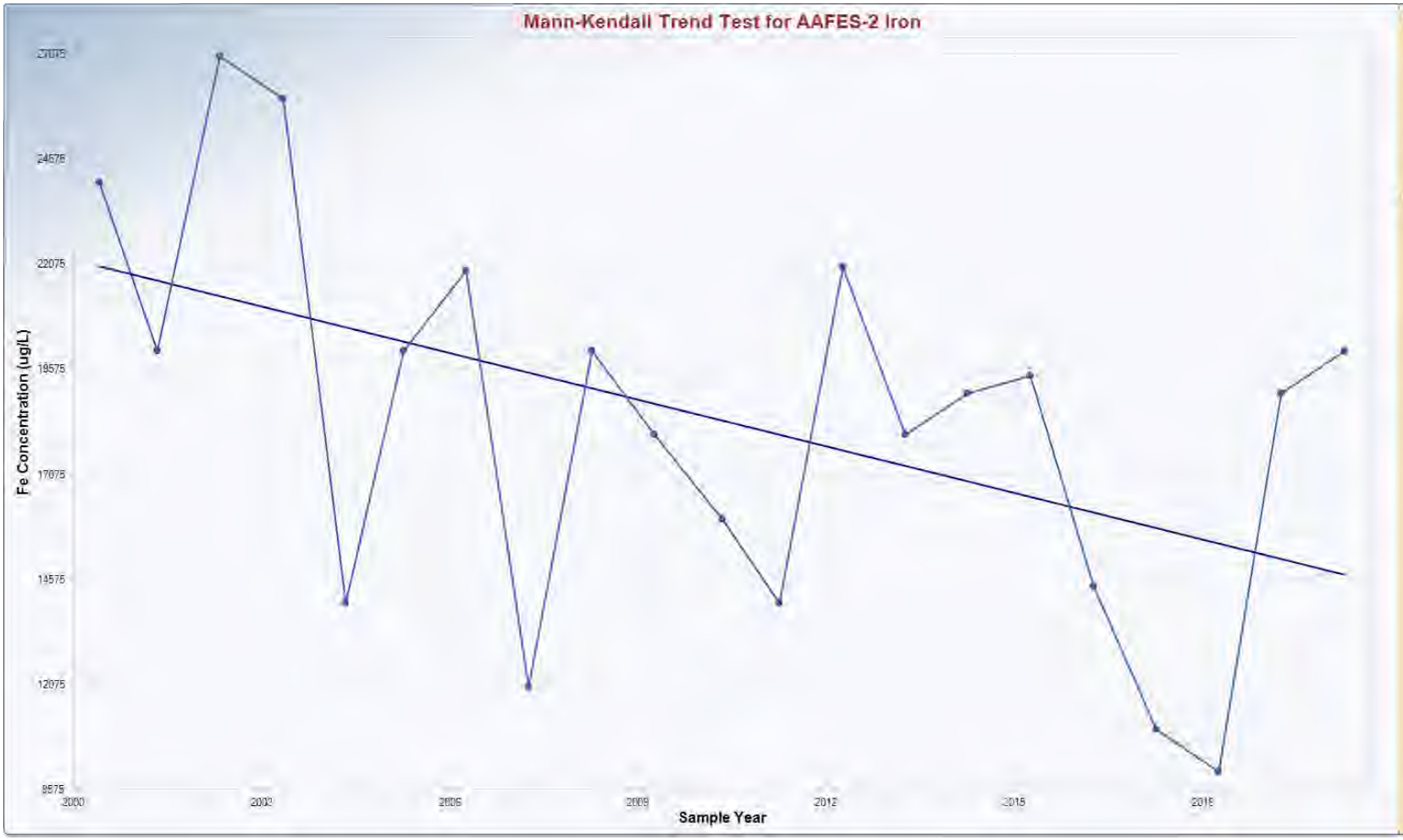
H.6 Historic Gas Station

43J Statistical Analysis


Mann-Kendall Trend Test for AAFES-2 VPH C5-C8 Aliphatics
VPH C5-C8 Aliphatic Concentration (ug/L)
1943
1549
1148
748
-348
-52
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 32.7923
Standardized Value of S
M-K Test Value (S) 0
Tabulated p-value 0.5120
Approximate p-value
OLS Regression Line (Blue)
OLS Regression Slope 12.9515
OLS Regression Intercept -25,117.1264
Insufficient statistical evidence
of a significant trend at the
specified level of significance.

Mann-Kendall Trend Test for AAFES-2 VPH C9-C10 Aromatics
VPH C9-C10 Aromatic Concentration (ug/L)
12423
10423
8423
6423
4423
2423
423
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 33.1009
Standardized Value of S -4.5920
M-K Test Value (S) -153
Tabulated p-value 0.0000
Approximate p-value 0.0000
OLS Regression Line (Blue)
OLS Regression Slope -434.8513
OLS Regression Intercept 877,515.1437
Statistically significant evidence
of a decreasing trend at the
specified level of significance.


Mann-Kendall Trend Test for AAFES-2 VPH C9-C12 Aliphatics
VPH C9-C12 Aliphatic Concentration (ug/L)
4669
3869
3069
2269
1469
669
-131
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 33.0606
Standardized Value of S 1.1494
M-K Test Value (S) 39
Tabulated p-value 0.1240
Approximate p-value 0.1253
OLS Regression Line (Blue)
OLS Regression Slope 4.7427
OLS Regression Intercept -9,790.5721
Insufficient statistical evidence
of a significant trend at the
specified level of significance.



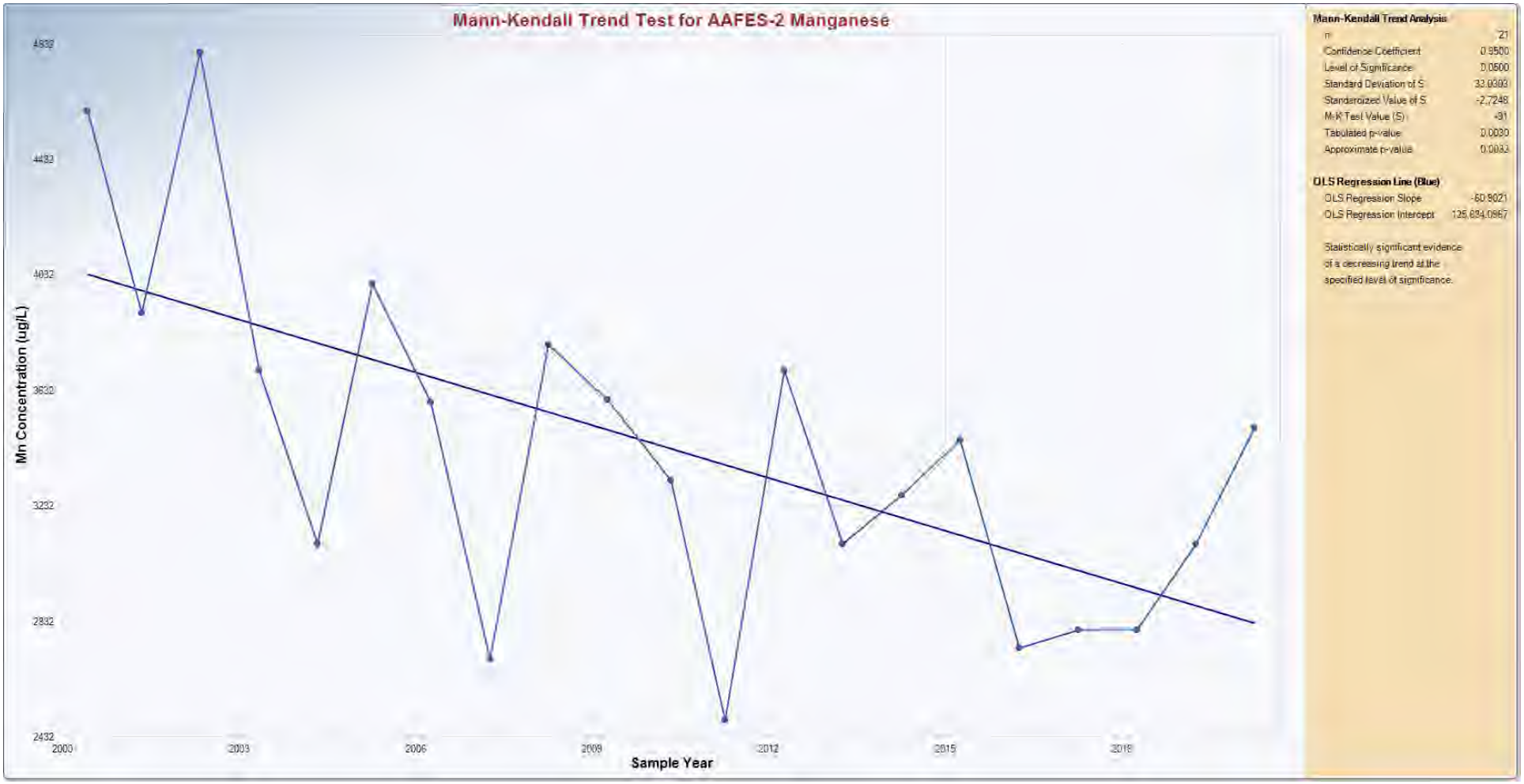
Mann-Kendall Trend Analysis

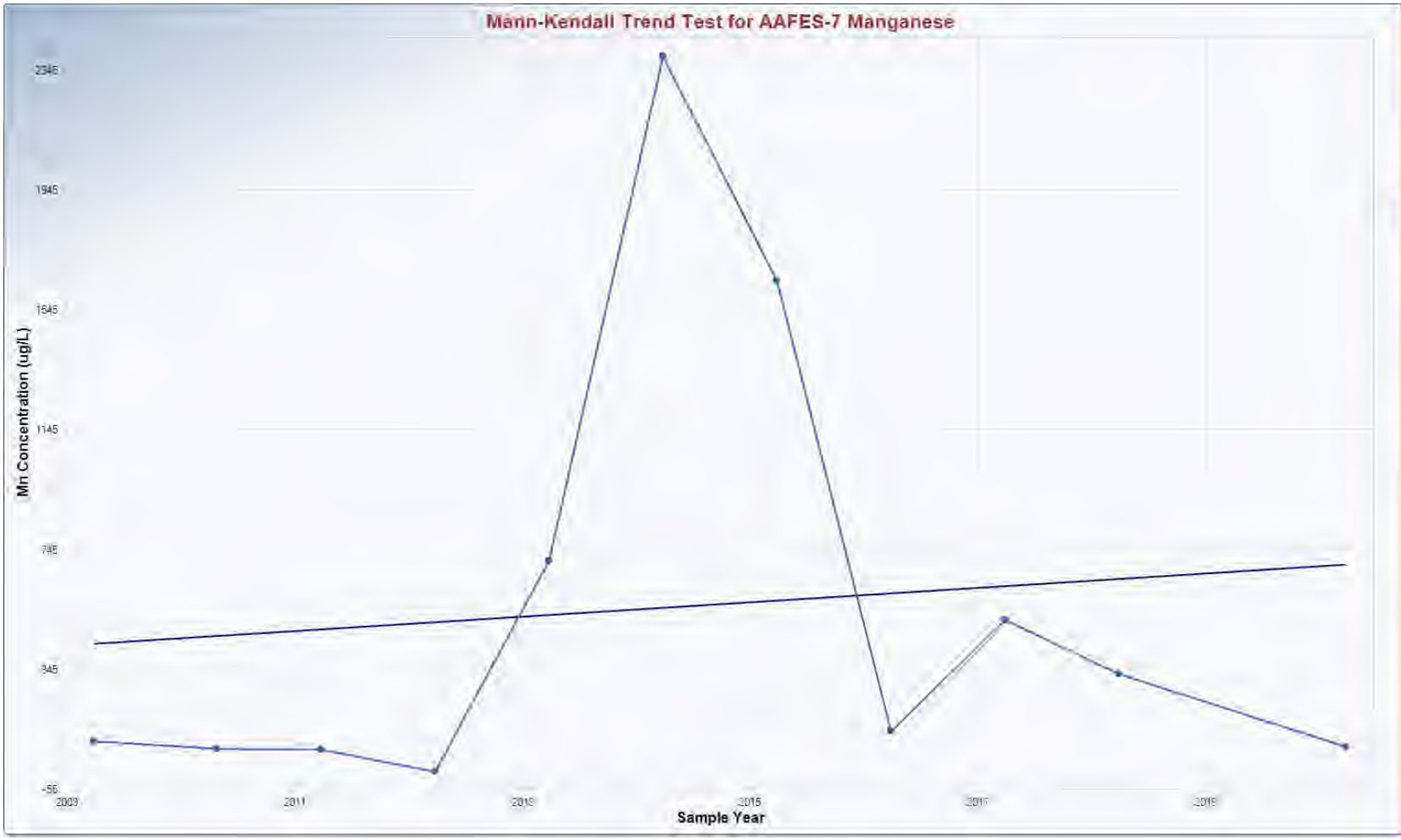
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	32.9393
Standardized Value of S	-2.1251
M-K Test Value (S)	-71
Tabulated p-value	0.0180
Approximate p-value	0.0168

OLS Regression Line (Blue)

OLS Regression Slope	-370.5899
OLS Regression Intercept	763,188.1788

Statistically significant evidence of a decreasing trend at the specified level of significance.


Mann-Kendall Trend Test for AAFES-2 Manganese
Mn Concentration (ug/L)
4832
4432
4032
3632
3232
2832
2432
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 33.0303
Standardized Value of S -2.7248
M-K Test Value (S) -91
Tabulated p-value 0.0030
Approximate p-value 0.0033
OLS Regression Line (Blue)
OLS Regression Slope -60.9021
OLS Regression Intercept 125,634.0967
Statistically significant evidence
of a decreasing trend at the
specified level of significance.



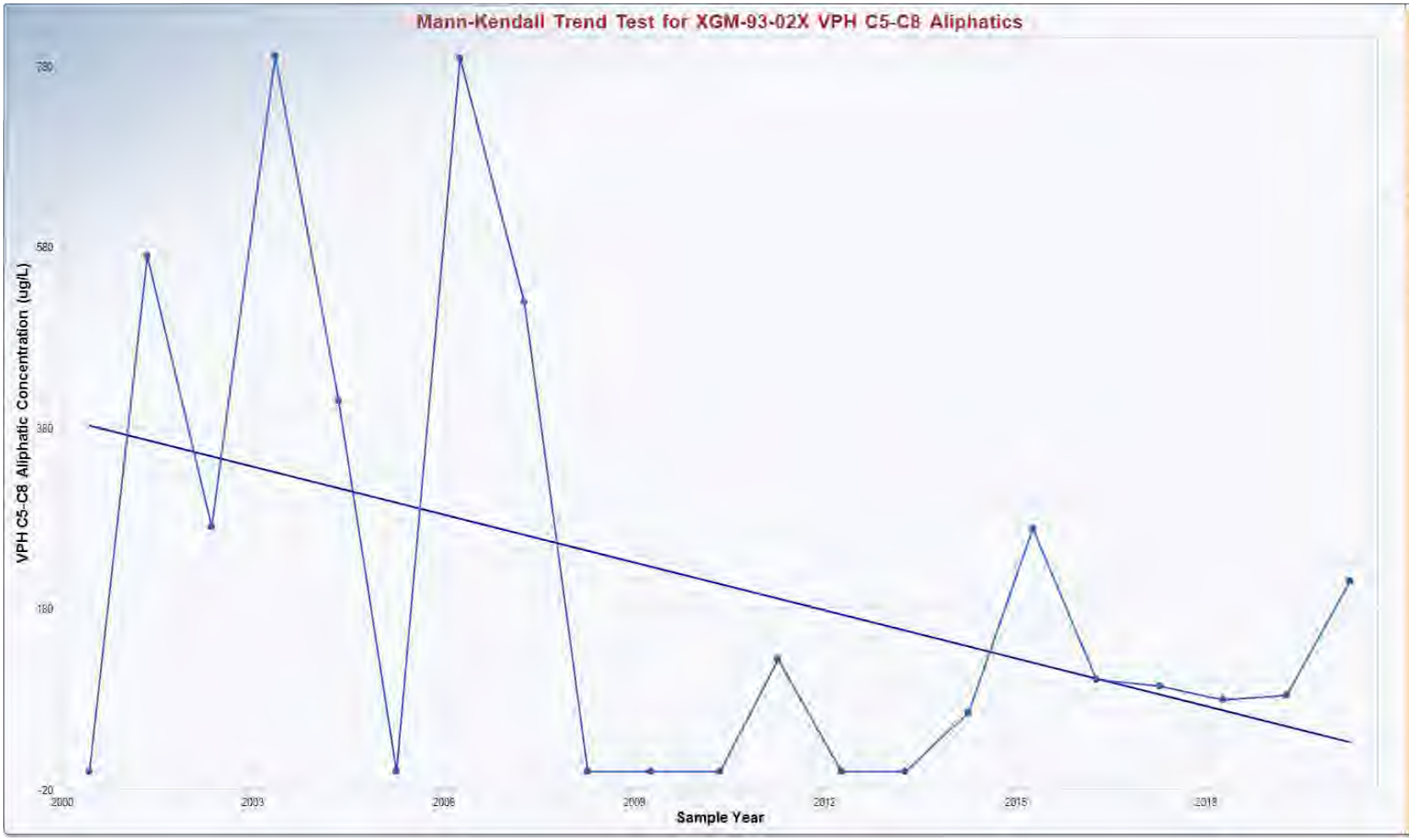
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	0.4671
M-K Test Value (S)	7
Tabulated p-value	0.3240
Approximate p-value	0.3202

OLS Regression Line (Blue)

OLS Regression Slope	24.0889
OLS Regression Intercept	-47,799.4981

Insufficient statistical evidence of a significant trend at the specified level of significance.



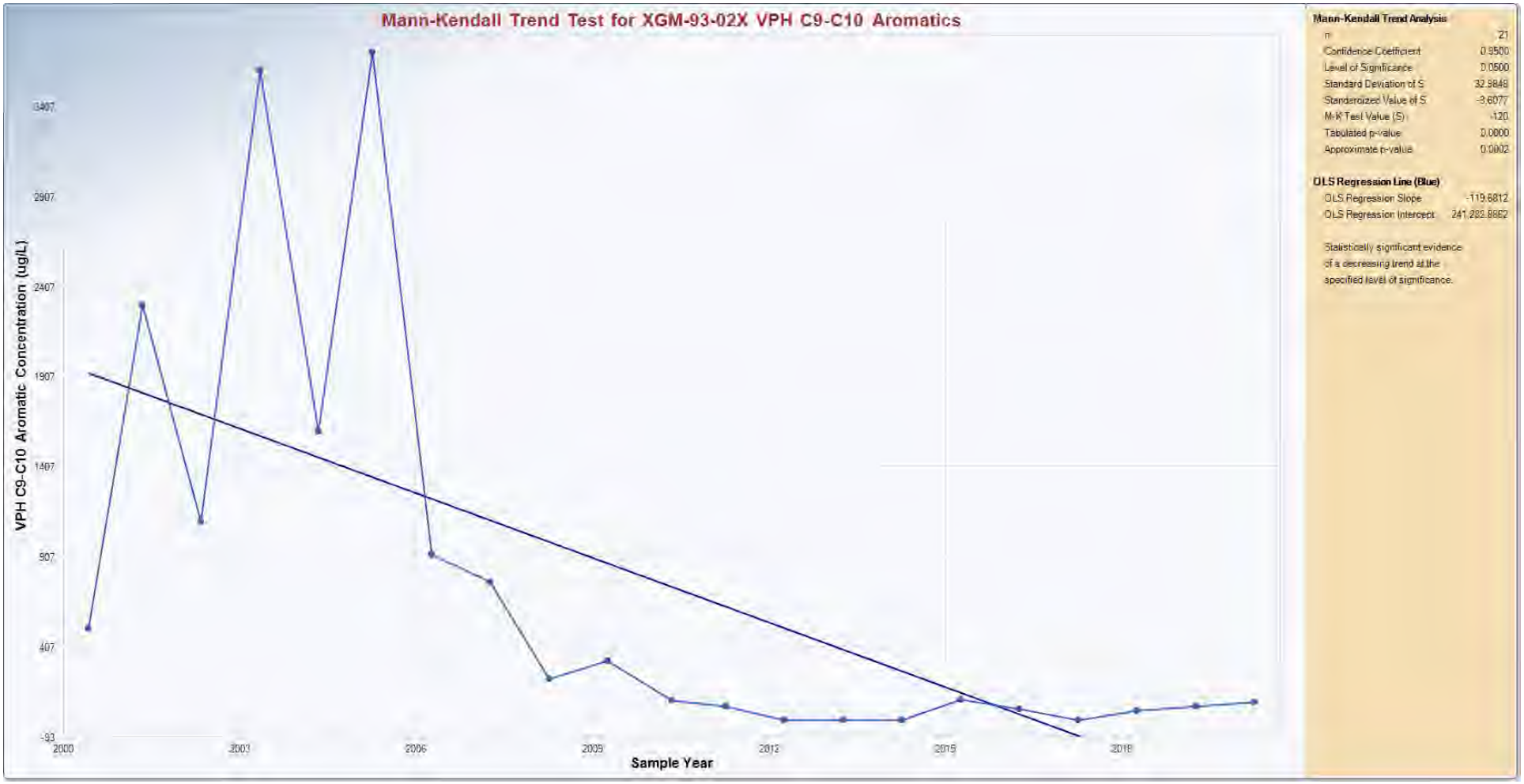
Mann-Kendall Trend Analysis

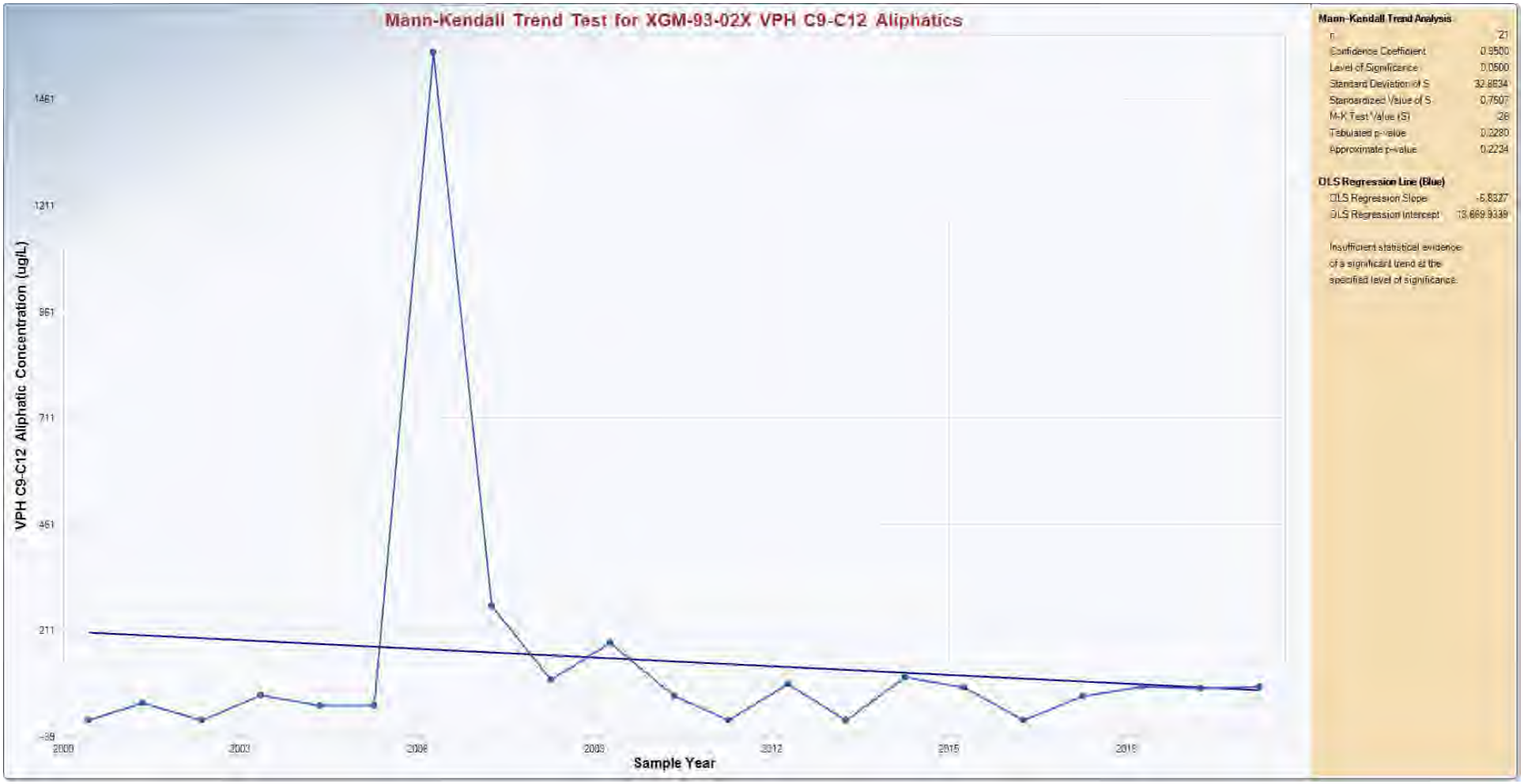
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	32.4397
Standardized Value of S	-0.6782
M-K Test Value (S)	-23
Tabulated p-value	0.2650
Approximate p-value	0.2488

OLS Regression Line (Blue)

OLS Regression Slope	-17.5714
OLS Regression Intercept	35,724.7097

Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test for XGM-93-02X VPH C9-C10 Aromatics
VPH C9-C10 Aromatic Concentration (ug/L)
3407
2907
2407
1907
1407
907
407
-93
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 32.9849
Standardized Value of S -3.6077
M-K Test Value (S) -120
Tabulated p-value 0.0000
Approximate p-value 0.0002
OLS Regression Line (Blue)
OLS Regression Slope -119.6812
OLS Regression Intercept 241,282.8862
Statistically significant evidence
of a decreasing trend at the
specified level of significance.


Mann-Kendall Trend Test for XGM-93-02X VPH C9-C12 Aliphatics
VPH C9-C12 Aliphatic Concentration (ug/L)
1461
1211
961
711
461
211
-39
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 32.8634
Standardized Value of S 0.7607
M-K Test Value (S) 28
Tabulated p-value 0.2280
Approximate p-value 0.2234
OLS Regression Line (Blue)
OLS Regression Slope -6.8327
OLS Regression Intercept 13,669.9339
Insufficient statistical evidence
of a significant trend at the
specified level of significance.

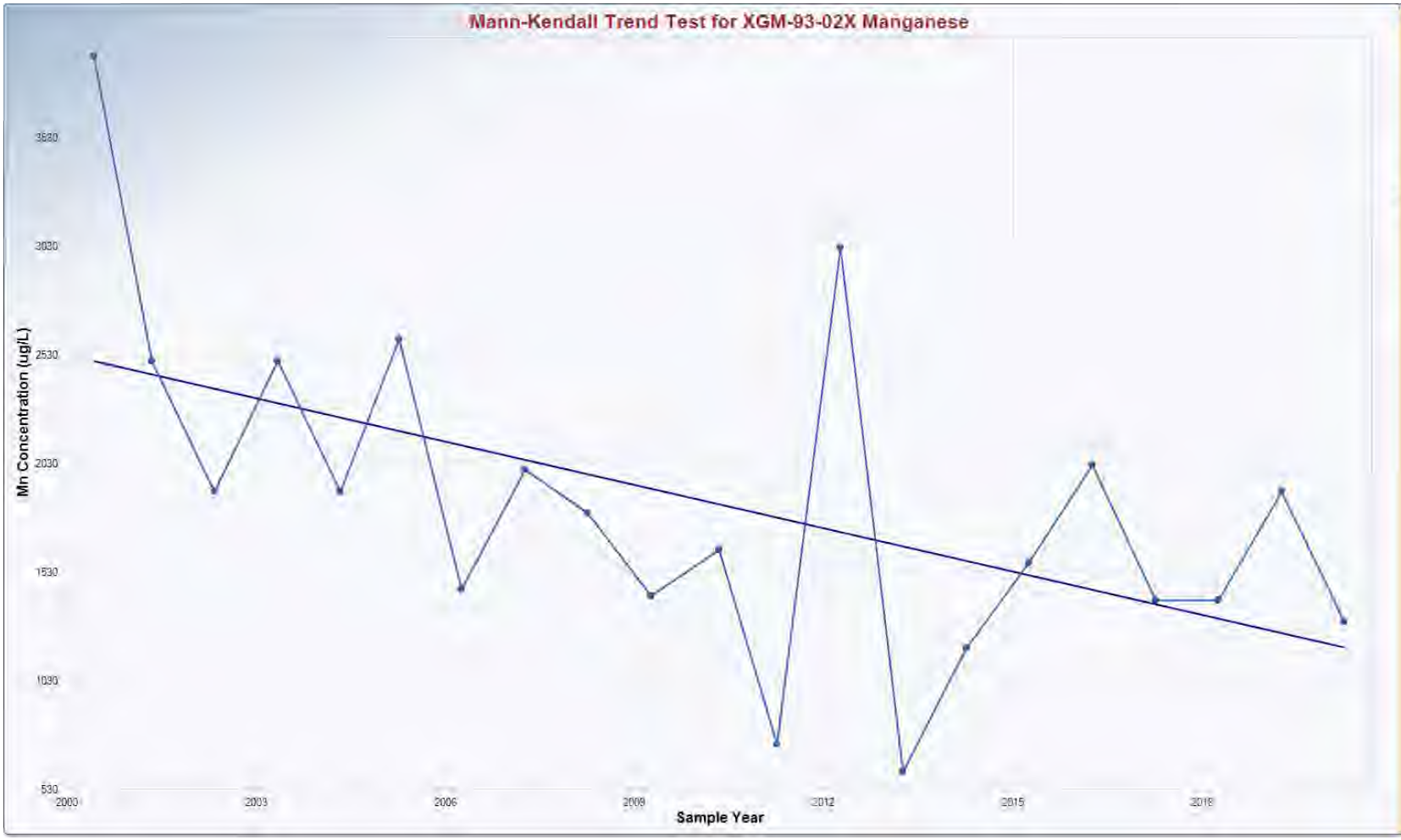
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0454
Standardized Value of S	-2.3906
M-K Test Value (S)	-80
Tabulated p-value	0.0080
Approximate p-value	0.0084

OLS Regression Line (Blue)

OLS Regression Slope	-610.2416
OLS Regression Intercept	1,239,783.5429

Statistically significant evidence of a decreasing trend at the specified level of significance.



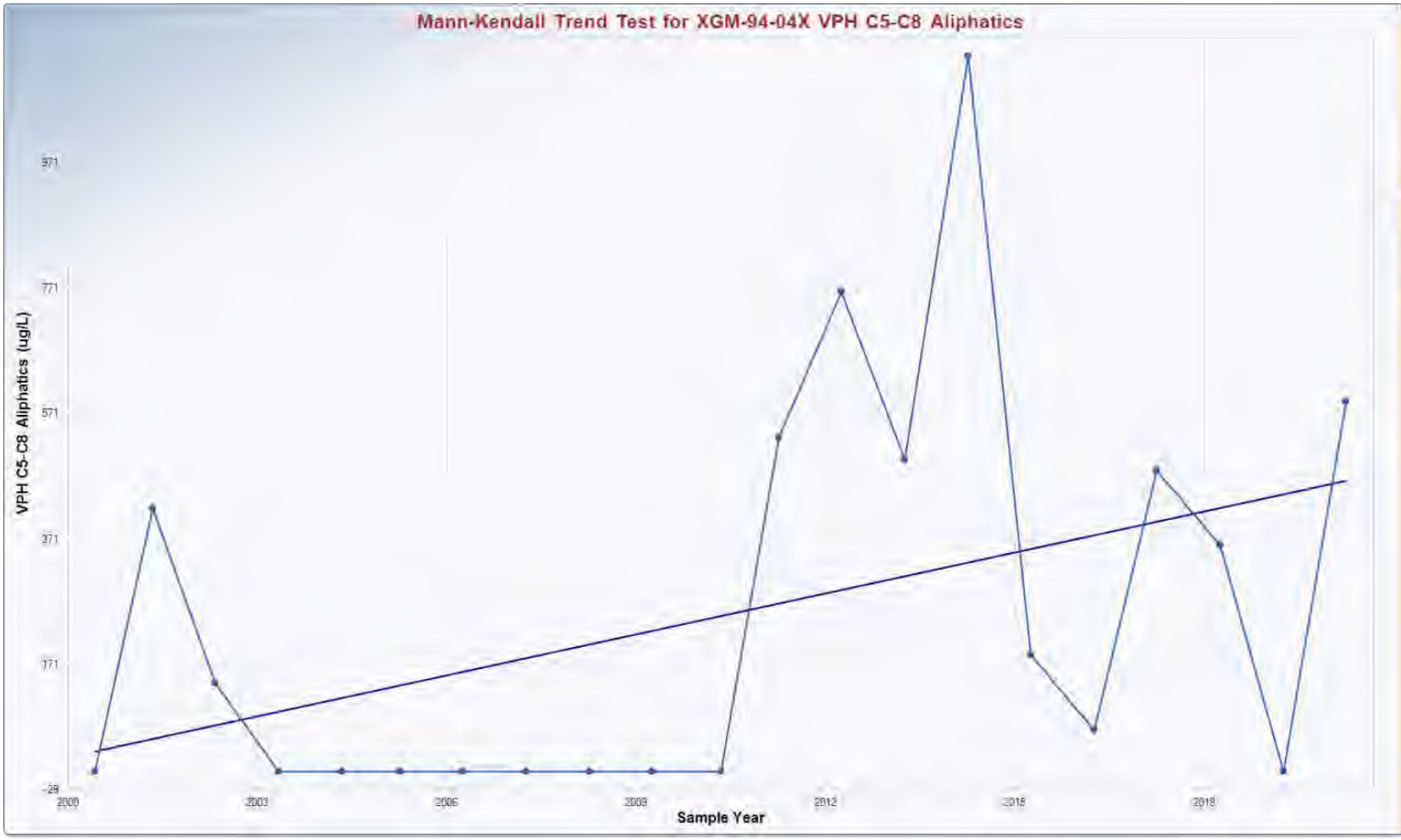
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	32.0303
Standardized Value of S	-2.6037
M-K Test Value (S)	-87
Tabulated p-value	0.0050
Approximate p-value	0.0046

OLS Regression Line (Blue)

OLS Regression Slope	-66.3886
OLS Regression Intercept	135,276.1239

Statistically significant evidence of a decreasing trend at the specified level of significance.



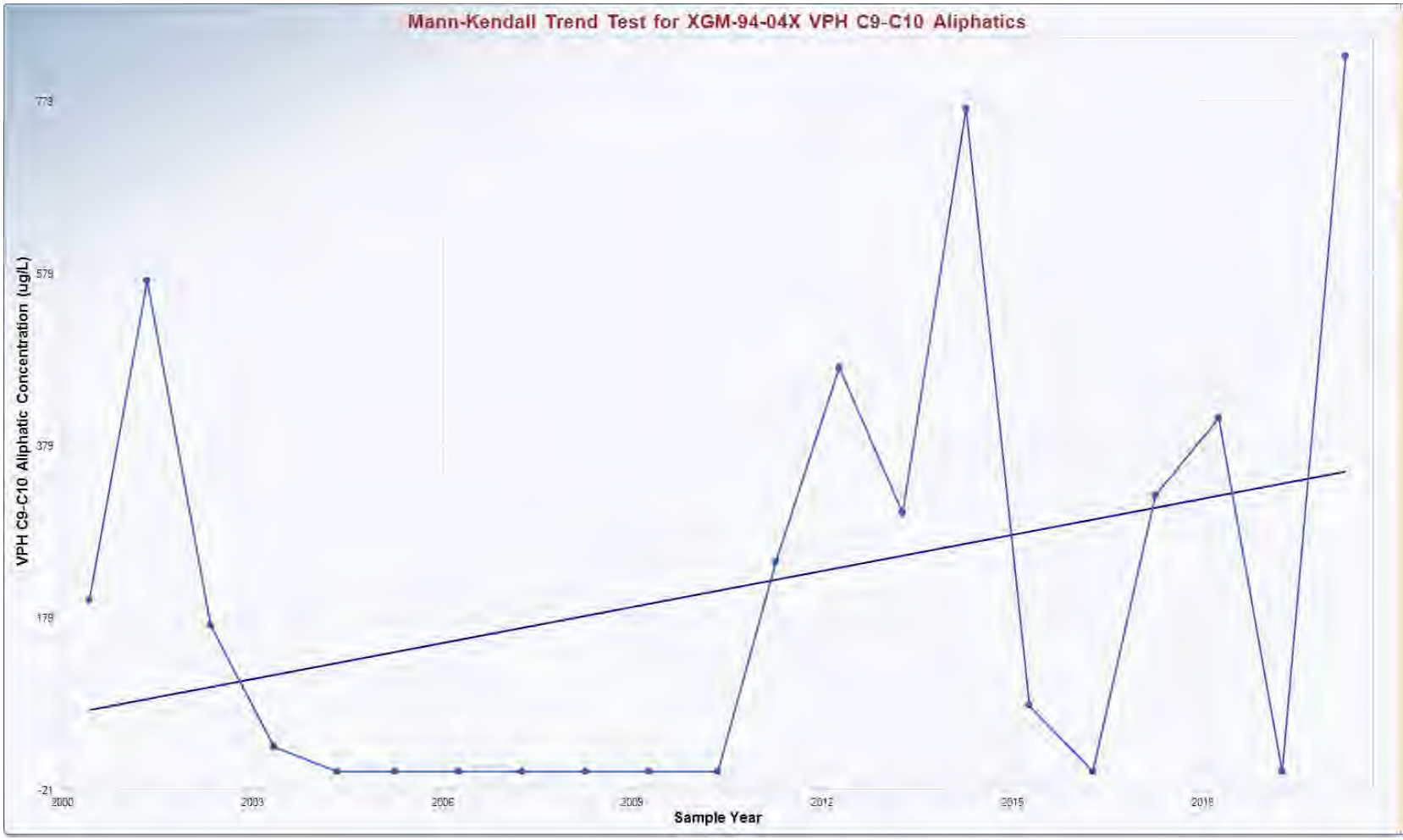
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	31.1716
Standardized Value of S	1.8607
M-K Test Value (S)	59
Tabulated p-value	0.0430
Approximate p-value	0.0314

OLS Regression Line (Blue)

OLS Regression Slope	21.7583
OLS Regression Intercept	-43,483.8891

Statistically significant evidence of an increasing trend at the specified level of significance.



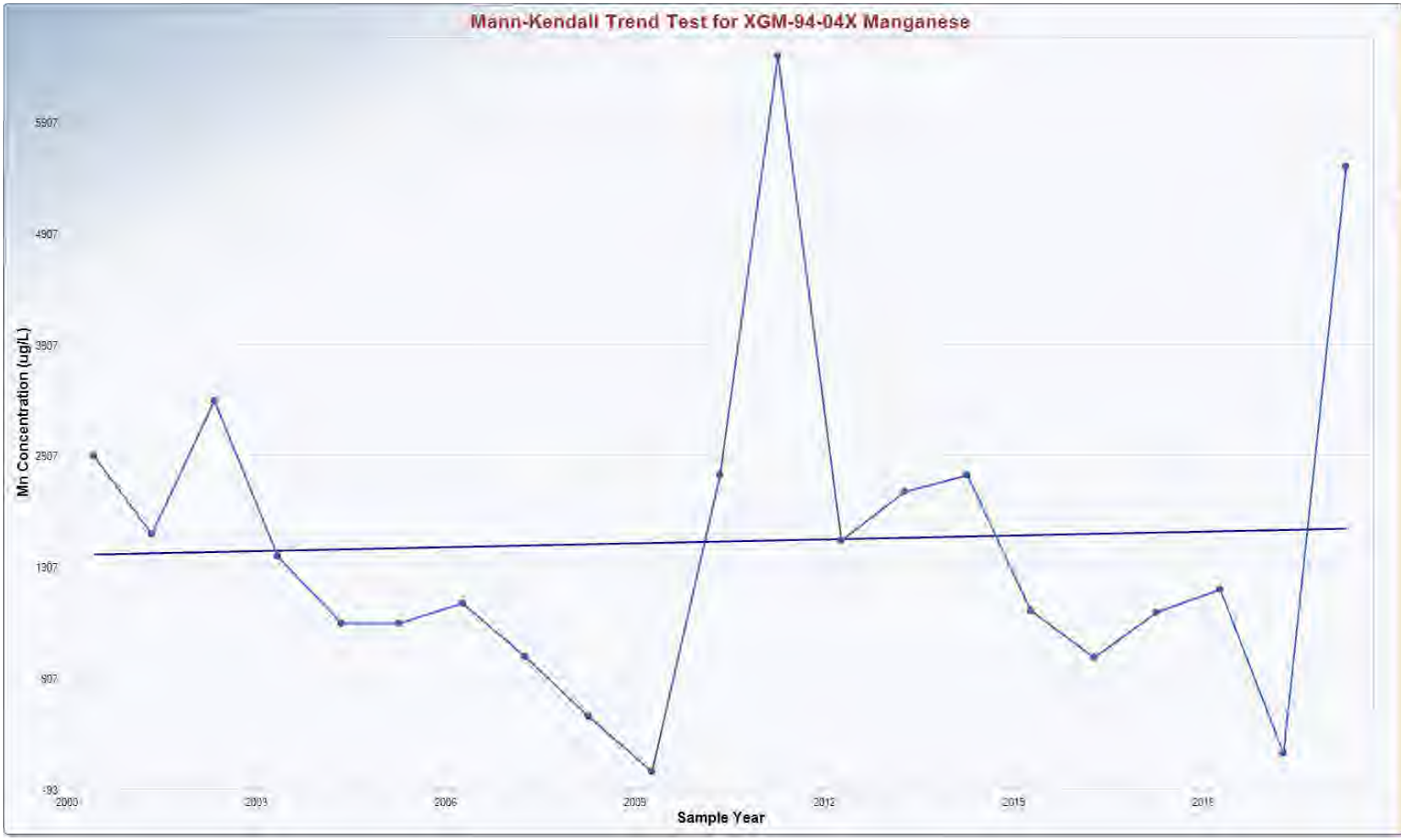
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	31.6986
Standardized Value of S	1.0411
M-K Test Value (S)	34
Tabulated p-value	0.1620
Approximate p-value	0.1489

OLS Regression Line (Blue)

OLS Regression Slope	13.9775
OLS Regression Intercept	-27,683.5942

Insufficient statistical evidence of a significant trend at the specified level of significance.



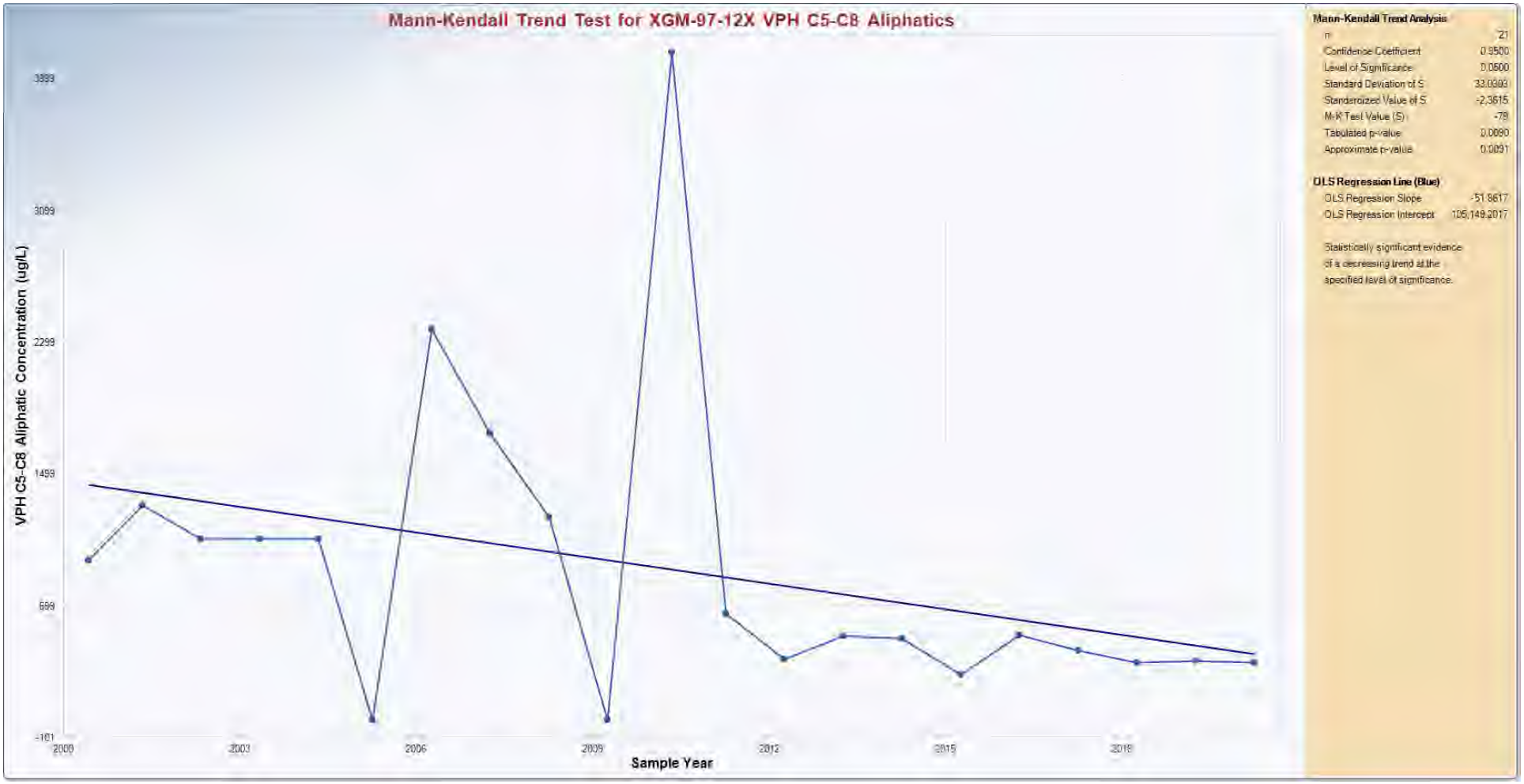
Mann-Kendall Trend Analysis

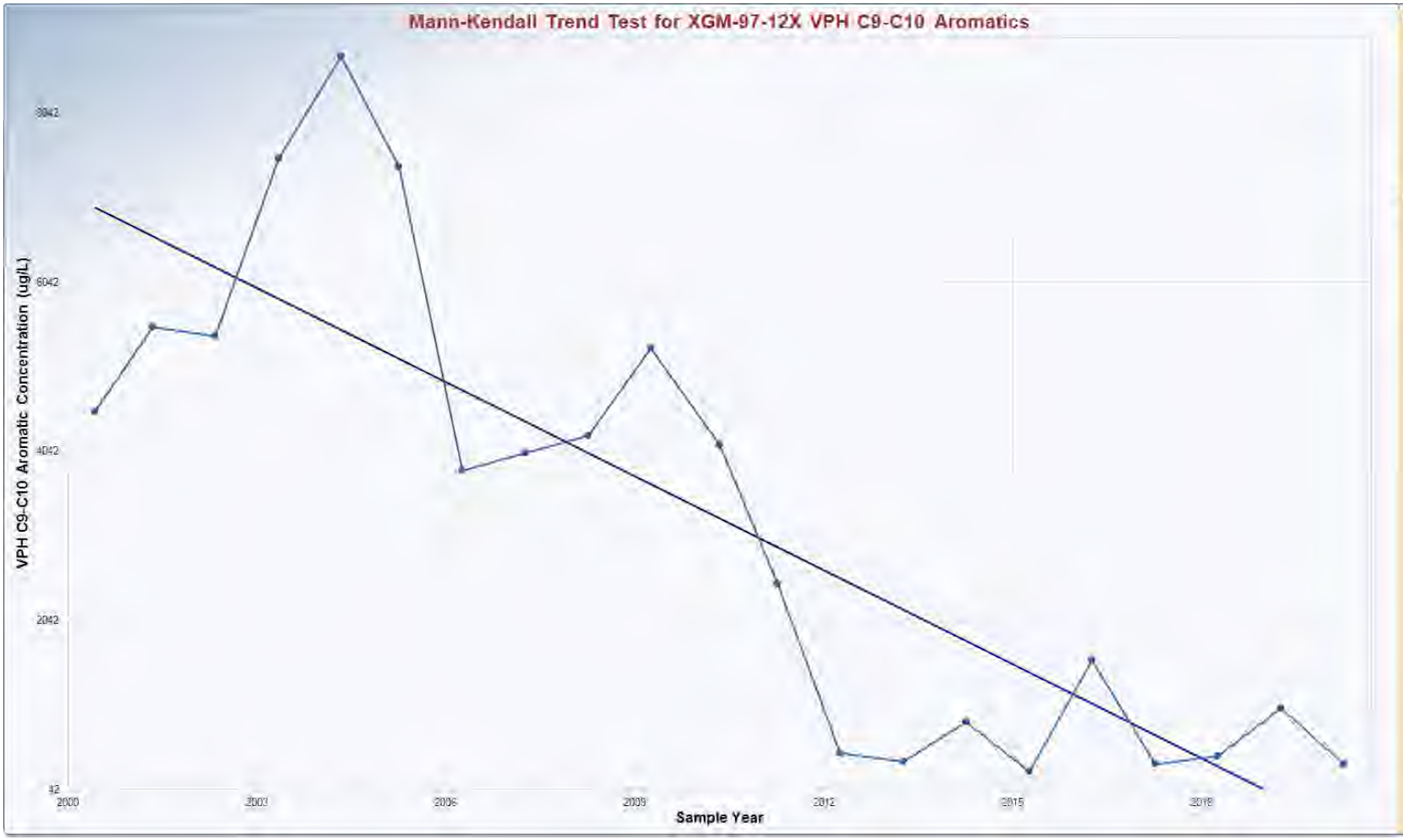
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0857
Standardized Value of S	-0.7556
M-K Test Value (S)	-26
Tabulated p-value	0.2280
Approximate p-value	0.2249

OLS Regression Line (Blue)

OLS Regression Slope	11.4056
OLS Regression Intercept	-20,789.5834

Insufficient statistical evidence of a significant trend at the specified level of significance.


Mann-Kendall Trend Test for XGM-97-12X VPH C5-C8 Aliphatics
VPH C5-C8 Aliphatic Concentration (ug/L)
3899
3099
2299
1499
699
-101
2000
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 33.0303
Standardized Value of S -2.3615
M-K Test Value (S) -78
Tabulated p-value 0.0090
Approximate p-value 0.0091
OLS Regression Line (Blue)
OLS Regression Slope -51.8617
OLS Regression Intercept 105,149.2017
Statistically significant evidence
of a decreasing trend at the
specified level of significance.



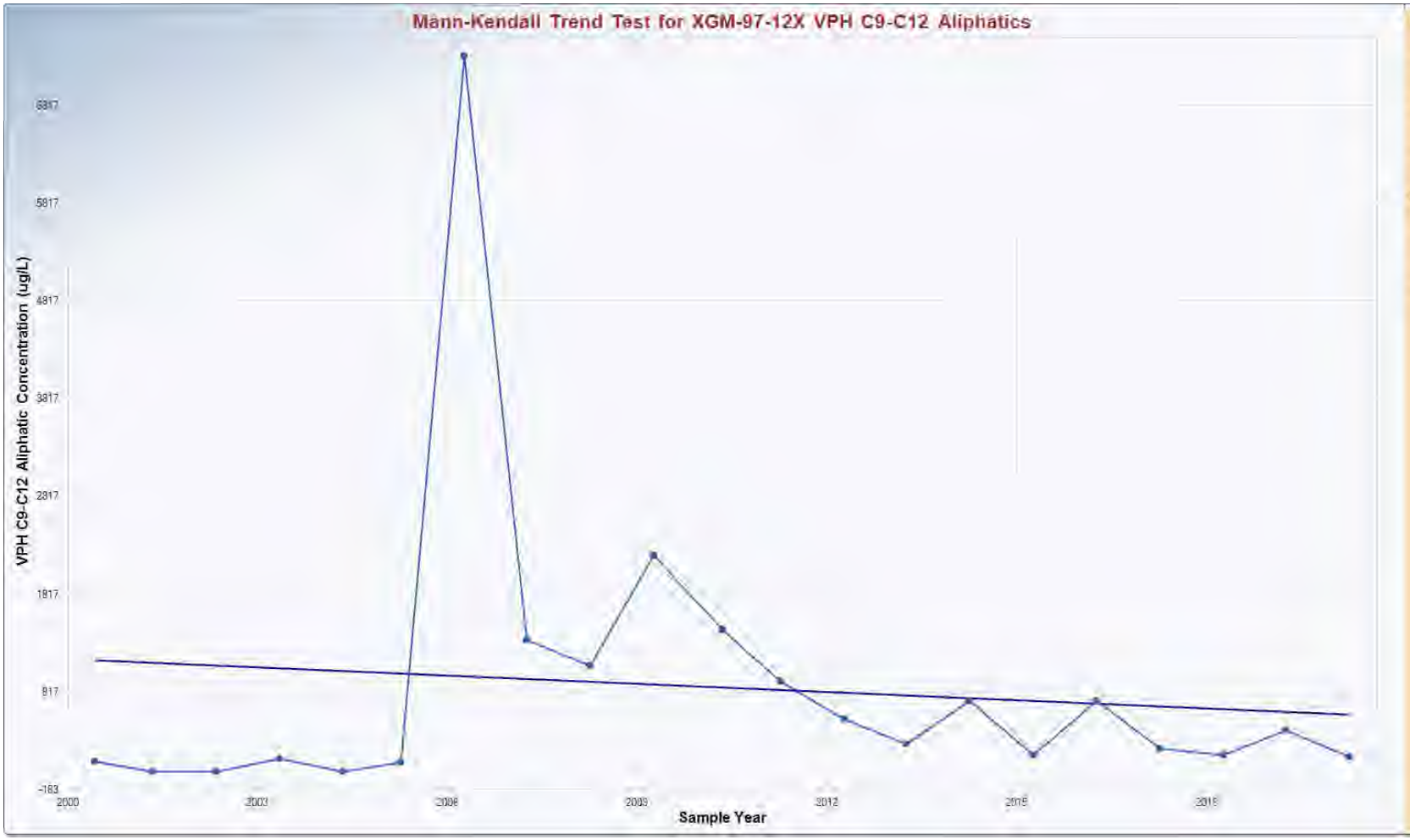
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1009
Standardized Value of S	-3.9878
M-K Test Value (S)	-133
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-370.4217
OLS Regression Intercept	747,744.0471

Statistically significant evidence of a decreasing trend at the specified level of significance.



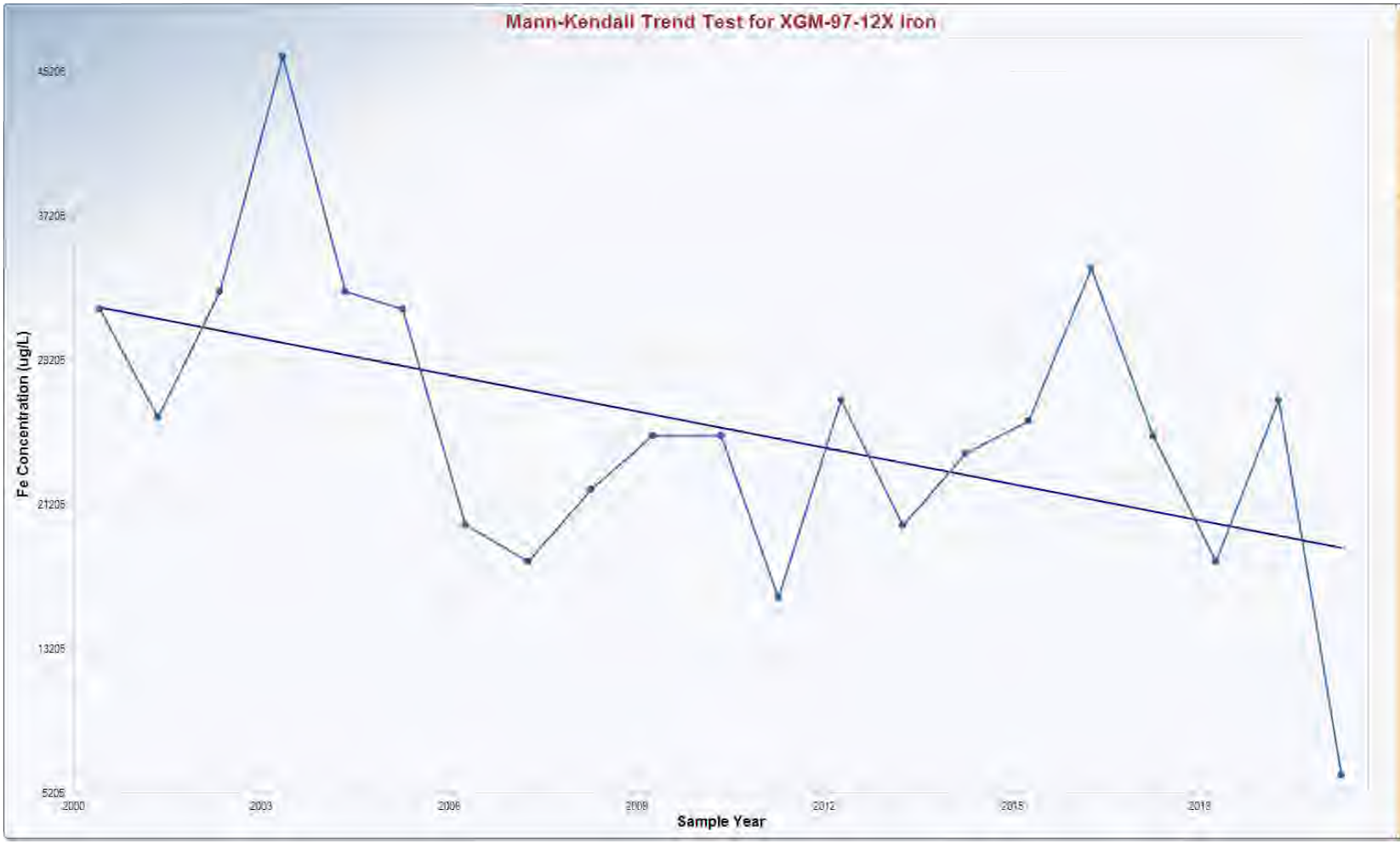
Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0606
Standardized Value of S	0.4235
M-K Test Value (S)	15
Tabulated p-value	0.3490
Approximate p-value	0.3360

OLS Regression Line (Blue)

OLS Regression Slope	-27.8299
OLS Regression Intercept	56,790.8699

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0000
Standardized Value of S	-1.7576
M-K Test Value (S)	-58
Tabulated p-value	0.0430
Approximate p-value	0.0394

OLS Regression Line (Blue)

OLS Regression Slope	-672.8197
OLS Regression Intercept	1,377,746.2526

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.1009
Standardized Value of S	-2.7794
M-K Test Value (S)	-93
Tabulated p-value	0.0020
Approximate p-value	0.0027

OLS Regression Line (Blue)

OLS Regression Slope	-136.9109
OLS Regression Intercept	275,662.9830

Statistically significant evidence of a decreasing trend at the specified level of significance.

APPENDIX I – Former Elementary School Spill Site

I.1 Former

Elementary School Spill Site

Additional Background

Information

Site Chronology

Chronology of Events AOC 69W

Event	Date
Fuel line crimp during UST installation leaked approximately 8,000 gallons of No. 2 fuel oil released to the ground	1972
Oil recovery system was installed	1972-1973
Underground fuel line failed at a pipe joint and approximately 8,000 gallons of No. 2 fuel oil was released to the ground	1978
Fort Devens Final NPL Listing	November 1989
SI performed	1994
Removal action of contaminated soil from 1972 leak and oil recovery	1997-1998
RI completed	1998
Limited Action ROD signed	1999
Final LTMP	March 2000
First Five-Year Review	September 2000
Final OPS Demonstration for AOC 69W	November 2005
Second Five-Year Review	September 2005
Finding of Suitability to Transfer (FOST)	November 2006
Property transferred from Army to MassDevelopment	August 2007
Final Indoor Air Soil Vapor Intrusion Study for Francis W. Parker Charter School	February 2008
Revised LTMP	November 2008
Semiannual LTM	2000-2005
Annual LTM	2006-2009
Third Five Year Review	September 2010
Annual LTM	2010- 2014
Fourth Five Year Review	September 2015
Annual LTM	2015- 2019
Fifth Five Year Review	September 2020

Background

The following items summarize the history for AOC 69W.

- 1951. The Fort Devens Elementary School was built and consisted of the east/southeast half of the present school. The school was heated by an oil-fired boiler, and the heating oil was stored in a 10,000-gallon UST located in what is currently the school courtyard. The school was operated and maintained by the Ayer School Department.
- 1972. An addition to the school was built that formed the current school structure. Although a new boiler room was constructed, the old boiler room remained operational. The original 10,000-gallon UST was removed and a new 10,000-gallon UST was installed north of the school in the middle of the current parking lot. During the UST installation, the underground fuel line leading to the new boiler room was accidentally crimped, causing the pipe to split and leak approximately 7,000 to 8,000 gallons of No. 2 fuel oil to the ground.
- 1972-1973. As a result of the fuel release, an oil recovery system was installed in the vicinity of the 10,000-gallon UST. The system consisted of underground piping connected to a buried 250-gallon concrete vault that acted as an oil/water separator. The vault collected oily water

and was pumped out approximately every 3 months.

- 1978. Underground fuel piping near the original boiler room failed at a pipe joint. Approximately 7,000 to 8,000 gallons of oil were released into the soil during the incident. Soil was excavated to locate the source of the release. The excavation remained open to collect the residual oil for 1 month before the damaged piping was found and replaced. A maximum of 2,600 gallons of residual oil was pumped from the oil recovery system.
- 1993. The Ayer School Department closed the school because the facility was excess to its needs. As part of the Base closure process, the Army performed a base wide evaluation of past spill sites and designated the elementary school spill site as Areas Requiring Environmental Evaluation (AREE). Based on document reviews and site visits, the evaluation concluded that residual fuel contamination might have been present in the soil and groundwater at the site.
- 1994. The Army performed a Site Investigation (SI), which revealed the presence of fuel-related contaminants in both soil and groundwater between the school and the existing UST, and in an area extending northwest from the existing fuel UST to near Willow Brook. The Army re-designated the site as AOC 69W and proposed a Remedial Investigation (RI) be performed.
- 1995-1998. An RI was performed to define the AREE SI, and to determine whether remediation was warranted. Investigation activities included an historical record search and personnel interviews, a geophysical survey and test pitting, sediment and toxicity sampling in Willow Brook, surface and subsurface soil sampling, groundwater monitoring well installation, groundwater sampling and groundwater level measurements, aquifer testing, ecological survey and wetland delineation, air quality sampling within the elementary school, and human health and ecological risk assessments. The RI data showed that fuel-related compounds, primarily TPHC and SVOCs were present in soils extending from the new (1972) boiler room to approximately 300 ft northwest. Fuel-related VOCs, SVOCs, TPHC, and inorganics comprised the observed groundwater contaminants. Soil and groundwater contamination appeared to be largely a result of the 1972 fuel oil release. The underground oil recovery system apparently acted as a conduit for contaminant migration in soil and groundwater. Observed contamination from the 1978 release did not appear to be migrating downgradient and further migration was considered unlikely considering the age of the release and the paved parking lot, which inhibited precipitation infiltration.
- 1996. Fort Devens officially closed. AOC 69W was slated for future transfer to the Massachusetts Government Land Bank (now MassDevelopment). The existing school building was expected to be re-opened.
- 1997-1998. The Army performed a removal action and excavated approximately 3,500 cy of petroleum-contaminated soil associated with the 1972 fuel oil leak. The 10,000 gallon fuel oil UST, oil recovery system's 250-gallon vault, and associated piping were also removed. The 10,000-gallon fuel oil UST was confirmed to be intact (i.e., no holes or leaks were observed). Confirmatory soil sampling in excavated areas indicated that EPH and VPH concentrations immediately adjacent to the school still exceeded MCP S-1/GW-1 soil standards after the removal action. Because of the proximity of the school, this soil could not be excavated without potential building structural damage.

- 1999. Limited Action ROD signed. The Limited Action consists of groundwater LTM and ICs to limit the potential exposure to contaminated soils and groundwater under both the existing and future site conditions. Because groundwater in this site's recharge area is not planned for as a drinking water source and because Devens has a municipal water supply, the Army's position has been that residual contamination of groundwater in this area does not pose an unacceptable risk. The Limited Action ROD has been in effect since 1999.
- 2000. The former Fort Devens Elementary School was reopened in September 2000 as the Francis W. Parker Charter School and currently occupies the site.
- 2006-2007. The Army finalized the Findings of Suitable Transfer (FOST) for AOC 69W in November 2006 and the property was formally transferred from Army ownership to MassDevelopment in August 2007. The current property owner, Francis W. Parker Charter School, is abiding by the ICs imposed on the property, and annual groundwater sampling continues as recommended in the current LTMP.

Physical Characteristics

The predominant soil type at AOC 69W consists of dark yellowish-brown fine to coarse sands, gravely sands, and silty sands. Explorations in the vicinity of Willow Brook and its associated wetlands revealed a 4- to 5-ft layer of dark grayish-brown, sandy silt overlying the sands. Organic material, believed to be from undisturbed native peat deposits, is located in the area north of the school at a maximum depth of 4 ft bgs. Near surface soils beneath the school and parking lot consist of reworked native soils. During the remedial investigation in 1998, bedrock was not encountered in any of the soil borings, which reached depths of up to 16 ft. The water table aquifer at AOC 69W occurs in the overburden at depths ranging from 4 ft to 6 ft bgs on the north side of the school building to approximately 1-ft bgs adjacent to Willow Brook. Groundwater flow direction is predominately from the south-southeast to north-northwest. Groundwater discharges to Willow Brook at times of high groundwater levels and is a losing stream during low groundwater conditions. Vertical gradients were not calculated as there are no deep overburden wells; however, the intermittent discharge to Willow Brook indicates locally upward gradients. Calculated groundwater flow velocities are consistent with the observed sandy soils with a maximum calculated flow velocity of 2 ft/day and a mean flow velocity of 0.7 ft/day. AOC 69W is located within the delineated Zone II for the MacPherson production well located approximately 3,000 ft to the north, and downgradient of AOC 69W (*USACE, 1998*).

History of Contamination (Soil)

A review of the field and analytical data from the 1995 and 1996 RIs (*HLA, 1998*) indicated that there were two areas of fuel-related soil contamination at AOC 69W. The larger area extended from the new boiler room to the oil recovery system 250-gallon concrete vault that acted as an oil water separator, in the wooded area approximately 300 ft northwest of the school. The contamination was attributed to the 1972 release of fuel oil from piping between the 10,000-gallon UST and the new boiler room. Analytical data and visual evidence suggested that the release may have been inside or near the new boiler room. Because of the release, an oil recovery system was installed in 1972 to remove oil from the source area and presumably from near surface soils in the grassy area north of the school. Contaminant distributions established by the RI indicated that the trench for the underground piping associated with this system may have acted as a conduit for contaminant migration. Detected contaminants were

primarily TPHC, PAHs, and EPH/VPH at approximately 6 ft to 10 ft bgs adjacent to the school and 0 to 4 ft bgs downgradient in the grassy area and in the vicinity of the 250-gallon underground concrete vault. Subsurface contaminants were located primarily at or near the water table. Surficial contamination downgradient of the school (near Willow Brook) is attributed to sorption during times of high groundwater levels.

Based on the nature and distribution of contaminants, a Removal Action (Weston, 1998) was undertaken in the winter of 1997 and 1998 to remove contaminated soil associated with the 1972 release. Soil was excavated to a maximum depth of 13 ft bgs near the school, and 8 ft bgs near the 250-gallon underground concrete vault. Confirmatory subsurface soil sample results from the removal action showed that concentrations of fuel-related contaminants still exceeded MCP S-1/G-1 standards for EPH in subsurface soils immediately adjacent to the school building, but were generally low in downgradient areas (*Weston, 1998*).

The other identified area of soil contamination was located adjacent to the school building outside of the original boiler room. This contamination was attributed to the 1978 fuel oil release from ruptured piping. An excavation at the time of the release showed visible fuel oil contamination emanating from underneath the school. Analytical data indicated that the contaminants were primarily TPHC at depths of 4 ft to 7 ft bgs beneath the parking lot. Contaminants appeared to be localized to the area immediately adjacent to the school. Future leaching is not likely as the area is paved, thereby inhibiting leaching of soils via precipitation infiltration.

History of Contamination (Groundwater)

Fuel-related VOCs, SVOCs, TPHC, and inorganics comprise the observed groundwater contaminants at AOC 69W. Varying degrees of groundwater contamination, as identified by field and off-site analysis, were observed to extend from the new boiler room towards the 250 gallon underground concrete vault located approximately 300 ft to the northwest. The area of groundwater contamination was coincident with the underground piping associated with the oil recovery system installed in response to the 1972 fuel oil release. Contaminant concentrations were highest between the new boiler room and monitoring well 69W-94-13, which was also the area of highest observed soil contaminant concentrations. The soil around monitoring wells 69W-94-10 and 69W-94-13 exhibited the highest contaminant and inorganic concentrations. This soil was removed during the soil Removal Action (*Weston, 1998*).

Arsenic, calcium, iron, manganese, potassium, and sodium were detected in filtered groundwater samples at concentrations in excess of calculated Devens background concentrations and in some cases in excess of cleanup values based on the MCP GW-1/GW-2 groundwater standards. Analytes that exceeded MCLs in these wells included arsenic, naphthalene, and the EPH and VPH aromatic fractions. Contaminated soils surrounding these wells were removed during the soil Removal Action (*Weston, 1998*).

The RI (*HLA, 1998*) did not reveal significant groundwater contamination associated with the 1978 fuel oil release in the vicinity of the old boiler room. Low concentrations of chlorinated VOCs were detected during the 1995 field analysis and the first round of groundwater sampling. No chlorinated VOCs were detected during the next three subsequent rounds of groundwater sampling efforts.

I.2 Former

Elementary School

Spill Site Figures

Figure I-1
Site Layout
Area of Contamination 69W

Legend

- LTM Sample Well
- LTM Sample Well Point
- LTM Well - Gauge Only
- LTM Piezometer
- ZWM-01-26X — Well/Piezometer/Surface Water Elevation Location
- Parcel Boundary
- Surface Water Course
- Excavated Soils Management Area
- Topographic Contour (Ft AMSL)
- MassDEP Zone II Wellhead Protection Area

Notes:
LTM = Long-term monitoring

Aerial Sources: 2013, USGS, MassGIS

2020 Five Year Review
AOC 69W

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 60 120
Feet

Date:
03/18/2020

Figure
I-1

File: AR2019_MP_F3-1_AOC69W.mxd

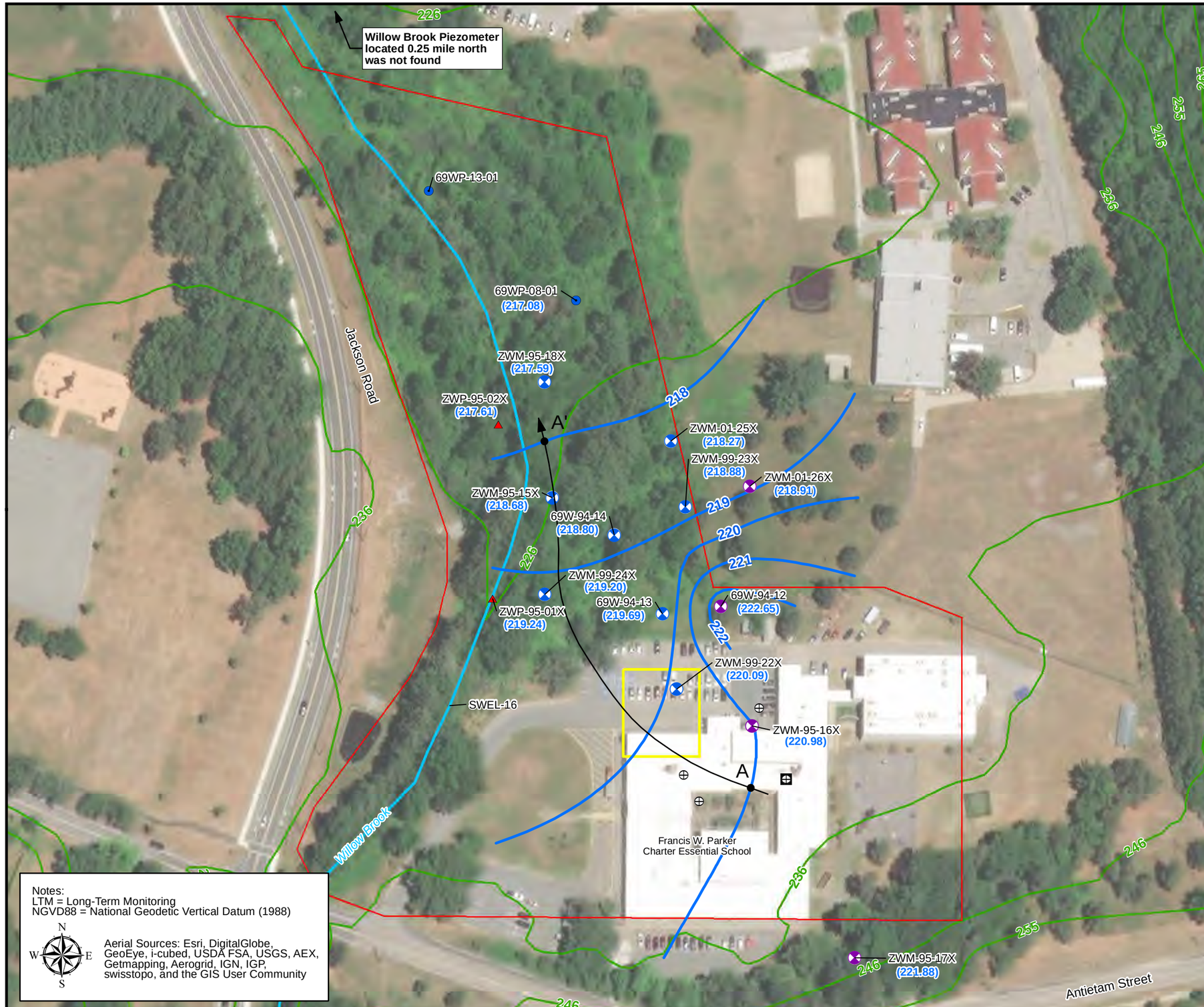


Figure I-2
Interpretive Water Table Elevation
Area of Contamination 69W
October 2019

Legend

- LTM Sample Well
- LTM Sample Well Point
- LTM Well - Gauge Only
- LTM Piezometer
- Monitoring Well - Abandoned (2012)
- Monitoring Well - Presumed Destroyed
- Groundwater Elevation Contour (ft NGVD88) (Contour Interval = 1 ft)
- (221.75) Groundwater Elevation (ft NGVD88)
- A—A' Groundwater Gradient Calculation Location
- ZWM-01-26X Well/Piezometer/Surface Water Elevation Location
- Parcel Boundary
- Surface Water Course
- Excavated Soils Management Area
- Topographic Contour (ft AMSL)

AOC 69W lies within the MassDEP Zone II Wellhead Protection Area for the MacPherson well.

2020 Five Year Review
AOC 69W

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 60 120
Feet

Date: 02/25/2020

Figure I-2

File: AR2019_MP_F3-2_AOC69W_GWC1019.mxd

I.3 Former

Elementary School

Spill Site Tables

Table I-1
Groundwater Analytical Results
Area of Contamination 69W
October 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	Monitoring Criteria[1]	GW 3 Groundwater Standard[3]	Background	69W 94 13	Q	69W 94 14	Q	ZWM 95 15X	Q	ZWM 99 22X	Q	ZWM 99 22X (69W DUP)	Q	ZWM 95 23X	Q
Metals (SW6010B)	Arsenic	µg/L	10	900	10.5	120		4.0	U	19.3		125.0		128.0		13.9	
	Iron[2]	µg/L	NS	NS	9,100	12,300		100	U	3,980		21,400		21,700		1,830	
	Manganese	µg/L	375	NS	291	2,050		19.1		843		1,440		1,430		749	
VPH (VPH 04 1.1)	C5 C8 Aliphatics (Adjusted)[3]	µg/L	300	50,000	NS	NA		NA		NA		NA		NA		NA	
	C9 C12 Aliphatics (Adjusted)[3]	µg/L	700	50,000	NS	NA		NA		NA		NA		NA		NA	
	C9 C10 Aromatics	µg/L	200	50,000	NS	NA		NA		NA		NA		NA		NA	
EPH (MADEP)	C9-C18 Aliphatics	µg/L	700	50,000	NS	100	U	100	U	100	U	100	U	110	U	100	U
	C19-C36 Aliphatics	µg/L	14,000	50,000	NS	100	U	100	U	100	U	100	U	110	U	100	U
	C11-C22 Aromatics	µg/L	200	5,000	NS	175		100	U	100	U	354		305		100	U
Field Parameters	Temperature, Initial	°Celcius	NS	NS	NS	18.14		16.66		15.54		20.72		NA		16.65	
	Temperature, Final	°Celcius	NS	NS	NS	18.26		16.69		15.57		20.35		NA		16.77	
	pH	Std units	NS	NS	NS	6.57		5.76		5.76		6.37		NA		6.32	
	Specific Conductance	µS/cm	NS	NS	NS	1782		902		957		900		NA		876	
	ORP/Eh	mV	NS	NS	NS	-85.9		169		69.8		-88.9		NA		-10.4	
	Dissolved Oxygen	mg/L	NS	NS	NS	0.21		3.32		0.33		0.20		NA		1.12	
	Turbidity	NTU	NS	NS	NS	4.71		1.86		3.22		8.85		NA		1.18	

Notes:

0.333 = Monitoring Criteria exceedance

0.716 = Detected result above GW 3 Standard, and/or Background

ND - non-detect

NS No standard

NA Not analyzed

1 The monitoring criteria is based on the lower value between the site specific cleanup goal and the MCP GW 1 Standard (310 CMR 40 Subpart P).

2 The background value from HLA (2000); iron is no longer considered a COC but will be used as an indicator of remediation efficacy and compared to the background level.

3 The GW 3 standard was effective April 2014

All general terms, laboratory indicators and data qualifiers are defined on the Key for Tables found at the beginning of this section.

Table I-1 (Continued)
Groundwater Analytical Results
Area of Contamination 69W
October 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	Monitoring Criteria[1]	GW 3 Groundwater Standard[3]	Background	ZWM 99 24X	Q	ZWM 99 25X	Q	69WP-08-01	Q	69WP-13-01	Q	ZWM-95-18X	Q
Metals (SW6010B)	Arsenic	µg/L	10	900	10.5	4.0	U	4.0	U	4.0	U	NA		4.0	U
	Iron[2]	µg/L	NS	NS	9,100	100	U	100	U	4,990		NA		100	U
	Manganese	µg/L	375	NS	291	15.0	U	859		78.4		71.9		165.0	
VPH (VPH 04 1.1)	C5 C8 Aliphatics (Adjusted)[3]	µg/L	300	50,000	NS	NA		NA		NA		NA		NA	
	C9 C12 Aliphatics (Adjusted)[3]	µg/L	700	50,000	NS	NA		NA		NA		NA		NA	
	C9 C10 Aromatics	µg/L	200	50,000	NS	NA		NA		NA		NA		NA	
EPH (MADEP)	C9-C18 Aliphatics	µg/L	700	50,000	NS	110	U	NA		NA		NA		100	U
	C19-C36 Aliphatics	µg/L	14,000	50,000	NS	110	U	NA		NA		NA		100	U
	C11-C22 Aromatics	µg/L	200	5,000	NS	100	U	NA		NA		NA		100	U
Field Parameters	Temperature, Initial	°Celcius	NS	NS	NS	15.9		16.53		15.48		12.68		14.59	
	Temperature, Final	°Celcius	NS	NS	NS	15.89		16.5		15.18		12.17		14.76	
	pH	Std units	NS	NS	NS	5.64		6.08		6.29		6.32		5.95	
	Specific Conductance	µS/cm	NS	NS	NS	877		934		860		1017		1191	
	ORP/Eh	mV	NS	NS	NS	213.9		60.5		-45.5		-54.2		182.9	
	Dissolved Oxygen	mg/L	NS	NS	NS	2.21		1.96		1.22		0.48		5.33	
	Turbidity	NTU	NS	NS	NS	0.27		0.21		4.25		48.9		0.17	

Notes:

0.333 = Monitoring Criteria exceedance

0.716 = Detected result above GW 3 Standard, and/or Background

ND - non-detect

NS No standard

NA Not analyzed

1 The monitoring criteria is based on the lower value between the site specific cleanup goal and the MCP GW 1 Standard (310 CMR 40 Su

2 The background value from HLA (2000); iron is no longer considered a COC but will be used as an indicator of remediation efficacy and

3 The GW 3 standard was effective April 2014

All general terms, laboratory indicators and data qualifiers are defined on the Key for Tables found at the beginning of this section.

Table I-2
AOC 69W Groundwater Analytical Results - October 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

Method	Analyte	Units	Monitoring Criteria[1]	Background[2]	69W 94 13	Q	69W 94 14	Q	ZWM 95 15X	Q	ZWM-95-18X	Q	ZWM 99 22X	Q	ZWM 99 22X (69W DUP1)	Q
					10/25/2016		10/25/2016		10/25/2016		10/26/2016		10/25/2016		10/25/2016	
Metals (SW6010B)	Arsenic (dissolved)	µg/L	10	10.5	**76**		3.0	U	3.7		3.0	U	**150**		**140**	
	Iron (dissolved)	µg/L	NS	9,100	***11,000***		87		180		50	U	***18,000***		***18,000***	
	Manganese (dissolved)	µg/L	375	291	**2,600**		27		17		12		**960**		**980**	
EPH[3] (MADEP)	C9-C18 Aliphatics	µg/L	700	NS	**1,100**		110	U	220	J	100	U	100	U	94	U
	C19-C36 Aliphatics	µg/L	14,000	NS	160		110	U	120	J	100	U	100	U	94	U
	C11-C22 Aromatics	µg/L	200	NS	**410**		110	U	100	J	**240**		**210**		84	J
Field	Temperature	°Celsius	NS	NS	14.47		13.12		11.69		11.19		15.81		--	
	pH	Std units	NS	NS	7.9		7.11		7.46		6.09		7.79		--	
	Specific Conductance	µS/cm	NS	NS	1342		706		86		715		613		--	
	ORP/Eh	mV	NS	NS	-103.7		-86.7		-87.3		-47.8		-143.7		--	
	Dissolved Oxygen	mg/L	NS	NS	1.79		3.07		2.07		5.74		0.94		--	
	Turbidity	NTU	NS	NS	5.96		13.7		13.2		2.39		5.3		--	

Notes:

0.333 = Exceedance of Monitoring Criteria

0.716 = Detected result above Background

NS = No standard

U = Non-detect

J = Estimated result

NA = Not analyzed

[1] The monitoring criteria for arsenic is the MCL.

[2] The benchmark for iron and manganese are background levels.

[3] EPH concentrations are evaluated against MCP standards for comparison purposes.

Table I-2 (Continued)
AOC 69W Groundwater Analytical Results - October 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

Method	Analyte	Units	Monitoring Criteria[1]	Background[2]	ZWM 99 23X	Q	ZWM 99 24X	Q	ZWM 01 25X	Q	69WP-08-01	Q	69WP-13-01	Q
					10/25/2016		10/25/2016		10/25/2016		10/26/2016		10/26/2016	
Metals (SW6010B)	Arsenic (dissolved)	µg/L	10	10.5	7.7		3.0	U	3.0	U	3.0	U	NA	
	Iron (dissolved)	µg/L	NS	9,100	1,500		41		50	U	7,100		NA	
	Manganese (dissolved)	µg/L	375	291	**590**		2.9	J	78		78.4		140	
EPH[3] (MADEP)	C9-C18 Aliphatics	µg/L	700	NS	110	U	96	U	94	U	NA		NA	
	C19-C36 Aliphatics	µg/L	14,000	NS	110	U	96	U	94	U	NA		NA	
	C11-C22 Aromatics	µg/L	200	NS	110		52	J	94	U	NA		NA	
Field	Temperature	°Celsius	NS	NS	13.43		12.34		13.47		10.7		8.73	
	pH	Std units	NS	NS	8.82		8.62		7.41		6.79		6.72	
	Specific Conductance	µS/cm	NS	NS	702		418		817		657		468	
	ORP/Eh	mV	NS	NS	-110.3		-79.0		-77.1		-100.3		-254.6	
	Dissolved Oxygen	mg/L	NS	NS	2.14		4.84		5.37		0.76		0.55	
	Turbidity	NTU	NS	NS	4.89		3.18		10.21		48.2		6.97	

Notes:

0.333 = Exceedance of Monitoring Criteria

0.716 = Detected result above Background

NS = No standard

U = Non-detect

J = Estimated result

NA = Not analyzed

[1] The monitoring criteria for arsenic is the MCL.

[2] The benchmark for iron and manganese are background levels.

[3] EPH concentrations are evaluated against MCP standards for comparison purposes.

Table I-3
AOC 69W Groundwater Analytical Results, October/November 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Monitoring Criteria[2]	69W-94-13	Q	69W-94-14	Q	ZWM-95-15X	Q	ZWM-95-18X	Q	ZWM-99-22X	Q	69W-DUP1 ZWM-99-22X	Q	ZWM-99-23X	Q	ZWM-99-24X	Q	ZWM-01-25X	Q	69WP-08-01	Q	69WP-13-01	Q
				10/31/2017		10/30/2017		10/31/2017		11/1/2017		10/30/2017		10/30/2017		10/30/2017		10/31/2017		10/30/2017		11/1/2017		11/1/2017	
Metals (SW6010B)																									
Arsenic (dissolved)	µg/L	10	NS	**24**		3.0	U	**10**		3.0	U	**190**		**170**		**17**		3.0	U	**4.5**		3.0	U	NA	
Iron (dissolved)	µg/L	NS	9,100	**1,000**		75	U	**550**		75	U	***24,000***		***23,000***		**2,600**		**370**		**510**		**4,900**		NA	
Manganese (dissolved)	µg/L	NS	291	***320***		**270**		**220**		**29**		***1,200***		***1,100***		***1,800***		**100**		***590***		**33**		**62**	
EPH[3] (MADEP)																									
C9-C18 Aliphatics	µg/L	NS	700	100	U	94	U	94	U	94	U	99	U	98	U	96	U	100	U	100	U	NA		NA	
C19-C36 Aliphatics	µg/L	NS	14,000	100	U	94	U	94	U	94	U	99	U	98	U	96	U	100	U	100	U	NA		NA	
C11-C22 Aromatics	µg/L	NS	200	100	U	94	U	94	U	94	U	**170**		**140**		96	U	100	U	100	U	NA		NA	
Field Parameters																									
Temperature	°Celsius	NS	NS	15.32		15.16		13.85		13.27		17.64		--		15.86		14.39		15.18		13.15		12.13	
pH	Std units	NS	NS	6.60		5.74		6.10		6.01		6.47		--		6.43		6.00		6.26		6.4		6.55	
Specific Conductance	µS/cm	NS	NS	1,418		899		419		1,043		944		--		1,057		422		726		1,203		623	
ORP/Eh	mV	NS	NS	140.2		166.6		103		209.1		-42.4		--		28.6		139.4		78.9		61.9		21.3	
Dissolved Oxygen	mg/L	NS	NS	2.66		2.37		0.68		3.04		0.16		--		0.14		1.4		2.03		1.37		0.79	
Turbidity	NTU	NS	NS	5.30		8.88		6.96		2.31		7.5		--		3.94		4.72		4.94		1.75		11.4	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NA = Not analyzed
NS = No Standard
Q = Qualifier
U = Non-detect
µg/L = microgram per liter
Water quality parameters were meant to be collected from wells ZWM-95-17X and ZWM-01-26X but were mistakenly omitted during the Fall 2017 LTM event.
[1] Cleanup Goal for arsenic is the MCL standard.
[2] Monitoring criteria for iron and manganese are background levels from the RI (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b). EPH concentrations are evaluated against Massachusetts Contingency Plan standards for comparison purposes.
[3] EPH concentrations are evaluated against Massachusetts Contingency Plan standards for comparison purposes

Table I-5
AOC 69W Groundwater Analytical Results, October 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Monitoring Criteria[2]	69W-94-13	Q	69W-94-14	Q	ZWM-95-15X	Q	ZWM-95-18X	Q	ZWM-99-22X	Q	69W-DUP1 ZWM-99-22X	Q	ZWM-99-23X	Q	ZWM-99-24X	Q	ZWM-01-25X	Q	69WP-08-01	Q	69WP-13-01	Q
				10/8/2018		10/9/2018		10/9/2018		10/9/2018		10/8/2018		10/8/2018		10/9/2018		10/8/2018		10/9/2018		10/9/2018		10/9/2018	
Metals (SW6010B)																									
Arsenic (dissolved)	µg/L	10	NS	**35**		3.8	U	**18**		3.0	U	**150**		**140**		**39**		**3.4**		NA		3.0	U	NA	
Iron (dissolved)	µg/L	NS	9,100	**4,500**		910	U	**1,800**		50	U	***19,000***		***19,000***		**4,700**		**700**		NA		**6,000**		NA	
Manganese (dissolved)	µg/L	NS	291	***1,600***		***320***		***340***		**81**		***1,500***		***1,300***		***1,600***		**68**		NA		**35**		**33**	
EPH[3] (MADEP)																									
C_9-C_{18} Aliphatics	µg/L	NS	700	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	UJ	71	U	NA		NA	
C_{19}-C_{36} Aliphatics	µg/L	NS	14,000	71	U	71	U	71	U	71	U	71	U	71	U	71	U	71	UJ	71	U	NA		NA	
C_{11}-C_{22} Aromatics	µg/L	NS	200	**98**		71	U	71	U	71	U	***230***		***220***		**130**		**89**	**J**	71	U	NA		NA	
Field Parameters																									
Temperature	°Celsius	NS	NS	17.3		17.3		15.7		15.4		19.2		--		17.5		15.9		17.2		16.3		13.9	
pH	Std units	NS	NS	6.61		5.73		5.52		5.80		6.64		--		6.22		5.59		5.88		6.22		6.30	
Specific Conductance	µS/cm	NS	NS	2,050		1,160		491		1,000		2,090		--		1,090		245		1,410		1,350		1,030	
ORP/Eh	mV	NS	NS	0.700		100		114		163		-48.1		--		29.5		70.2		90.6		1.00		18.1	
Dissolved Oxygen	mg/L	NS	NS	9.10		0.360		7.90		29.8		0.260		--		0.320		0.780		0.460		7.00		27.8	
Turbidity	NTU	NS	NS	3.54		4.61		5.31		3.28		8.38				6.27		2.19		3.20		69.3		16.1	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NA = Not analyzed
NS = No Standard
Q = Qualifier
U = Non-detect
UJ = Estimated non-detect because of QC outliers.
µg/L = microgram per liter
Water quality parameters were meant to be collected from wells ZWM-95-17X and ZWM-01-26X but were mistakenly omitted during the Fall 2017 LTM event.
[1] Cleanup Goal for arsenic is the MCL standard.
[2] Monitoring criteria for iron and manganese are background levels from the RI (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b).
[3] EPH MADEP concentrations are evaluated against Massachusetts Contingency Plan standards for comparison purposes.

Table I-6
AOC 69W Groundwater Analytical Results, October 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Monitoring Criteria[2]	69W-94-13		69W-94-14		ZWM-95-15X		ZWM-95-18X		ZWM-99-22X		69W-DUP1 ZWM-99-22X		ZWM-99-23X		ZWM-99-24X		ZWM-01-25X		69WP-08-01		69WP-13-01	
				10/3/2019	Q	10/4/2019	Q	10/4/2019	Q	10/2/2019	Q	10/3/2019	Q	10/3/2019	Q	10/3/2019	Q	10/3/2019	Q	10/2/2019	Q	10/3/2019	Q	10/3/2019	Q
Metals (SW6010B)																									
Arsenic (dissolved)	µg/L	10	NS	**70**		3.0	U	**17**		3.0	U	**150**		**140**		**24**		**1.9**	J	3.0	U	3.0	U	NA	
Iron (dissolved)	µg/L	NS	9,100	**7,400**		50	U	**2,300**		1,400		***10,000***		***9,800***		**3,500**		**390**		**230**		**7,600**		NA	
Manganese (dissolved)	µg/L	NS	291	***1,600***		***1,200***		***690***	J	**66**		***1,100***		***1,100***		***770***		**67**		***6,200***		***1,300***		**88**	
EPH[3] (MADEP)																									
C_9-C_{18} Aliphatics	µg/L	NS	700	**76**	J	74	U	74	U	77	U	**65**	J	74	U	73	U	73	U	76	UJ	NA		NA	
C_{19}-C_{36} Aliphatics	µg/L	NS	14,000	**100**	J	74	U	74	U	77	U	**130**	J	**120**		**120**		73	U	76	UJ	NA		NA	
C_{11}-C_{22} Aromatics	µg/L	NS	200	**77**	J	74	U	74	U	77	U	***220***		***230***		73	U	73	U	76	U	NA		NA	
Field Parameters																									
Temperature	°Celsius	NS	NS	18		16		14		15		19		19		16		15		NA		14		11	
pH	Std units	NS	NS	6.6		5.7		5.8		5.9		6.3		6.3		6.3		5.8		NA		6.4		6.3	
Specific Conductance	µS/cm	NS	NS	24		2,000		1,300		1,200		1,200		1,200		1,200		590		NA		1,100		1,100	
ORP/Eh	mV	NS	NS	-26		88		54		200		-27		-27		6.5		92		NA		-19		-17	
Dissolved Oxygen	mg/L	NS	NS	0.16		0.62		0.42		7.7		0.39		0.39		0.31		0.78		NA		0.35		0.46	
Turbidity	NTU	NS	NS	6.5		4.9		13		0.43		3.9		3.9		2.4		1.7		NA		29		24	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NA = Not analyzed
NS = No Standard
Q = Qualifier
U = Non-detect
UJ = Estimated non-detect because of QC outliers.
µg/L = microgram per liter
[1] Cleanup Goal for arsenic is the MCL standard.
[2] Monitoring criteria for iron and manganese are background levels from the RI (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b).
[3] EPH MADEP concentrations are evaluated against Massachusetts Contingency Plan standards for comparison purposes.

Table I-7
Summary of Historical Groundwater Cleanup Goal Exceedances at AOC 69W
Main Post, Former Fort Devens Army Installation, Massachusetts

Sample Location	Spring 2000	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003	Spring 2004	Fall 2004	Spring 2005	Fall 2005	Spring 2006	Fall 2007	Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Arsenic, dissolved - 10 µg/l Cleanup Goal																										
69W-94-13	**54**	**110**	**85**	**150**	**52**	**130**	**35**	**69**	**27**	**88**	**56**	**60**	**69**	**142**	**73**	**86**	**127**	**120**	**115**	**73**	**101**	**120**	**76**	**24**	**35**	**70**
ZWM-95-15X	ND	**7.9**	ND	**22**	**36**	**40**	ND	**16**	**7.7**	**30**	ND	ND	ND	**16**	ND	ND	**13**	**41**	**23**	**17**	**30.2**	**19.3**	**3.7**	**10**	**18**	**17**
ZWM-99-22X	**150**	**130**	**230**	**140**	**86**	**140**	**150**	**160**	**140**	**140**	**120**	**120**	**159**	**244**	**223**	**408**	**343**	**367**	**299**	**233 J**	**172**	**125**	**150**	**190**	**150**	**150**
ZWM-99-23X	**23**	**70**	**67**	**55**	**15**	ND	**27**	ND	**44**	**61**	**46**	**47**	**56**	**56**	**52**	**62**	**15**	**60**	**29**	**27**	**19.5**	**13.9**	**7.7**	**17**	**39**	**24**
ZWM-01-25X	NA	NA	NA	**4.1 J**	ND	ND	**2.3 J**	ND	ND	**3.4 J**	ND	ND	**3 J**	**5**	**2.3 J**	**2 J**	ND	**13**	**19**	**5**	ND	ND	ND	**4.5**	NA	ND
Manganese, dissolved - 291 µg/l Monitoring Criteria																										
69WP-08-01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**174**	**89**	**78**	***2,190***	***904***	**237**	**64.5**	**78.4**	**79**	**33**	**35**	***1,300***
69W-94-13	***2,300***	***1,700***	***1,500***	***1,600***	***2,100***	***2,400***	***2,800***	***4,100***	***2,500***	***1,300***	***3,000***	***1,600***	***2,600***	***1,120***	***1,940***	***2,110***	***1,360***	***1,840***	***1,400***	***1,730***	***1,940***	***2,050***	***2,600***	***320***	***1,600***	***1,600***
ZWM-95-15X	**28**	***1,300***	**25**	**100**	***1,500***	***2,200***	***1,600***	***970***	***4,600***	***980***	***850***	**130**	***860***	***1,230***	***438***	***502***	***1,120***	***1,010***	***1,580***	***1,280***	***900***	***843***	**17**	**220**	***340***	***690 J***
ZWM-99-22X	***2,000***	***1,800***	***2,300***	***2,400***	***2,000***	***1,500***	***2,700***	***2,300***	***3,100***	***1,900***	***3,400***	***3,200***	***3,700***	***3,120***	***3,790***	***2,660***	***1,750***	***2,160***	***1,120***	***998***	***1,280***	***1,440***	***960***	***1,200***	***1,500***	***1,100***
ZWM-99-23X	***4,200***	***3,600***	***5,800***	***1,500***	***550***	***1,700***	***5,300***	***4,300***	***2,500***	***2,300***	***5,200***	***2,500***	***2,700***	***1,320***	***2,500***	***3,080***	***523***	***1,720***	***500***	***556***	***533***	***749***	***590***	***1,800***	***1,600***	***770***
ZWM-01-25X	NA	NA	NA	**280**	**61**	***1,000***	**89**	**230**	**140**	***300***	**140**	***490***	***1,400***	***3,210***	***1,320***	***5,830***	***1,490***	***2,820***	***2,540***	***1,570***	***435***	***859***	**78**	***590***	NA	***6,200***
EPH C_{11}-C_{22} Aromatics - 200 µg/l Monitoring Criteria																										
69W-94-13	***690***	***1,400***	***720***	***790***	***1,900***	***290***	ND	**160**	ND	**110**	ND	ND	***209***	***311***	**152**	***225***	***339***	***242***	***379***	***227***	***252***	**175**	***410***	ND	**98**	**77 J**
ZWM-95-15X	ND	ND	ND	ND	**1,400**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	**100**	ND	ND	ND
ZWM-99-22X	***2,500***	***1,400***	***2,100***	***370***	***620***	***210***	***380***	***330***	***270***	***400***	***320***	***280***	***627***	**166**	***356***	***276***	***209***	***327***	***308***	***286***	***332***	***354***	***210***	**170**	***230***	***220***
ZWM-99-23X	**170**	***520***	***200***	**140**	**140**	ND	ND	ND	ND	ND	ND	ND	**174**	**107**	**80**	ND	ND	ND	ND	ND	ND	ND	**110**	ND	**130**	ND
EPH C_{9}-C_{18} Aromatics - 700 µg/l Monitoring Criteria																										
69W-94-13	**120**	**270**	**160**	**320**	**150**	**200**	**62**	**140**	**130**	**230**	**110**	**140**	**84**	**144**	**81**	**105**	**142**	**66.7**	**63 J**	**87.6**	NA	NA	NA	NA	NA	**76 J**
ZWM-99-22X	**620**	**150**	**550**	**83**	**88**	**150**	***840***	**450**	**650**	**600**	**460**	**460**	**330**	**113**	**217**	**120**	**76.4**	**114**	**55.5 J**	**119**	NA	NA	NA	NA	NA	**65 J**
ZWM-99-23X	**46**	**62**	**40**	**34**	ND	ND	**53**	**59**	ND	ND	**100**	ND	ND	ND	**28**	**35.2**	ND	ND	ND	ND	NA	NA	NA	NA	NA	ND

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NA = Not analyzed
ND = non-detect
µg/L = microgram per liter

I.4 Former

Elementary School

Spill Site

Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: AOC 69W	**Date of inspection:** 02/05/~~14~~20 (LR)
Location and Region: Devens, MA	**EPA ID:**
Agency, office, or company leading the five-year review: Koman Goverment Solutions	**Weather/temperature:** 36°F, Cloudy cold

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 Long term Ground water monitering

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____

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

4. **Other interviews** (optional) ☐ Report attached.

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 Available at Devens trailer

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

   Remarks Available at Devens trailer

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

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 NA

1. **O&M Organization**
   - ☐ State in-house
   - ☐ PRP in-house
   - ☐ Federal Facility in-house
   - ☐ Contractor for State
   - ☐ Contractor for PRP
   - ☐ Contractor for Federal Facility
   - ☐ Other _____

2. **O&M Cost Records**
   - ☐ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ☐ Breakdown attached

   Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
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 Deed restrictions
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached

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

D. General

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

2 **Land use changes on site** ☒ N/A
Remarks _____

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 Paved Roadway & Parking lot

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____			
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 _____

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 ☒

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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

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

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

* Free Continent

D. Monitored Natural Attenuation

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.

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.).

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.

C. Early Indicators of Potential Remedy Problems N/A

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.

D. Opportunities for Optimization None

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

View of AOC 69W Main Entrance

View of grassy area southwest of western building

View of Parker Schools western Building

View of wooded area in the southwestern area of AOC 69W

View of a typical stickup monitoring well observed in the western area of AOC 69W

View of Parker Schools eastern Building

View of northeast stairwell access

View of wooded area in the northeastern area of AOC 69W

I.5 Former

Elementary School

Spill Site ARARs

TABLE 5
CHEMICAL-, LOCATION-, AND ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
AOC 69W

RECORD OF DECISION
DEVENS, MASSACHUSETTS

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
GROUNDWATER Federal	Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs; 40 CFR 141.11-141.16 and 141.50-141.52	Relevant and Appropriate	MCLs are enforceable standards (based in part on the availability and cost of treatment) that specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLGs are non-enforceable health based goals that specify the maximum concentration at which no known or anticipated adverse effects on human will occur	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at the site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the majority of the source of the aquifers reducing conditions.
State	Massachusetts Groundwater Quality Standards; 310 CMR 6.00	Relevant and Appropriate	These standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated uses. Groundwater at AOC 69W is classified as Class I, fresh groundwaters designated as a source of potable water supply.	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at the site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the majority of the source of the

TABLE 5
CHEMICAL-, LOCATION-, AND ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
AOC 69W

RECORD OF DECISION
DEVENS, MASSACHUSETTS

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Massachusetts Drinking Water Regulations; 310 CMR 22.00	Relevant Appropriate	These regulations list Massachusetts MCLs which apply to drinking water distributed through a public water system.	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the
	Massachusetts Hazardous Waste Management Regulations; 130 CMR 30.300	Applicable	These regulations contain requirements for generators including testing of wastes to determine if they are hazardous wastes and accumulation of hazardous waste prior to disposal.	Any hazardous waste (soils or groundwater) generated from long-term monitoring or excavation at AOC 69W will be managed in accordance with these regulations. Institutional Controls will limit contact to in-situ

APPENDIX J – Former Moore Army Airfield

J.1 Former

Moore Army Airfield

Additional Background Information

Site Chronology

Chronology of Site Events for AOC 50

EVENT	DATE
NPL listing	December 1989
Remedial Actions (Pre-ROD)	SVE 1996 Pilot ERD 2001
RI initiated	1996
RI completed	January 2000
FS complete	December 2002
Proposed Plan	January 2003
ROD signed	March 2004
Final Remedial Action work Plan	June 2005
Five Year Review (All Fort Devens AOCs)	September 2005
Demonstration of Remedial Action Operating Properly and Successfully Report	March 2007
AOC 50 Interim Five Year Remedy Review	January 2008
Revised LTM Plan AOC 50	March 2008
ERD O&M Manual Addendum 1	March 2009
Five Year Review (All Fort Devens AOCs)	September 2010
Draft Final LTM Plan	March 2012
Performance Monitoring Work Plan AOC 50	September 2013
Annual O&M and Monitoring Reports	2010 - 2014
2014 Performance Monitoring Data Report	June 2014
AOC50 Source Area MiHPT Investigation Summary (Draft)	February 2015
Five Year Review (All Fort Devens AOCs)	September 2015
Final LTMMP	November 2017
Annual O&M and LTM	2015 - 2019
Vertical Profiling and Installation of Monitoring Wells G6M-18-01 and -02	Fall 2018 – Winter 2019
Five Year Review (All Fort Devens AOCs)	September 2020

Physical Characteristics

A single water table aquifer occurs within the overburden deposits below the former MAAF and AOC 50. Low permeability confining units were not encountered during the previous investigation programs and no confined aquifers have been identified. Restrictions to vertical groundwater flow, such as silty clay layers, are present, but not prevalent in boring logs within the kame deposit or along the Nashua River. Some silty clay layers were encountered within the aquifer in the AOC 50 Source Area. These thin, silty clay layers reduce the vertical permeability, contribute to a slight increase in the water table elevation, and increase the difference between shallow and deep water levels.

Measurements of the depth to groundwater have been collected from a network of monitoring wells and sampling points on a regular basis since 1997. Groundwater is encountered at approximately three ft below ground surface (bgs) in the AOC 50 Source Area and approximately

64 ft bgs at the southwestern end of the former MAAF. Groundwater elevations within deeper wells at and to the north of AOC 50 typically have lower heads indicating that there is a downward hydraulic gradient within this area.

The Nashua River is the controlling hydrologic feature for AOC 50 and the former MAAF area. As groundwater beneath AOC 50 moves downgradient in a southwesterly direction toward the Nashua River, vertical gradients become neutral. Vertical gradients reverse and become upward along the Nashua River, as would be expected near such a discharge feature. These changes in gradient demonstrate that groundwater is recharged near the AOC 50 source area, travels below the former MAAF, and discharges to the Nashua River. Since remedial activities were implemented in 2004/2005, the plume has diminished in its extent and is no longer a continuous plume but is segmented into smaller sections.

Land and Resource Use

The Army currently leases the areas designated as the Source Area to Massachusetts Development and Finance Agency (MassDevelopment). The Source Area buildings are included in the lease but are abandoned. The Army, MassDevelopment, and the U.S. Fish and Wildlife Service (USFWS) own portions of the area overlying the Southwest Plume, including the majority of the former airfield. The former airfield is closed to aircraft traffic and is currently leased by the Massachusetts State Police for training and vehicle storage.

The Merrimack Warehouse Realty Co., Inc. owns the area overlying the North Plume. The property is zoned commercial and is developed with a building used for the manufacture of windshield washer fluid and as a storage facility. A fire pond is located on the property and would be used for fire suppression source water in the event of a fire.

The Army retained approximately 14 acres of the former airfield for use by the Devens Reserve Forces Training Area (RFTA) for vehicle storage, maintenance, and office space. The 14 acre area includes the AOC 50 source area. The Army transferred the remaining 246 acres of the property to MassDevelopment in 1996 for reuse. Under the Devens Reuse Plan (November 14, 1994), the area is zoned for Special Use II and Innovation and Technology Business. Special Use II and Innovation and Technology Business zone may include a broad range of industrial, light industrial, office, and research and development uses. There are currently no other plans for development of the MAAF, although the area can be developed if interested parties are identified. The portion of the property managed by the USFWS is located adjacent to the Nashua River, within the floodplain, is generally forested and heavily vegetated with steep terrain and limited access. There are presently no plans to develop this area. Due to its designation as a wildlife refuge and location within the floodplain, future development is unlikely.

History of Contamination and Initial Response

Sources of groundwater contamination within AOC 50 include two World War II fueling systems, a drywell formerly connected to the parachute stakeout tower, a PCE drum storage area and cesspool. These sources are collectively referred to as the AOC50 Source Area. Although these sources have been removed or taken out of commission, groundwater underlying AOC 50 contains elevated concentrations of volatile organic compounds (VOC) most notably tetrachloroethene (PCE). The primary area of groundwater contamination at AOC 50 is referred to as the Southwest Plume. In its pre-remediation extent, the plume extended from the Source Area approximately 3,000 feet (ft) downgradient to the Nashua River. The Southwest Plume is divided into five areas

(Source Area/Area 1), Area 2 (located east southeast of building 3818), Area 3 (located south of building 3813), Area 4 (located within the runway) and Area 5 (located southwest of Area 4 and northeast of the Nashua River).

Fueling Systems

During World War II, two fueling systems were used in the area subsequently designated as AOC 50; one system was used for fueling aircraft and trucks (System A), and the other for fueling trucks only (System B). These systems were not used for refueling operations after the late 1940s (Biang, et aI., 1992). The two separate fueling systems were filled by gasoline shipments on a Boston & Maine Railroad spur (which no longer exists) located adjacent to Fueling System B.

At the time of the initial SI in 1992 (ABB, 1993), several fueling system components were still visible in their original locations. Fort Devens removed all of these components in 1992. In addition, approximately 450 tons of contaminated soil was removed from under the water separator, water control pits, and three 25,000-gallon USTs. The excavation extended to a depth of approximately 19 ft bgs. All excavations were backfilled to grade.

Dry Well

In 1969, Building 3840 was constructed and attached, via an enclosed walkway, to Building 3803. In addition, two large sinks, and a janitor's room were added to Building 3803. The design drawings for Building 3840 indicated that a floor drain was constructed in the center of the concrete floor. This floor drain, the additional sinks in Building 3803, and the roof drains for Building 3840 were piped to a drywell located approximately 20 ft northeast of Building 3840. The drywell and associated piping were removed between November and December 1996 (Weston, 1997). The resulting excavation was 9.5 ft deep and covered an area 21 ft by 30 ft, equating to 225 bank cy of soil.

In addition, a 750-gallon fuel UST associated with the Building 3840 heating system was removed. In conjunction with the tank removal, 787 gallons of oil, water, and residual sludge were recovered from the tank and approximately 25 cy of contaminated soil were excavated. Solid and liquid wastes generated during removal of the drywell and fuel USTs were taken off site for proper treatment and disposal. Details regarding the removal activities are documented in a Removal Action Report (Weston, 1997).

PCE Drum Storage Area

A PCE drum storage area, east of Building 3801, was identified during field investigation activities completed in 1992. Historical records and interviews with former Fort Devens personnel indicated that this area was used to store single drum quantities of PCE (HLA, 2000). The PCE was used by Army personnel in Buildings 3803 and 3840 for spot cleaning of parachutes. Parachute cleaning was performed only as needed to maintain the integrity of the parachute material. Unused PCE was either reused or may have been washed down into the drywell system associated with Buildings 3803 and 3840. This information was supported by a review of the historic hazardous waste manifest, which did not include the removal of waste chlorinated solvents from AOC 50 (Mott, 1997). The use of this area for drum storage was discontinued in 1992. The length of time or total number of drums stored in this area of AOC 50 is unknown.

An in-situ SVE system was installed between December 1993 and January 1994 adjacent to the former drum storage area. Five soil vapor extraction wells (SVE-l through SVE-5) were installed, one in the center of the presumed PCE source and four on the periphery. The SVE system was shut

down in 1996 due to poor PCE recovery but was operated again for a brief period in December 1998, May and June 1999, and October and November 1999, again experiencing poor PCE recovery. The SVE system was permanently shut down in September 2004 due to continued poor recovery of PCE. The system was decommissioned and disconnected from the recovery piping in November 2005. The treatment system building and SVE system components remain on site.

Cesspool

A cesspool associated with the bathroom in Building 3803 was identified on the site drawing as the only septic system structure for the building. The drywell and cesspool were investigated as potential contaminant sources for the various volatile contaminants, including PCE. The cesspool was removed concurrent with the drywell and UST removal actions described in previous sections. During the cesspool removal activities, a total of 25cy of soil, sludge, and concrete were excavated and taken off site for treatment and disposal (HLA 2000).

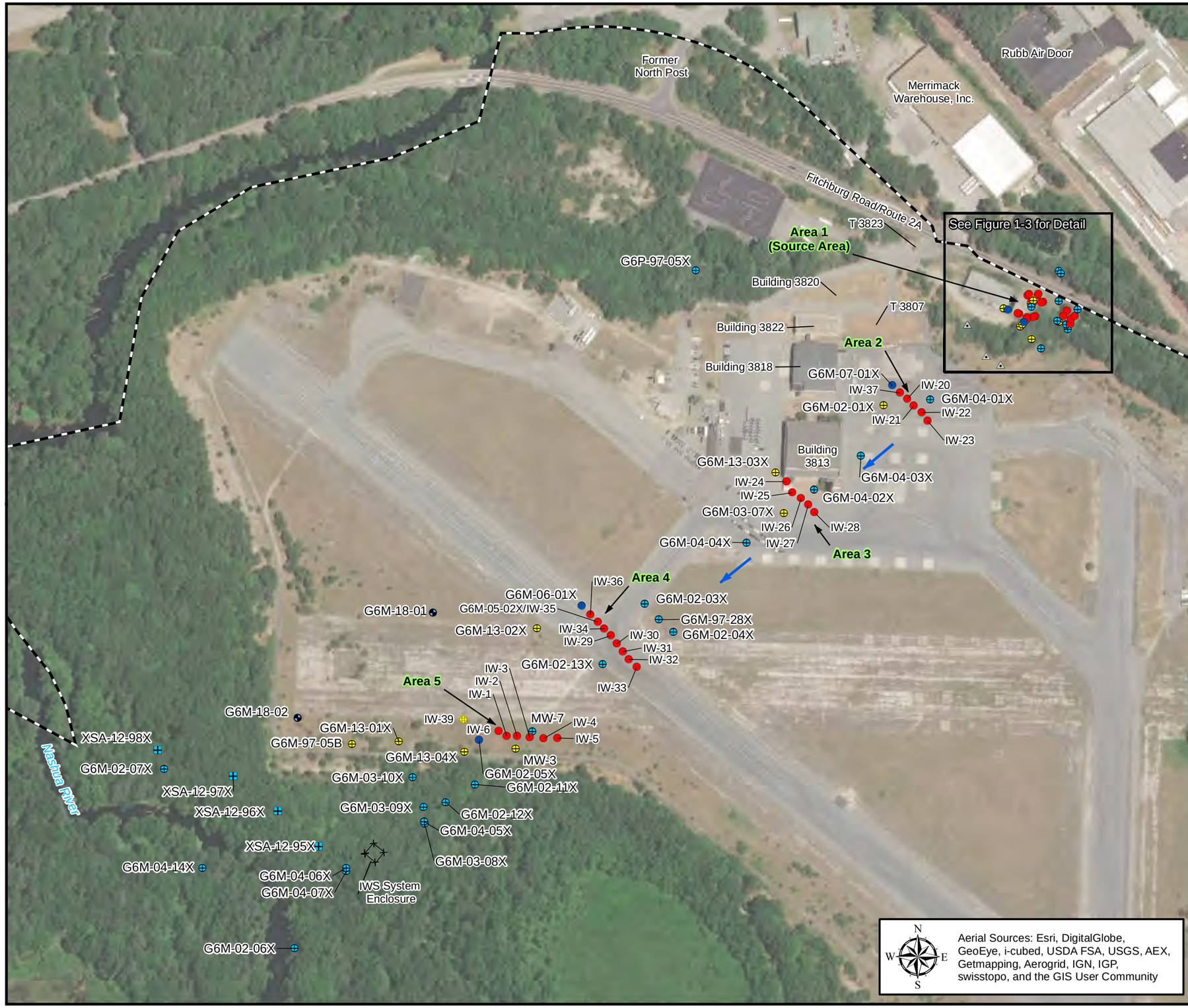
J.2 Former

Moore Army

Airfield

Figures

Figure J-1
Site Layout
AOC 50



Legend

- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Groundwater Flow Direction
- Former Fort Devens Boundary

Notes:
ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 02/03/2020

Figure J-1

File: AR2019_AOC50_F1-2_Layout.mxd

Figure J-2
Site Layout, Source Area
AOC 50

Aerial:
USGS, MassGIS

Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Injection Well Installed Prior to 01/2014
- Vertical Groundwater Profiling Location
- Former Dry Well
- Floor Drain
- Floor Drain Piping
- Janitor Sink
- Building Footprint
- Former Feature
- Former Fort Devens Boundary

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 17.5 35
Feet

Date:
12/09/2019

Figure
J-2

File: AR2019_AOC50_F1-3_SourceArea.mxd

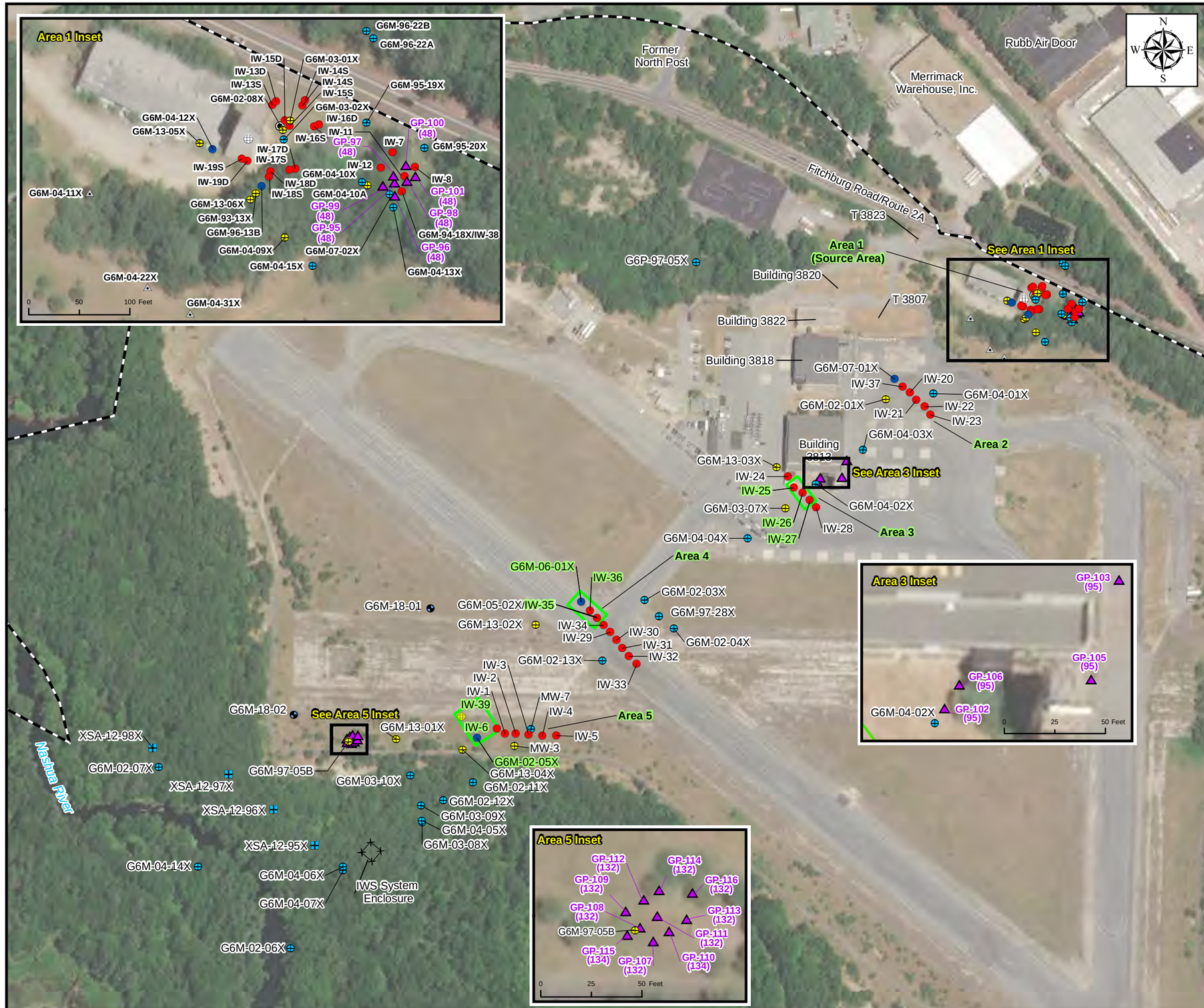


Figure J-3
ERD Injection Locations
July/August 2019

Legend

- IW-25 — Permanent Injection Well used in 2019
- Geoprobe Injection Location July/August 2019
- (48) — Final Injection Depth
- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Dry Well
- Floor Drain
- ERD Injection Well Transect
- Former Fort Devens Boundary

Notes:
1. Feature locations provided by HGL
2. ERD = Enhanced Reductive Dechlorination
3. LTM = Long-Term Monitoring
4. DPT = Direct Push Technology
5. GP = Geoprobe
6. IW = Injection Well

Aerial: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100 Marlborough, MA 01752

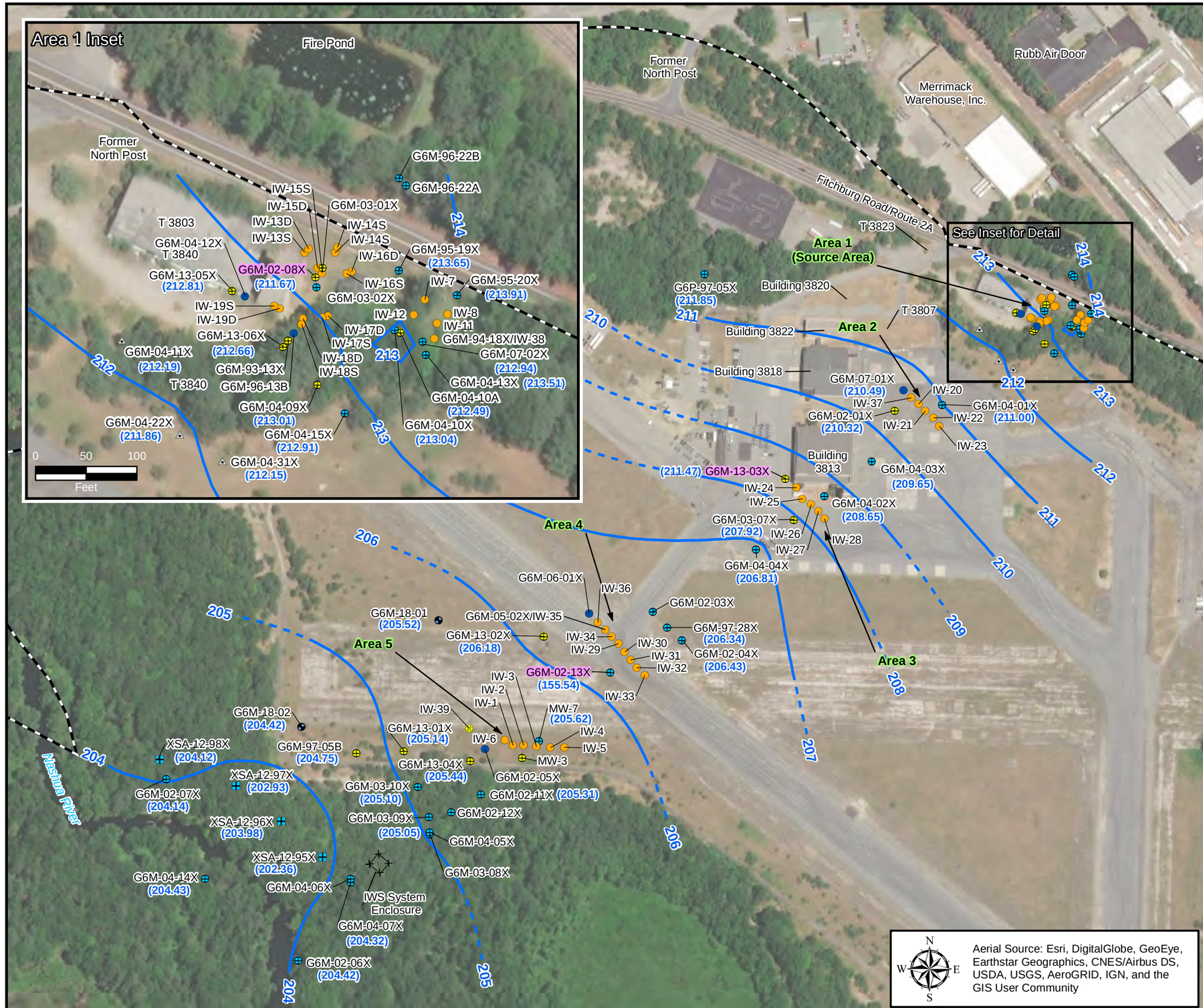
0 150 300 Feet

Date: 01/09/2020

Figure J-3

File: AR2019_AOC50_F2-1_ERD_InjectionLoc.mxd

Figure J-4
Groundwater Contour Map
AOC 50
April 2, 2019



Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Groundwater Contour (ft NAVD88) (Interval = 1 ft)
- Groundwater Contour Dashed Where Inferred (ft NAVD88) (Interval = 1 ft)
- (212.19) Groundwater Elevation (ft NAVD88)
- Former Fort Devens Boundary

Notes:

G6M-02-13X, G6M-02-08X, G6M-13-03X were not used in contouring.

ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

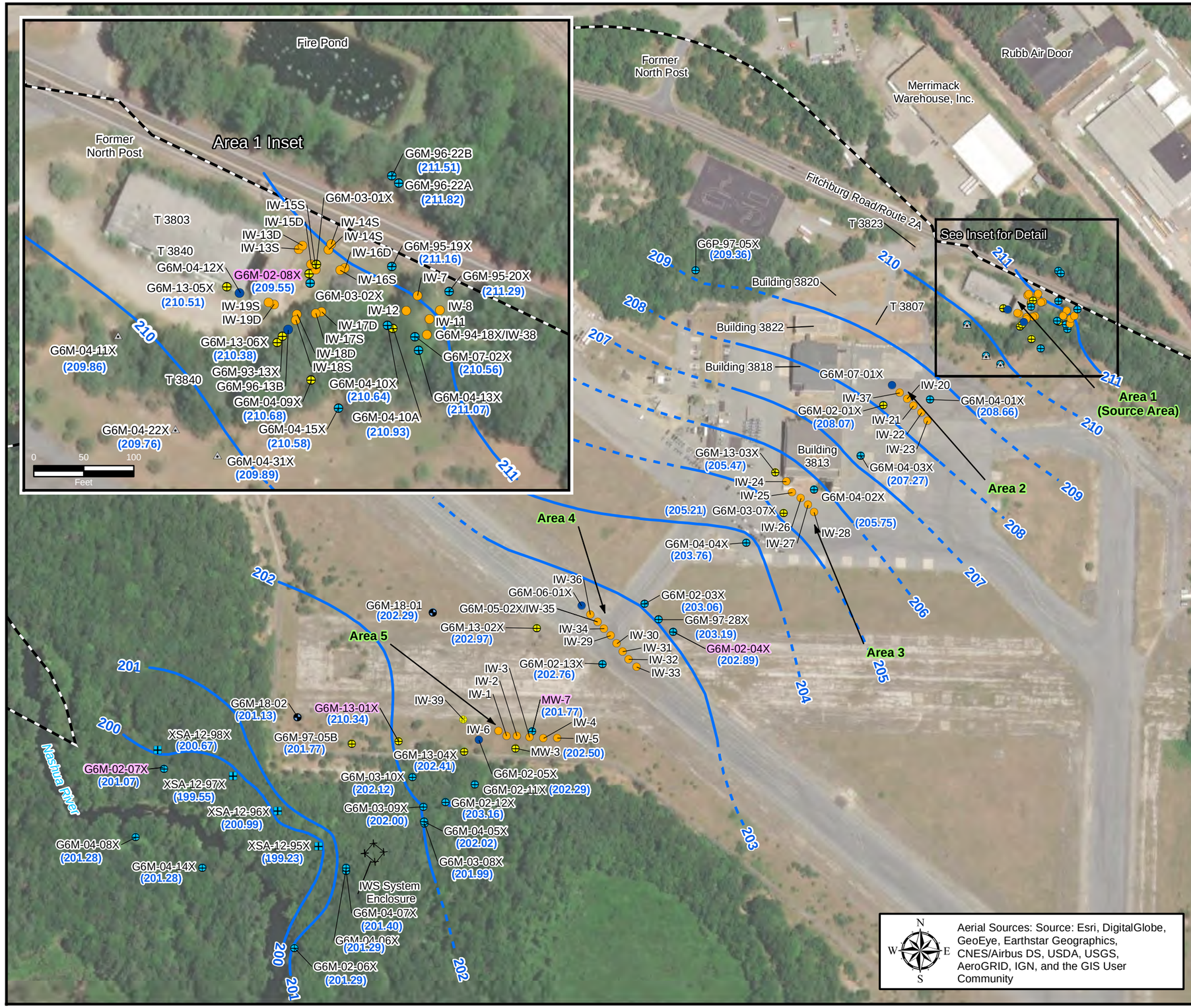
0 150 300 Feet

Date: 03/09/2020

Figure J-4

File: AR2019_AOC50_F3-1_April2019_GWC.mxd

Figure J-5
Groundwater Contour Map
AOC 50
October 7, 2019



Legend

- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- (213.30) Groundwater Elevation (ft NAVD88)
- Groundwater Contour (ft NAVD88) (Interval = 1 ft)
- Groundwater Contour Dashed Where Inferred (ft NAVD88) (Interval = 1 ft)
- Former Fort Devens Boundary

Notes:

G6M-02-04X, G6M-13-01X, G6M-02-07X, G6M-02-08X, MW-7 were not used in contouring.

were not used in contouring.

ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

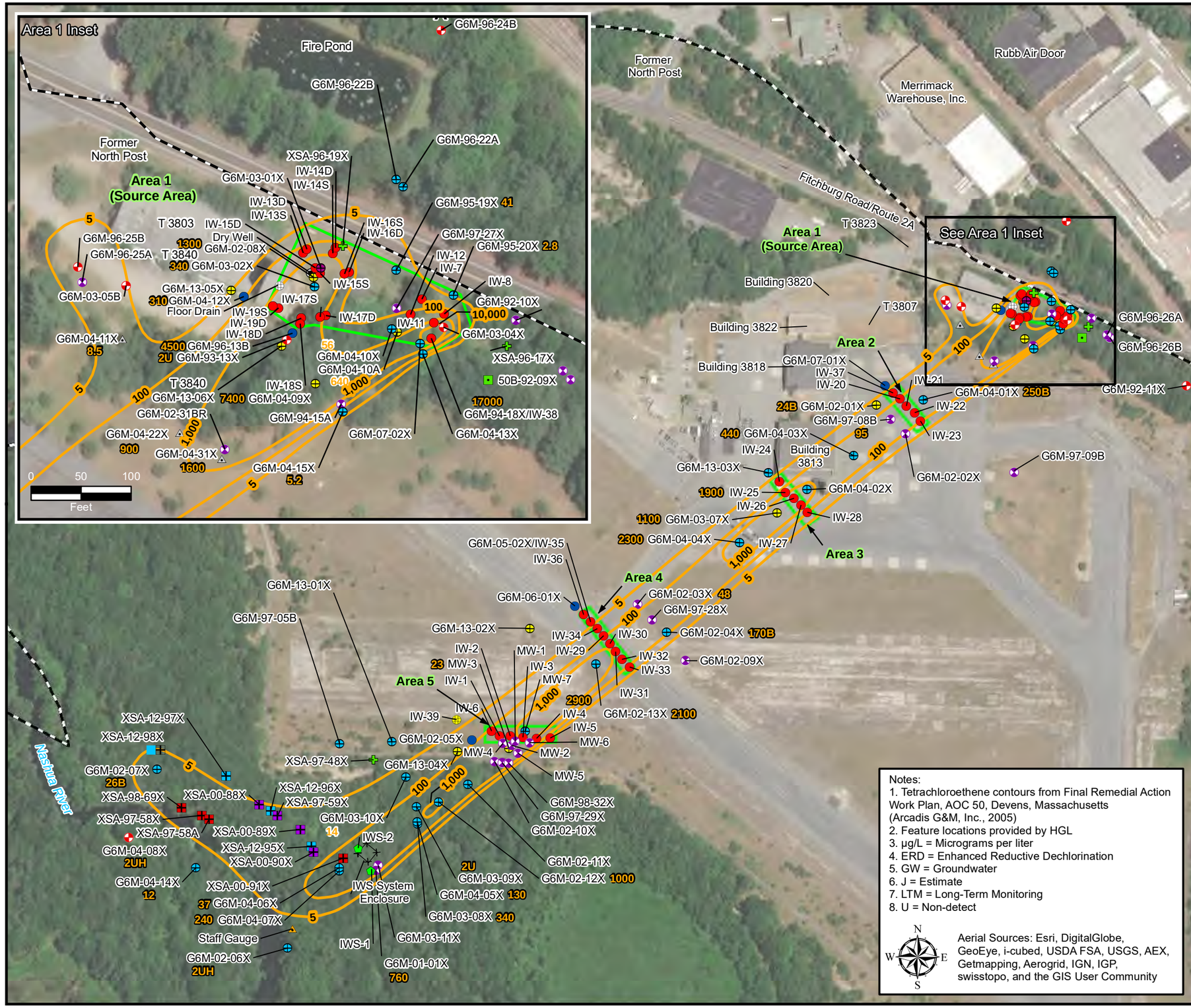
0 150 300 Feet

Date: 03/19/2020

Figure J-5

File: AR2019_AOC50_F3-2_October_GWC.mxd

Figure J-6
Tetrachloroethene Concentrations in Groundwater, 2004, AOC 50



Notes:
1. Tetrachloroethene contours from Final Remedial Action Work Plan, AOC 50, Devens, Massachusetts (Arcadis G&M, Inc., 2005)
2. Feature locations provided by HGL
3. µg/L = Micrograms per liter
4. ERD = Enhanced Reductive Dechlorination
5. GW = Groundwater
6. J = Estimate
7. LTM = Long-Term Monitoring
8. U = Non-detect

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- ERD LTM Well - Sampled Every 3 Years
- LTM Well - Gauge Only
- Monitoring Well
- Monitoring Well Converted to Injection Well
- In-Well Stripping System Well
- MicroWell® - Sampled Annually
- MicroWell® - Gauge Only
- MicroWell®
- Injection Well Installed Prior to 01/2014
- Staff Gauge
- Historic Vertical Groundwater Profiling Location
- Historic Soil Boring
- Injection Well Installed 01/2014
- Dry Well
- Floor Drain
- Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- 1.7 Tetrachloroethene (PCE) Concentration (µg/L)
- ERD Injection Well Transect
- Former Fort Devens Boundary

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AOC 50

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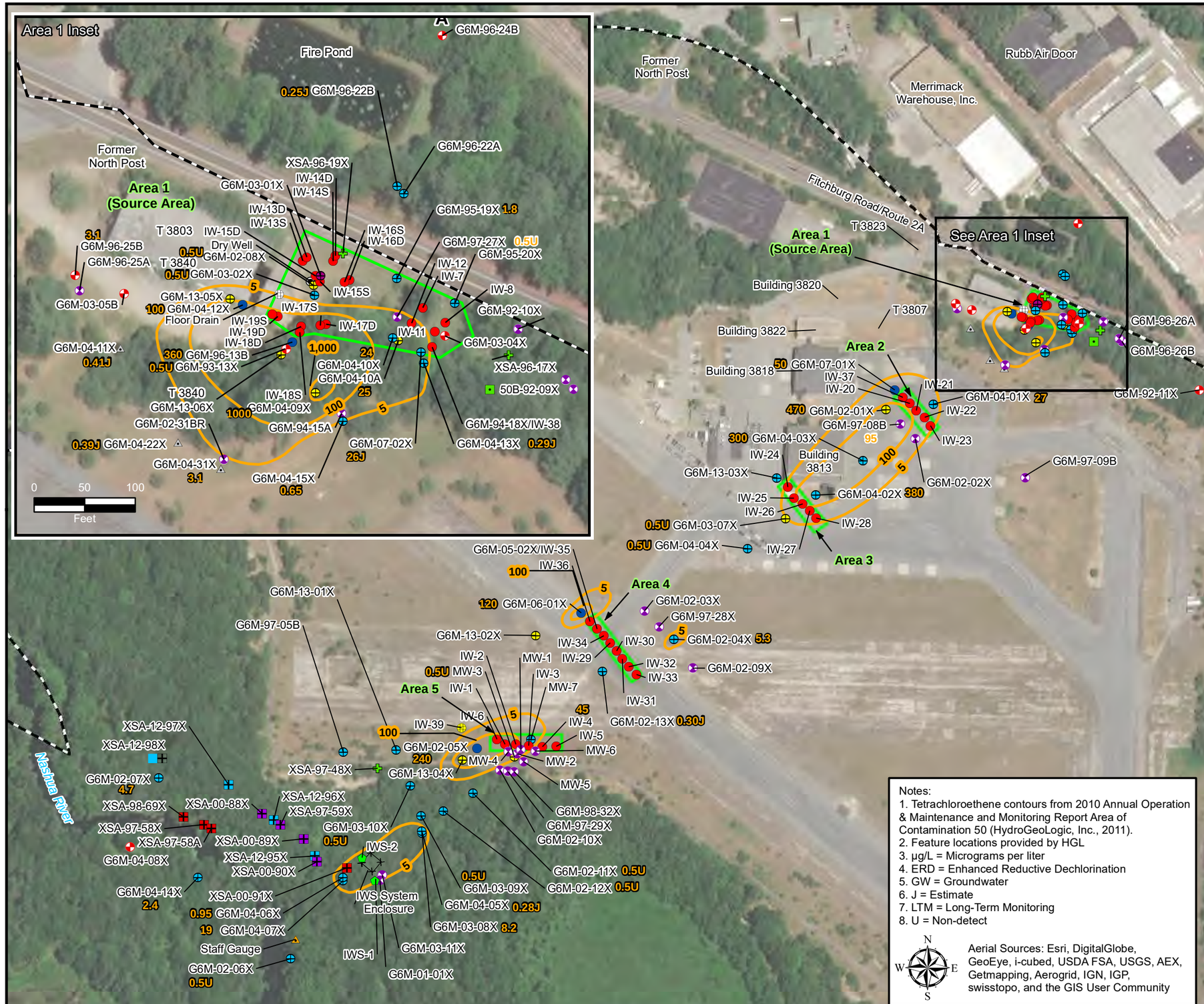
0 150 300 Feet

Date: 12/09/2019

Figure J-6

File: AR2019_AOC50_F4-2_PCE_2004.mxd

Figure J-7
Tetrachloroethene Concentrations in Groundwater, 2010, AOC 50



Notes:
1. Tetrachloroethene contours from 2010 Annual Operation & Maintenance and Monitoring Report Area of Contamination 50 (HydroGeoLogic, Inc., 2011).
2. Feature locations provided by HGL
3. µg/L = Micrograms per liter
4. ERD = Enhanced Reductive Dechlorination
5. GW = Groundwater
6. J = Estimate
7. LTM = Long-Term Monitoring
8. U = Non-detect

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- ERD LTM Well - Sampled Every 3 Years
- LTM Well - Gauge Only
- Monitoring Well
- Monitoring Well Converted to Injection Well
- In-Well Stripping System Well
- MicroWell®- Sampled Annually
- MicroWell®- Gauge Only
- MicroWell®
- Injection Well Installed Prior to 01/2014
- Staff Gauge
- Historic Vertical Groundwater Profiling Location
- Historic Soil Boring
- Injection Well Installed 01/2014
- Dry Well
- Floor Drain
- Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- 1.7 Tetrachloroethene (PCE) Concentration (µg/L)
- ERD Injection Well Transect
- Former Fort Devens Boundary

2020 Five Year Review
AOC 50

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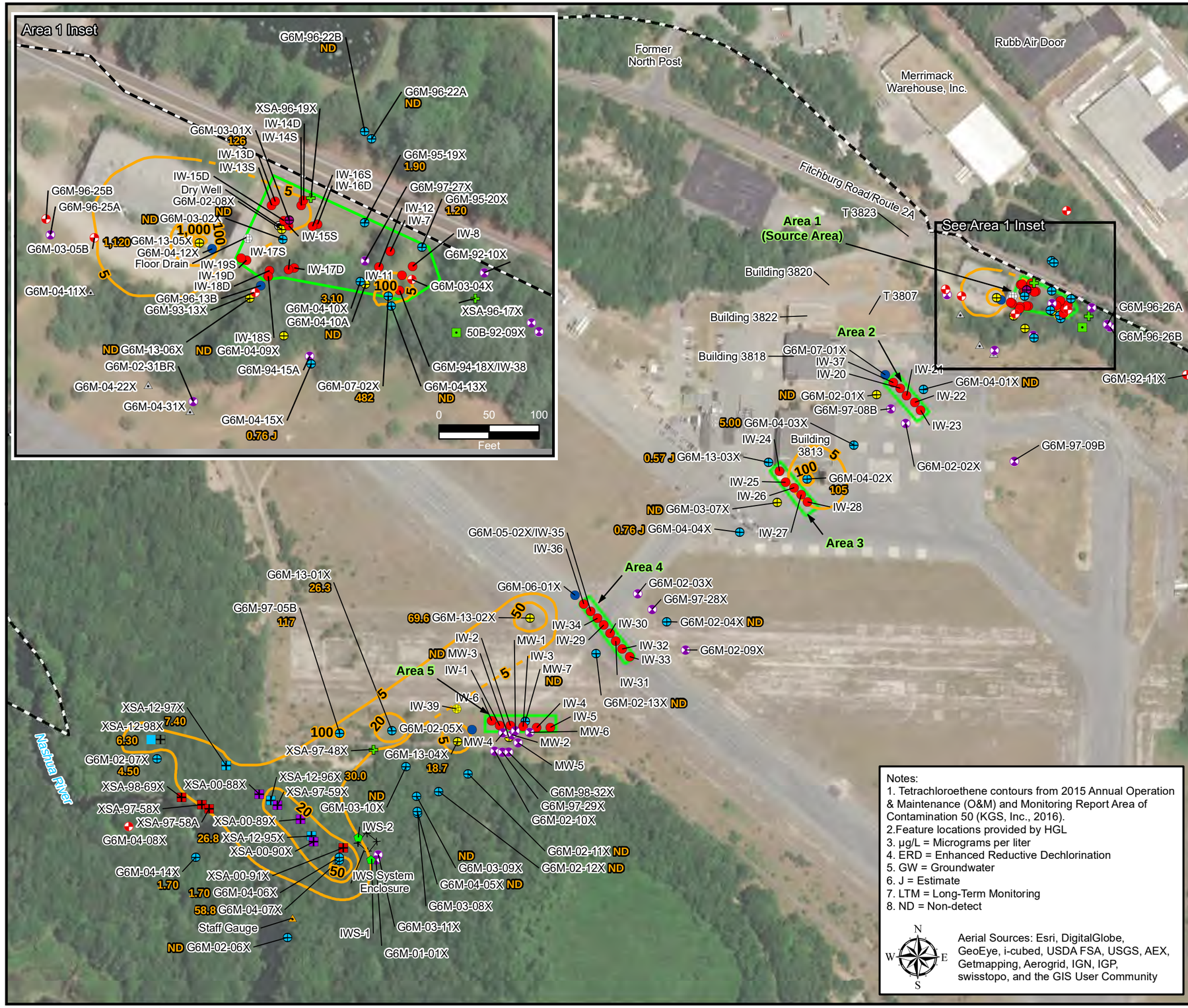
0 150 300 Feet

Date: 12/09/2019

Figure J-7

File: AR2019_AOC50_F4-3_PCE_2010.mxd

Figure J-8
Tetrachloroethene Concentrations in Groundwater, October 2015, AOC 50



Notes:
1. Tetrachloroethene contours from 2015 Annual Operation & Maintenance (O&M) and Monitoring Report Area of Contamination 50 (KGS, Inc., 2016).
2.Feature locations provided by HGL
3. µg/L = Micrograms per liter
4. ERD = Enhanced Reductive Dechlorination
5. GW = Groundwater
6. J = Estimate
7. LTM = Long-Term Monitoring
8. ND = Non-detect

N W E S

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- ERD LTM Well - Sampled Every 3 Years
- LTM Well - Gauge Only
- Monitoring Well
- Monitoring Well Converted to Injection Well
- In-Well Stripping System Well
- MicroWell® - Sampled Annually
- MicroWell® - Gauge Only
- MicroWell®
- Injection Well Installed Prior to 01/2014
- Staff Gauge
- Historic Vertical Groundwater Profiling Location
- Historic Soil Boring
- Injection Well Installed 01/2014
- Dry Well
- Floor Drain
- 5 — Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- Inferred Tetrachloroethene (PCE) Contour (µg/L)
- 69.6 — Tetrachloroethene (PCE) Concentration (µg/L)
- Former Fort Devens Boundary
- ERD Injection Well Transect

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
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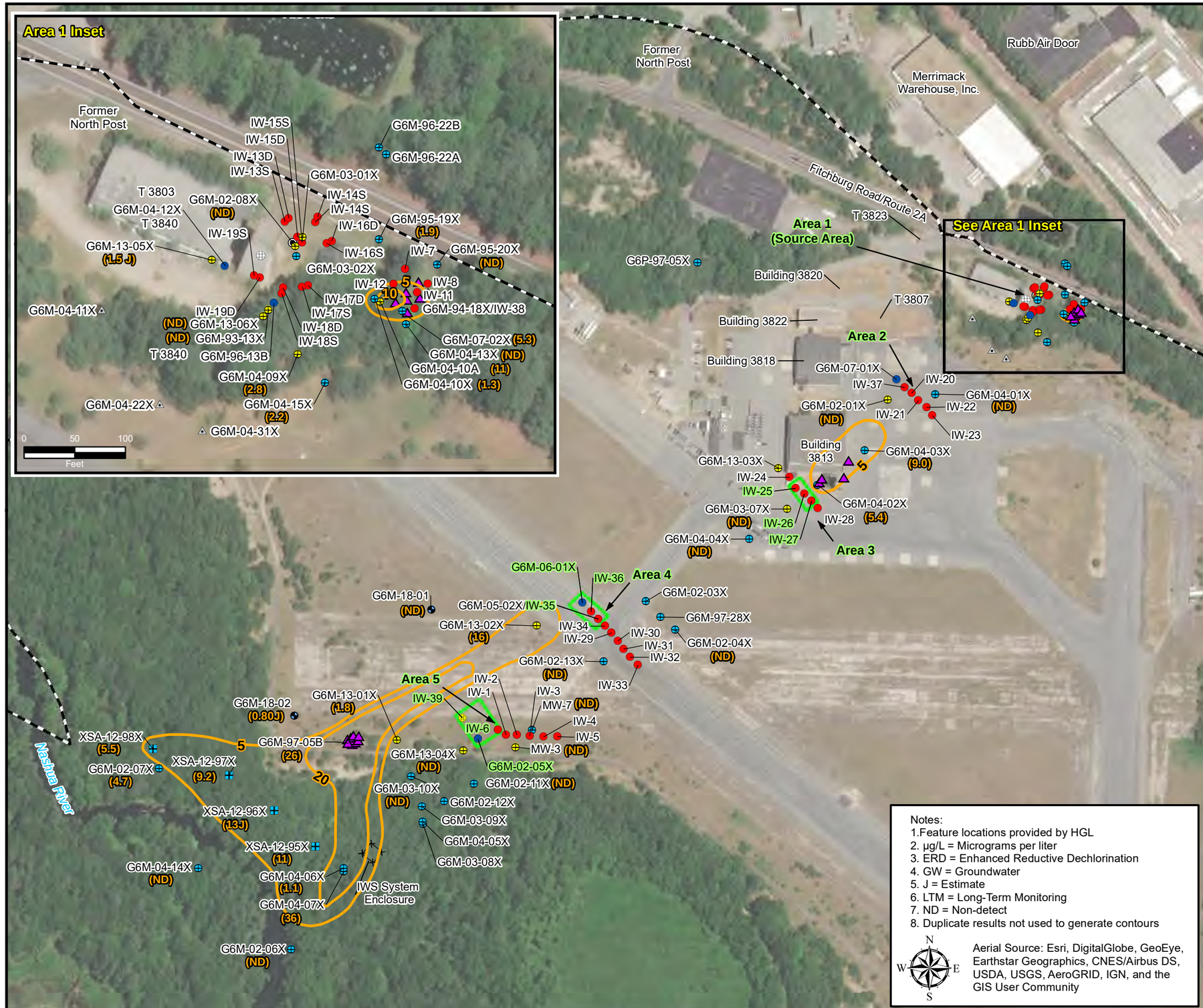
0 150 300
Feet

Date: 12/09/2019

Figure J-8

File: AR2019_AOC50_F4-4_PCE_Oct2015.mxd

Figure J-9
Tetrachloroethene Concentrations in Groundwater, October 2019, AOC 50



Legend

- IW-25 — Permanent Injection Well used in 2019
- Geoprobe Injection Location July/August 2019
- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Dry Well
- Floor Drain
- 5 — Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- (5.4) — Tetrachloroethene (PCE) Concentration (µg/L)
- ERD Injection Well Transect
- Former Fort Devens Boundary

Notes:
1. Feature locations provided by HGL
2. µg/L = Micrograms per liter
3. ERD = Enhanced Reductive Dechlorination
4. GW = Groundwater
5. J = Estimate
6. LTM = Long-Term Monitoring
7. ND = Non-detect
8. Duplicate results not used to generate contours

N W E S

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2020 Five Year Review
AOC 50

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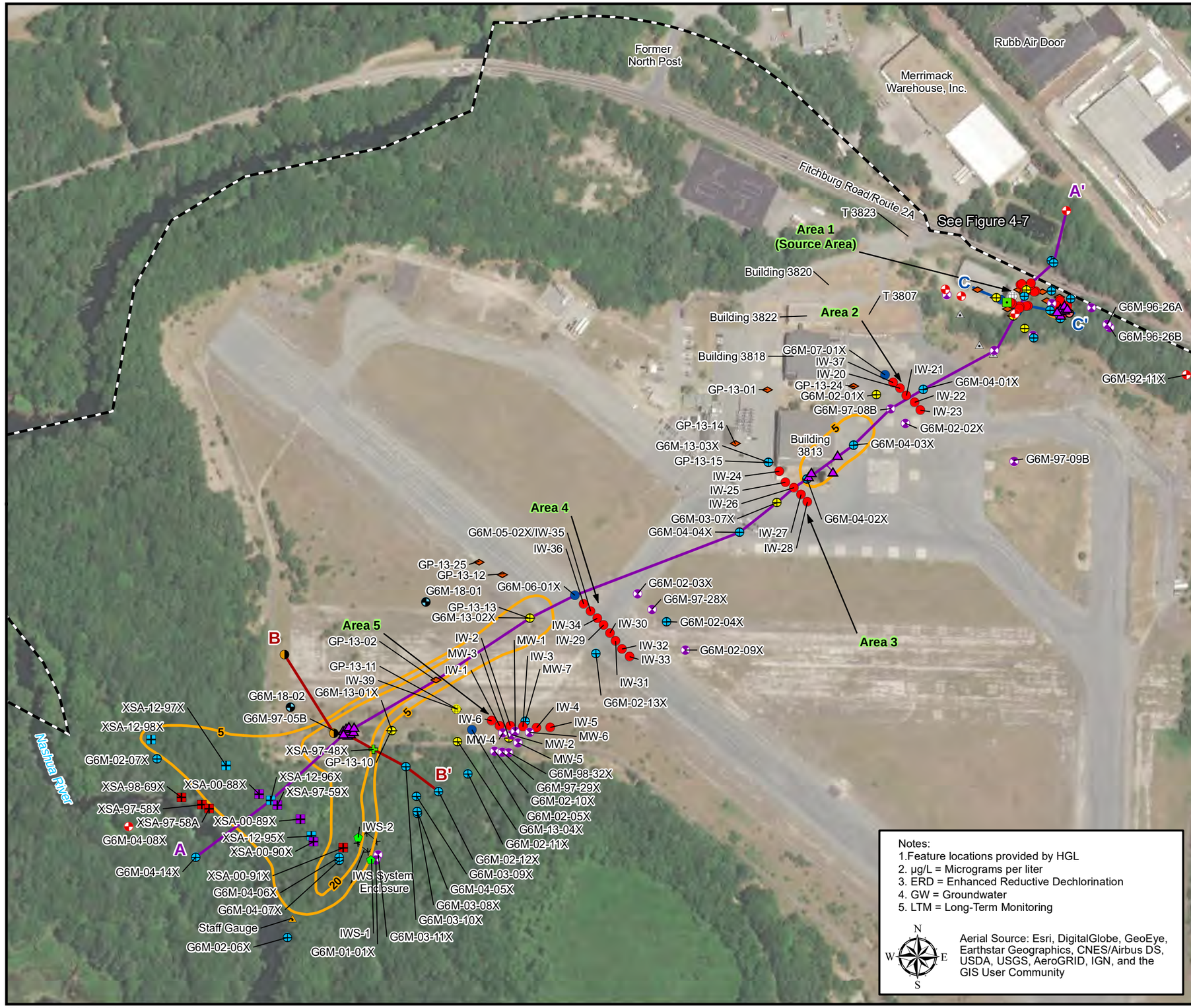
0 150 300 Feet

Date: 01/16/2020

Figure J-9

File: AR2019_AOC50_F4-5_PCE_Oct2019.mxd

Figure J-10
Cross-Section Plan View
AOC 50



Notes:
1. Feature locations provided by HGL
2. µg/L = Micrograms per liter
3. ERD = Enhanced Reductive Dechlorination
4. GW = Groundwater
5. LTM = Long-Term Monitoring

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Newly Installed Monitoring Well - 01/2019
- Geoprobe Injection Location - July/August 2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Abandoned Well
- Historic Soil Boring
- Historic Vertical Groundwater Profiling Location
- In-Well Stripping System Well
- Injection Well Installed Prior to 01/2014
- Abandoned Injection Well
- Injection Well Installed 01/2014
- LTM Well - Gauge Only
- MicroWell
- MicroWell - Gauge Only
- MicroWell - Sampled Annually
- Monitoring Well
- Monitoring Well Converted to Injection Well
- Staff Gauge
- MiHPT Investigation Location
- Vertical Groundwater Profiling Location
- Dry Well
- Floor Drain
- 5 October 2019 Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- Cross-Section A-A'
- Cross-Section B-B'
- Cross-Section C-C'
- Former Fort Devens Boundary

2020 Five Year Review
AOC 50

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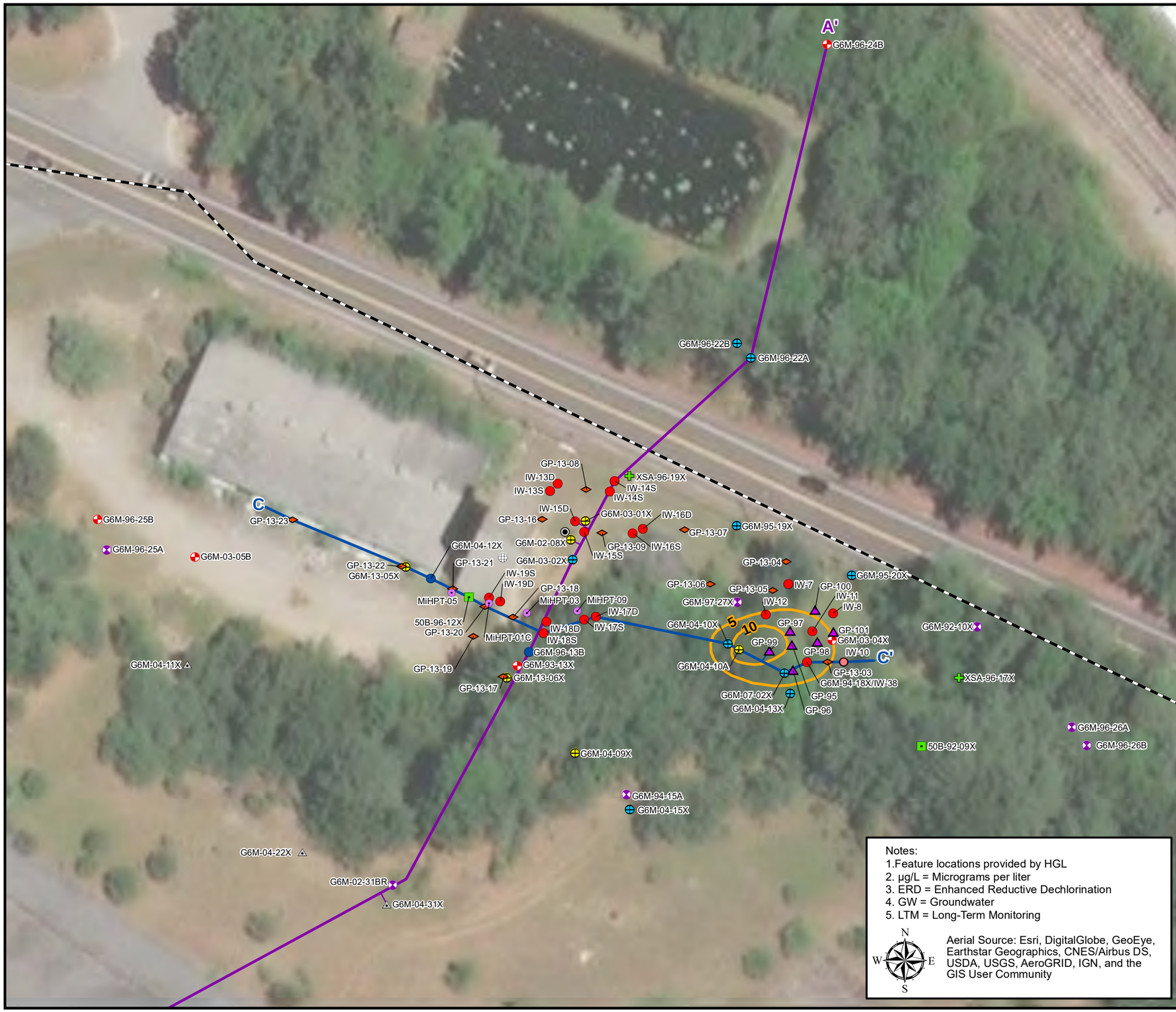
0 150 300
Feet

Date: 02/03/2020

Figure J-10

File: AR2019_AOC50_F4-6_XSectLoc.mxd

Figure J-11
Cross-Section Plan View
AOC 50 - Area 1



Notes:
1.Feature locations provided by HGL
2. µg/L = Micrograms per liter
3. ERD = Enhanced Reductive Dechlorination
4. GW = Groundwater
5. LTM = Long-Term Monitoring

Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Geoprobe Injection Location - July/August 2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Abandoned Well
- Historic Soil Boring
- Historic Vertical Groundwater Profiling Location
- In-Well Stripping System Well
- Injection Well Installed Prior to 01/2014
- Abandoned Injection Well
- Injection Well Installed 01/2014
- LTM Well - Gauge Only
- MicroWell
- MicroWell - Gauge Only
- MicroWell - Sampled Annually
- Monitoring Well
- Monitoring Well Converted to Injection Well
- Staff Gauge
- MiHPT Investigation Location
- Vertical Groundwater Profiling Location
- Dry Well
- Floor Drain
- 5 October 2019 Interpretive Tetrachloroethene (PCE) Contour (µg/L)
- Former Fort Devens Boundary
- Cross-Section A-A'
- Cross-Section C-C'

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
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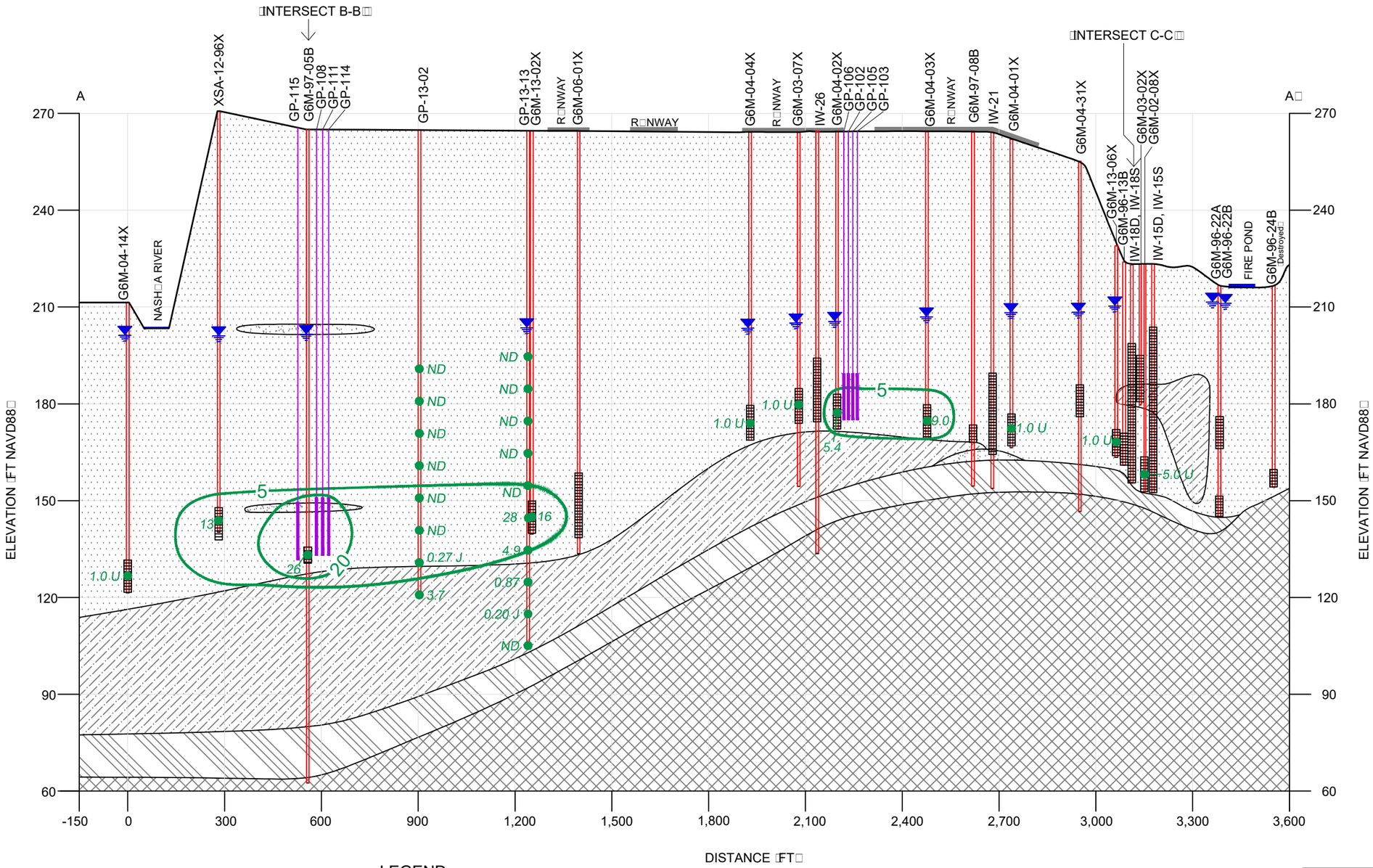
0 25 50
Feet

Date: 01/10/2020

Figure J-11

File: AR2019_AOC50_F4-7_AREA1_XSectLoc.mxd



NOTES:

FT = FEET.
FT NAVD88 = NORTH AMERICAN VERTICAL DATUM 1988 (FT)
U = THE ANALYTE WAS DETECTED AT THE REPORTED CONCENTRATION. THE VALUE IS AN ESTIMATE.
µg/L = MICROGRAMS PER LITER.

U/ND = NON-DETECT.

GROUNDWATER PROFILING RESULTS AT GP-13-02 AND GP-13-13 WERE FROM 2013.

STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

CROSS SECTION FEATURES INCLUDING WELL LOCATIONS, SCREEN LOCATION AND LITHOLOGY FOR THE EASTERN PORTION OF THE CROSS-SECTION (G6M-04-04X TO G6M-96-24) BASED ON "FIGURE 4.10 TETRACHLOROETHENE PLUME IN GROUNDWATER (CROSS SECTION A-A') PRIOR TO ERD INJECTIONS" BY HGL ON 03/31/2014.

LEGEND

- FINE SAND
- COARSE SAND
- SILTY SAND
- GLACIAL TILL
- BEDROCK
- GW ELEVATION ON 10/7/2019
- WELL SCREEN INTERVAL
- BORING
- 2019 INJECTION INTERVAL
- G6M-13-02X — BORING/WELL IDENTIFICATION
- 26 ● — TETRACHLOROETHENE SAMPLE CONCENTRATION (µg/L)
- 2019 TETRACHLOROETHENE CONTOUR (µg/L)
- SOIL TYPE BOUNDARY

Tetrachloroethene Plume in Groundwater - Cross Section, A-A'
AOC 50, October 2019

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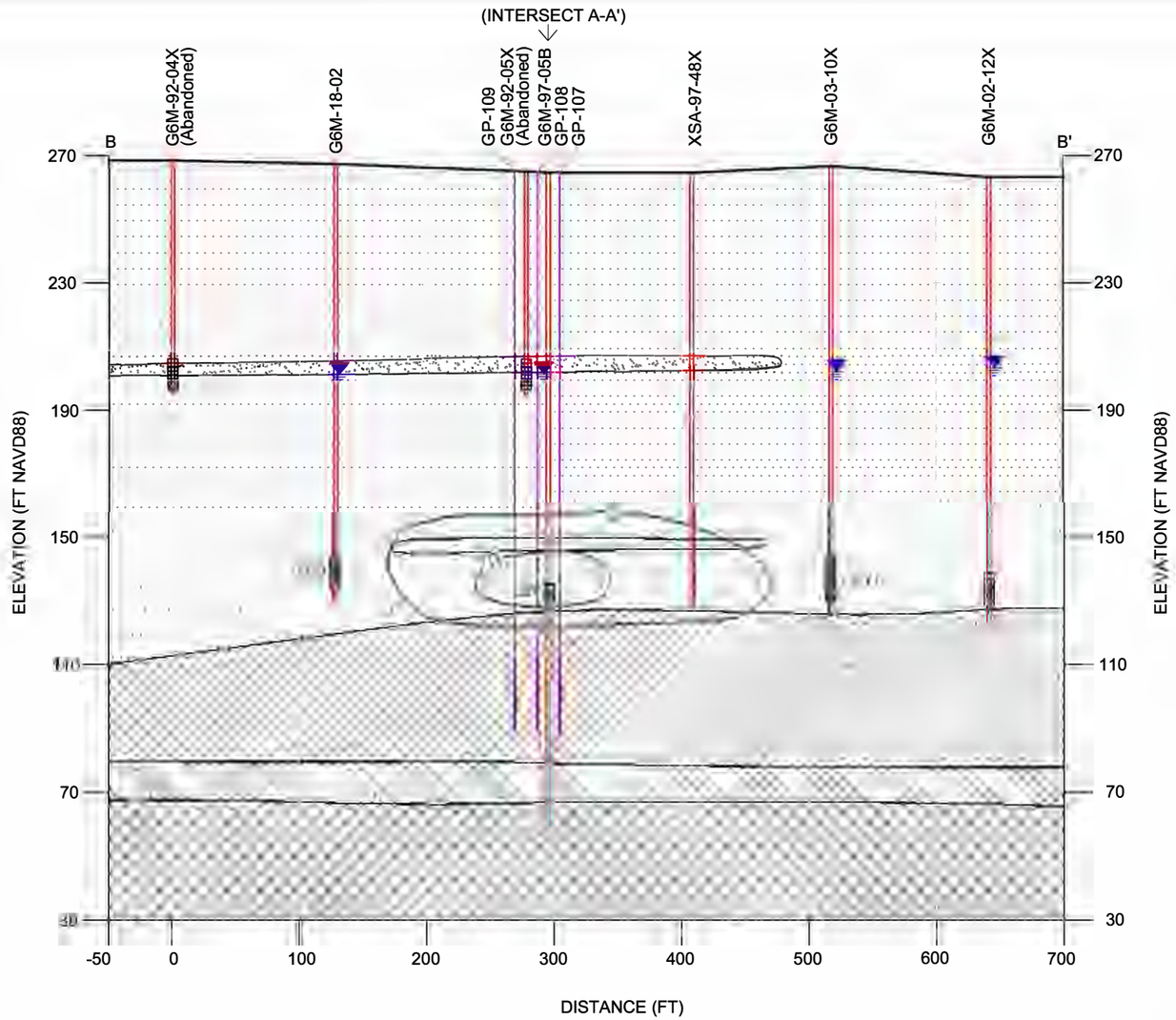
Date:	Figure
01/16/2020	J-12

X:\HS_Environmental\FortDevens_Mass\Drawings\AOC50_XSections\AR_2019\AR2019_AOC50_XSections.dwg



LEGEND

- FINE SAND
- COARSE SAND
- SILTY SAND
- GLACIAL TILL
- BEDROCK
- GW ELEVATION ON 10/7/2019
- WELL SCREEN INTERVAL
- BORING
- 2019 INJECTION INTERVAL
- SOIL TYPE BOUNDARY
- G6M-03-10X — BORING/WELL IDENTIFICATION
- 26 ● — TETRACHLOROETHENE SAMPLE CONCENTRATION (µg/L)
- 2019 TETRACHLOROETHENE CONTOUR (µg/L)

NOTES:

FT = FEET.
FT NAVD88 = NORTH AMERICAN VERTICAL DATUM 1988 (FT)
µg/L = MICROGRAMS PER LITER.

ND = NON-DETECT.

STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

CROSS SECTION FEATURES INCLUDING WELL LOCATIONS, SCREEN LOCATION AND LITHOLOGY AT G6M-92-04X, G6M-97-05B AND XSA-97-78X BASED ON "FIGURE 6 TETRACHLOROETHENE PLUME IN GROUNDWATER (CROSS SECTION C-C') OCTOBER 2013" BY HGL ON 03/31/2014.

Tetrachloroethene Plume in Groundwater - Cross Section, B-B'
AOC 50, October 2019

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Devens, Massachusetts

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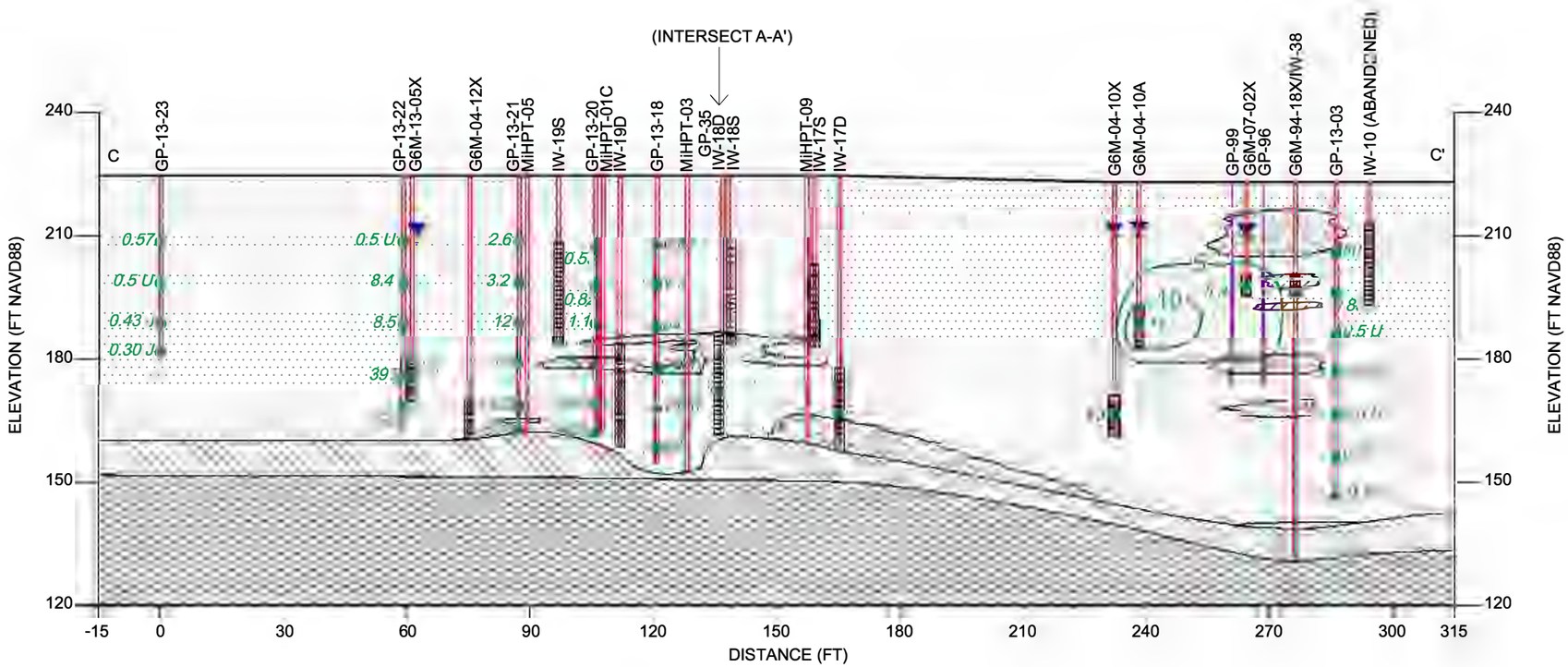
	Date: 01/16/2020	Figure J-13	KGS

X:\HS_Environmental\FortDevens_Mass\Drawings\AOC50_XSections\AR_2019\AR2019_AOC50_XSections.dwg



NOTES:

FT = FEET.
FT NAVD88 = NORTH AMERICAN VERTICAL DATUM 1988 (FT).
J = THE ANALYTE WAS DETECTED AT THE REPORTED CONCENTRATION; THE VALUE IS AN ESTIMATE.
U = ANALYTE WAS DETECTED BELOW LABORATORY DETECTION LIMIT.
µg/L = MICROGRAMS PER LITER.

GROUNDWATER PROFILING RESULTS AT GP LOCATIONS WERE FROM 2013.

STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

LEGEND

- FINE SAND
- SILTY SAND
- GW ELEVATION ON 10/7/2019
- GLACIAL TILL
- BEDROCK
- WELL SCREEN INTERVAL
- BORING
- 2019 INJECTION INTERVAL
- G6M-13-05X BORING/WELL IDENTIFICATION
- 11 ● TETRACHLOROETHENE SAMPLE CONCENTRATION (µg/L)
- 2019 TETRACHLOROETHENE CONTOUR (µg/L)
- SOIL TYPE BOUNDARY

Tetrachloroethene Plume in Groundwater - Cross Section, C-C'
AOC 50, October 2019

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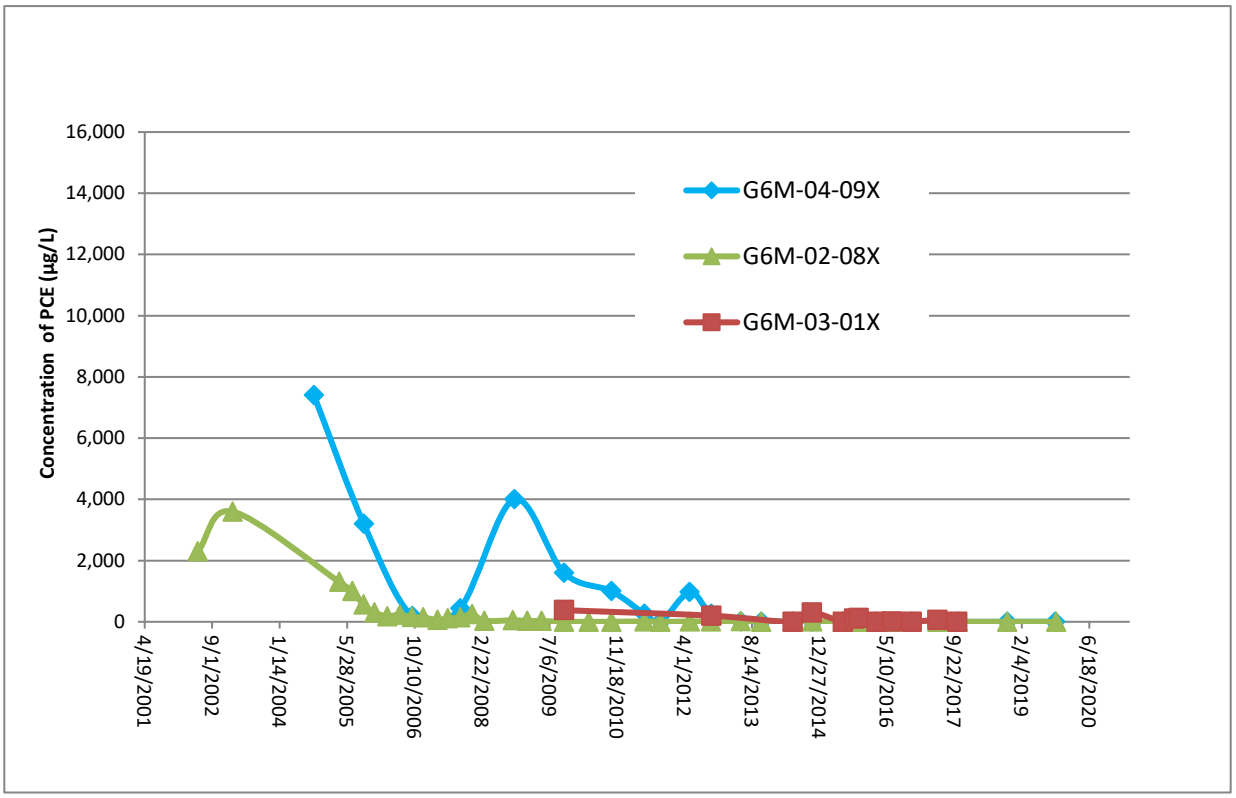
Date:	Figure
01/16/2020	J-14

X:\HS_Environmental\FortDevens_Mass\Drawings\AOC50_XSections\AR_2019\AR2019_AOC50_XSections.dwg

Figure J-15
Area 1 PCE Concentration Trend Graph



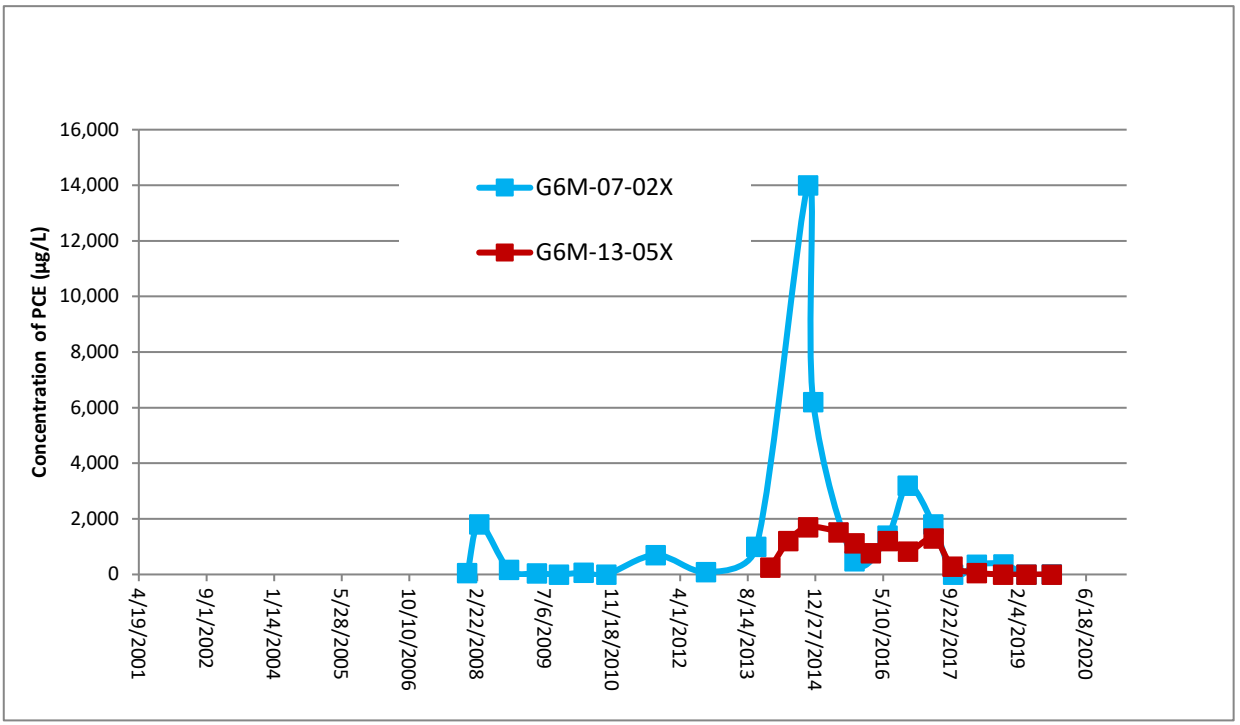


Figure J-16
Area 2 PCE Concentration Trend Graph

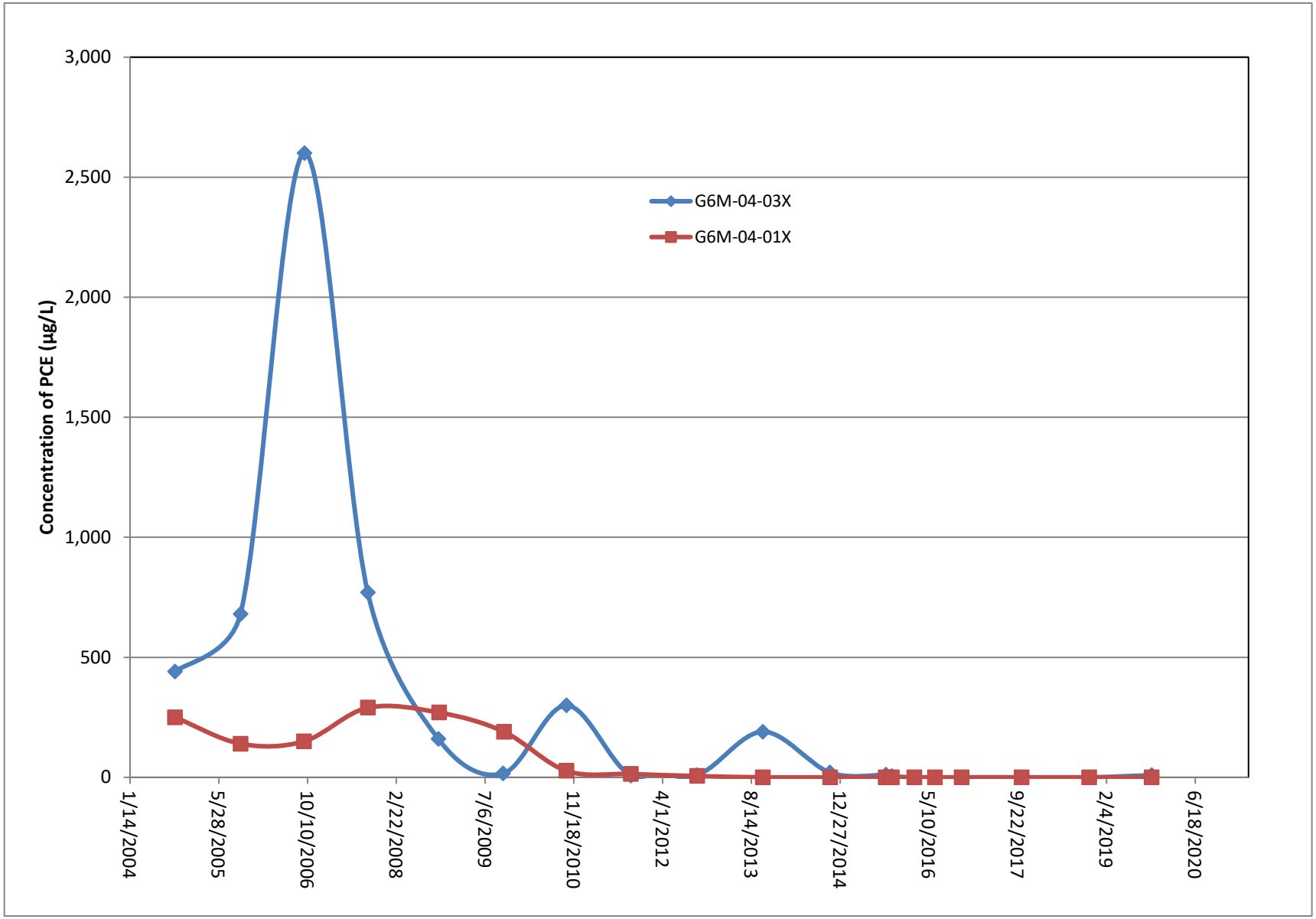


Figure J-17
Area 3 PCE Concentration Trend Graph

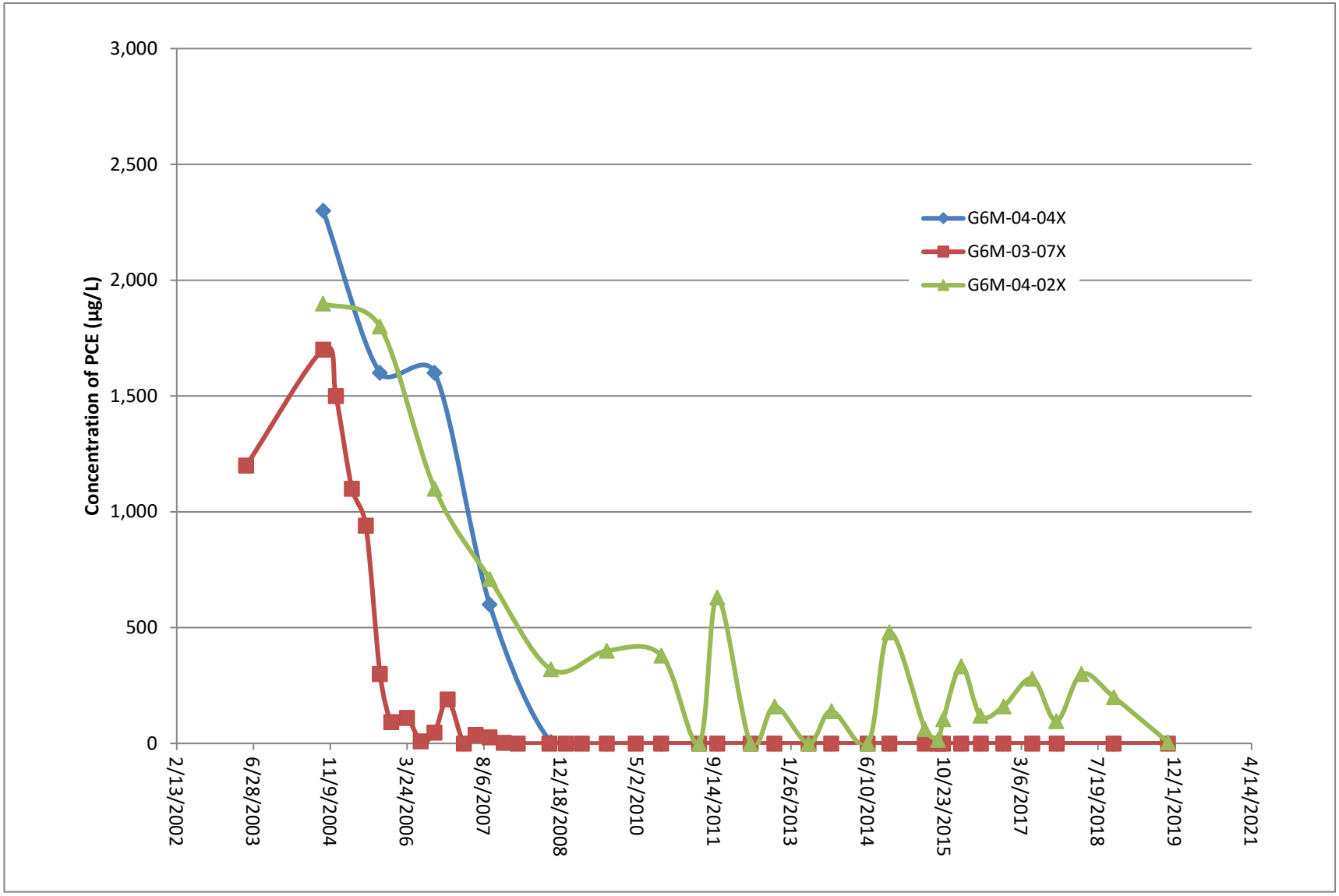
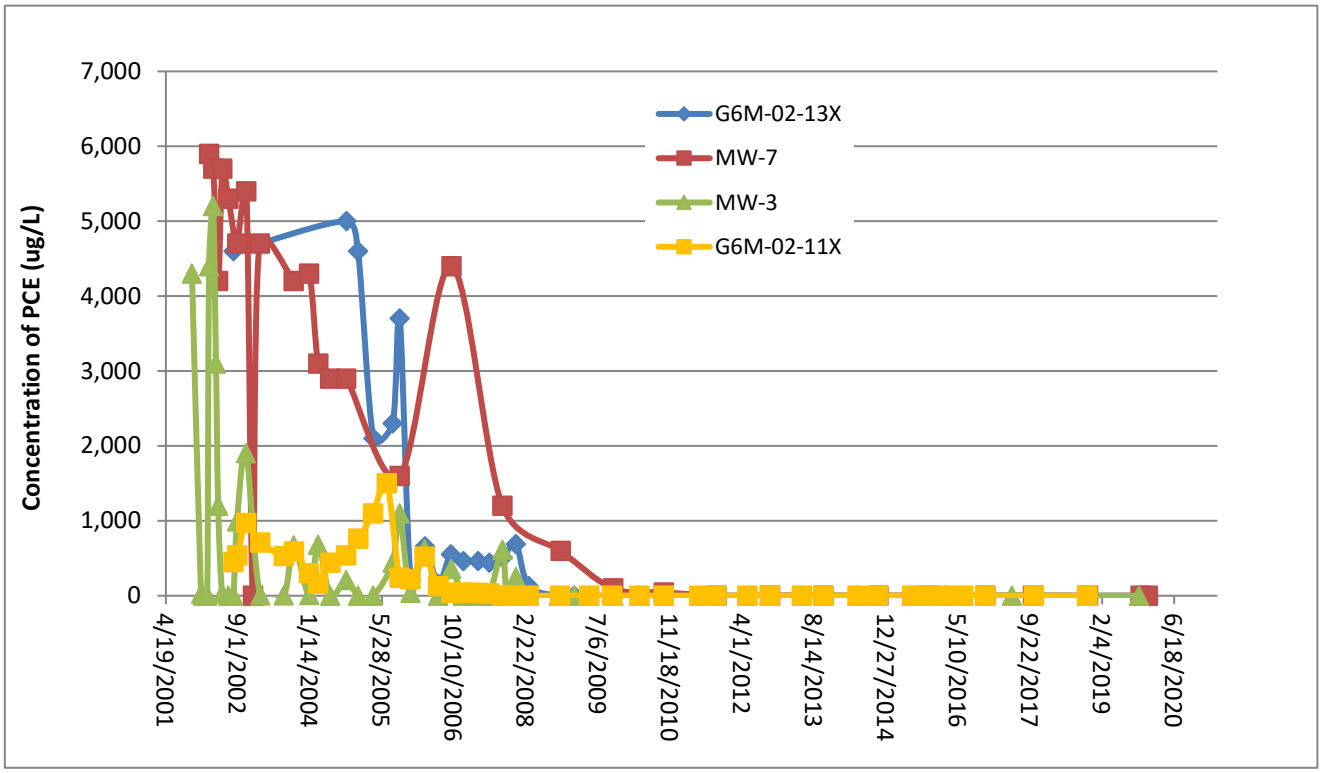
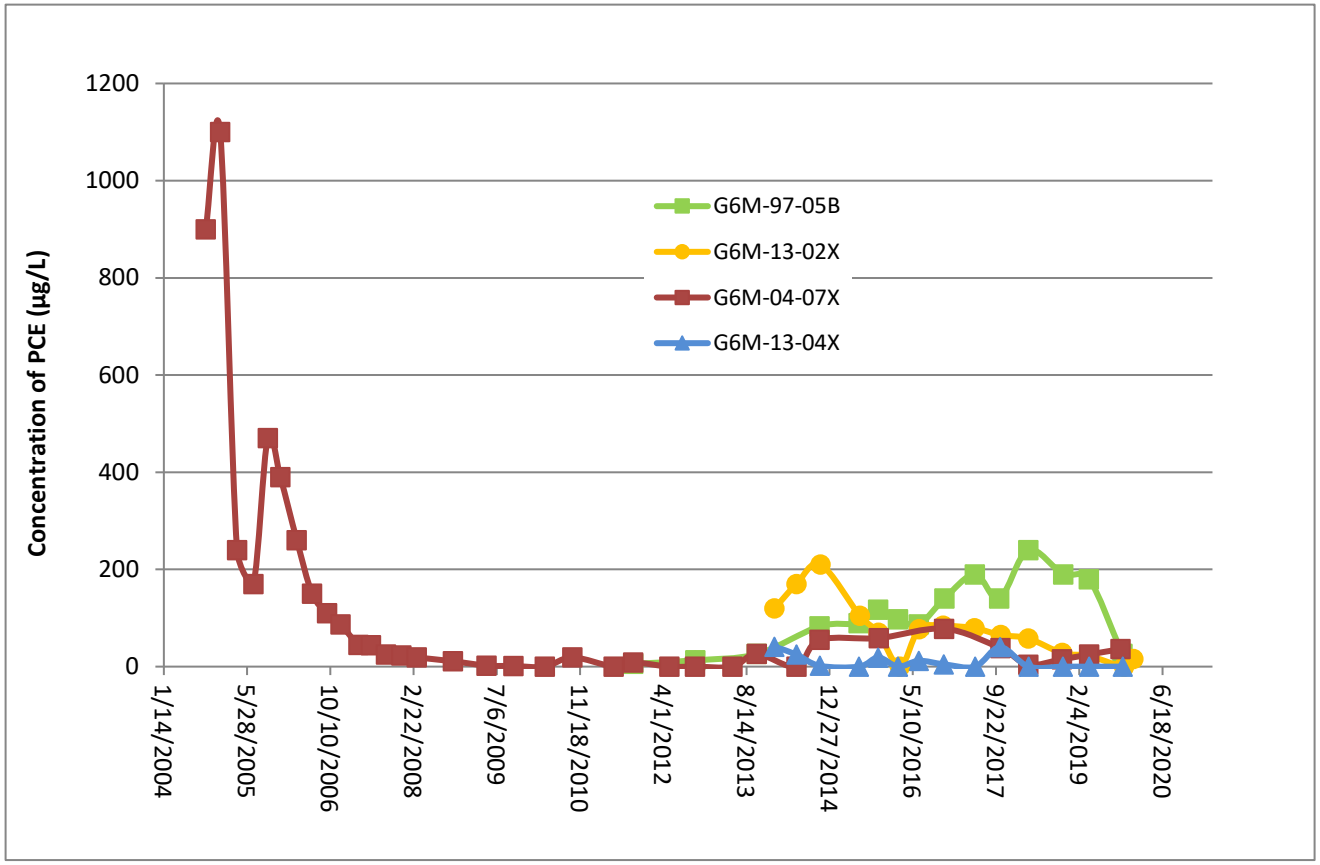


Figure J-18
Area 4 and 5 PCE Concentration Trend Graph





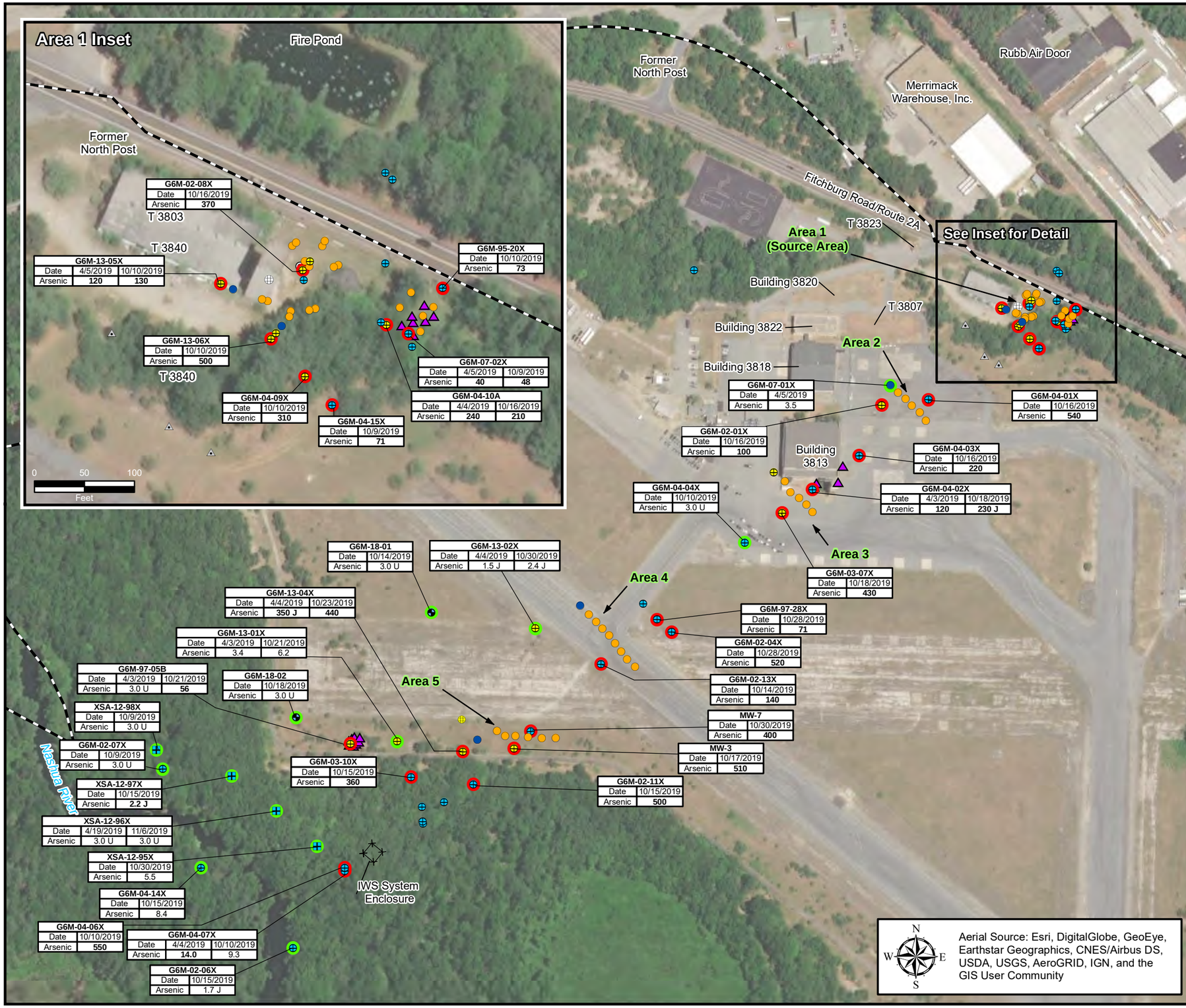


Figure J-19
Dissolved Arsenic in Groundwater, AOC 50, 2019

Legend

- Arsenic Above Cleanup Goal
- Arsenic Below Cleanup Goal
- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Geoprobe Injection Location July/August 2019
- Dry Well
- Floor Drain
- Former Fort Devens Boundary

Notes:
All concentrations in micrograms per liter (µg/L)
J = Estimated Results
U = Non-detect
Arsenic Clean-Up Goal = 10 µg/L
BOLD values indicate Clean-Up Goal exceedances

ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

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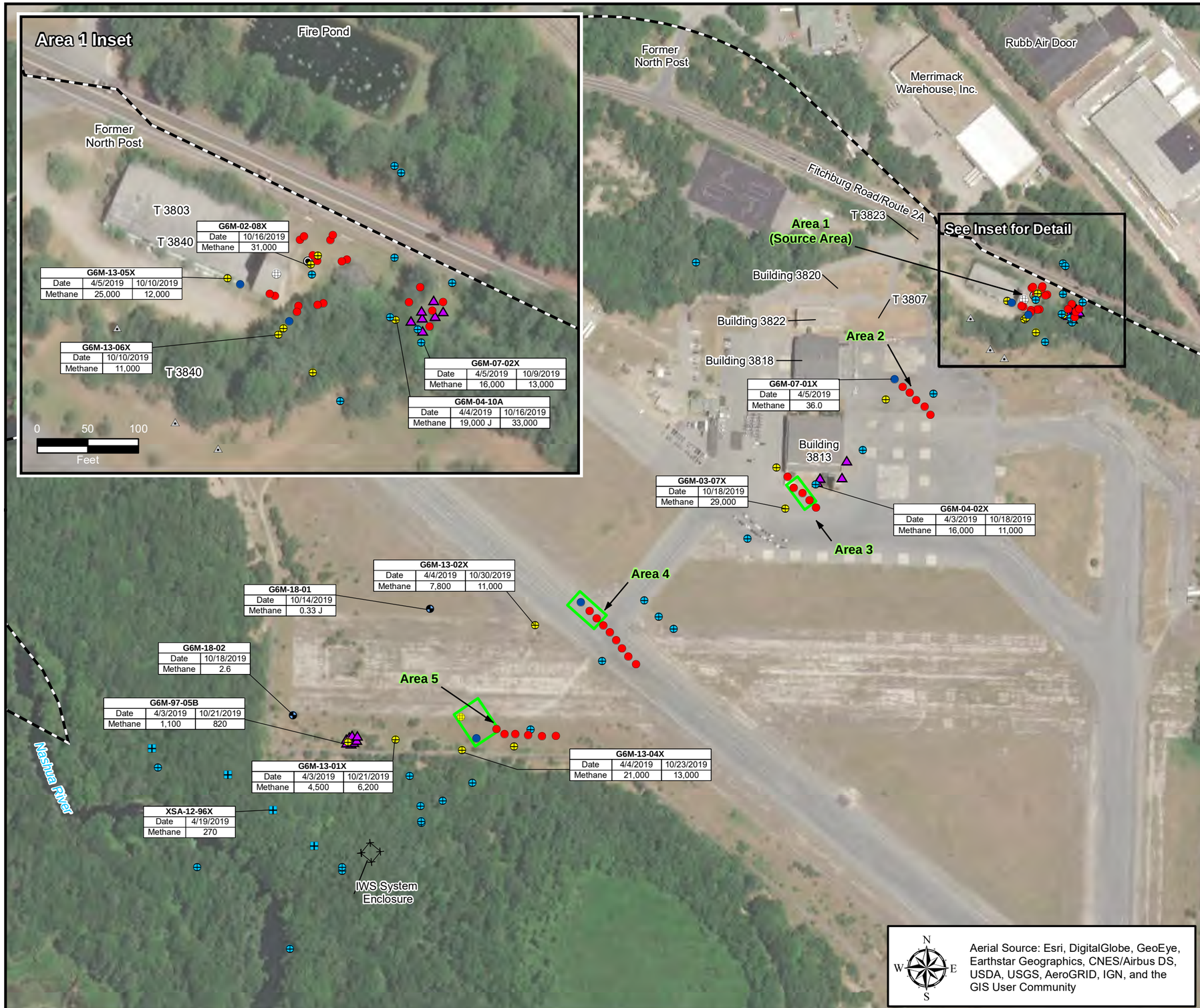
0 150 300
Feet

Date: 04/21/2020

Figure J-19

File: 2020_FJ-19_AOC50_Arsenic_FiveYear.mxd

Figure J-20
Methane Concentration in Groundwater, AOC 50, 2019



Legend

- Newly Installed Monitoring Well - 01/2019
- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Monitoring Well Converted to Injection Well
- MicroWell - Sampled Annually
- Injection Well Installed Prior to 01/2014
- Injection Well Installed 01/2014
- Geoprobe Injection Location July/August 2019
- Dry Well
- Floor Drain
- ERD Injection Well Transect
- Former Fort Devens Boundary

Notes:
All concentrations in micrograms per liter (µg/L)
J = Estimated Results
U = Non-detect

ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

2020 Five Year Review
AOC 50

Former Fort Devens Army Installation and Sudbury Annex
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 01/17/2020

Figure J-20

File: AR2019_AOC50_F4-16_Methane_2019.mxd

J.3 Former

Moore Army

Airfield

Tables

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
North Plume	G6M-96-22A	10/16/2001	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.50	5.1	210	2	0	15.95
North Plume	G6M-96-22A	2/28/2002	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	0.10U	-	-	5.70	8.37	183.5	1.78	0.5	12.41
North Plume	G6M-96-22A	9/21/2004	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	54	-	-	-	-	-	5.75	6.73	187.9	1.885	1.59	11.59
North Plume	G6M-96-22A	9/29/2005	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	52	-	-	-	-	-	5.95	4.9	223.1	3.18	0.38	10.75
North Plume	G6M-96-22A	9/20/2006	2U	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	42	-	-	-	-	-	5.68	4.78	176.3	1.814	1.85	11.03
North Plume	G6M-96-22A	9/12/2007	2U	2U	2U	2U	1U	2U	-	-	-	6U	0.1U	78	-	-	-	-	-	5.50	6.95	-101.1	1.404	5.0	12.38
North Plume	G6M-96-22A	10/17/2008	0.55	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	2,240	-	-	-	-	-	5.57	1.41	123.8	1.378	1.8	10.07
North Plume	G6M-96-22A	10/16/2009	0.25J	29	0.27J	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	7,120	-	-	-	-	-	5.91	0.25	228.5	2.288	0	11.31
North Plume	G6M-96-22A	10/7/2010	0.22J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	7,670	-	-	-	-	-	5.72	0.21	141.2	3.623	0	9.31
North Plume	G6M-96-22A	10/7/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	6,860	-	-	-	-	-	5.6	0.18	59.9	2.144	0	10.13
North Plume	G6M-96-22A	10/15/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	12,400	-	-	-	-	-	5.82	0.36	110.5	2.915	0	14.55
North Plume	G6M-96-22A	10/18/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	6,010	-	-	-	-	-	6.05	0.58	177.1	1.524	0	11.1
North Plume	G6M-96-22A	11/4/2014	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.019U	3,160	-	-	-	-	-	6.12	3.75	203.7	0.774	0.86	-
North Plume	G6M-96-22A	10/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	3,810	-	-	-	-	-	6.11	2.77	122.9	1.333	0.21	-
North Plume	G6M-96-22A	11/8/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	2,300						4.64	3.73	129.4	0.983	0.75	11.89
North Plume	G6M-96-22B	10/19/2001	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.76	6.95	176	2.09	0.6	13.13
North Plume	G6M-96-22B	2/28/2002	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	0.10U	-	-	6.35	7.83	198.5	2.002	1.5	12.89
North Plume	G6M-96-22B	1/31/2003	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.48
North Plume	G6M-96-22B	9/21/2004	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	44	-	-	-	-	-	5.83	6.15	193.9	1.941	2.76	13.86
North Plume	G6M-96-22B	9/29/2005	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	48	-	-	-	-	-	6.12	5.57	187.7	3.02	1.43	11.15
North Plume	G6M-96-22B	9/20/2006	2U	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	44	-	-	-	-	-	5.53	6.51	179	2.183	0.67	10.19
North Plume	G6M-96-22B	9/12/2007	2U	2U	2U	2U	1U	2U	-	-	-	6U	0.1U	40	-	-	-	-	-	5.73	16.11	-112.1	2.618	13.9	11.86
North Plume	G6M-96-22B	10/17/2008	0.91	0.5U	0.24J	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	67.3	-	-	-	-	-	5.40	1.77	121.3	1.02	0.85	11.56
North Plume	G6M-96-22B	10/16/2009	0.3J	23	0.32J	0.5U	0.5U	0.5U	-	-	-	8U	0.135U	25,500	-	-	-	-	-	6.08	0.31	209.1	1.683	0.04	11.52
North Plume	G6M-96-22B	10/7/2010	0.25J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	3.3J	0.1U	14,600	-	-	-	-	-	6.00	0.48	115.1	2.295	0.49	12.85
North Plume	G6M-96-22B	10/7/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	9,320	-	-	-	-	-	5.98	0.16	30.7	1.899	0	11.27
North Plume	G6M-96-22B	10/15/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.120U	9,980	-	-	-	-	-	6.14	0.25	16.4	2.358	1.17	12.41
North Plume	G6M-96-22B	10/18/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	3.2J	0.1U	14,100	-	-	-	-	-	6.17	0.81	142	2.288	0.31	13.79
North Plume	G6M-96-22B	11/4/2014	0.21J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	4.6J	0.017U	7,180	-	-	-	-	-	6.58	0.45	137.4	1.087	3.55	17.20
North Plume	G6M-96-22B	10/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	5,610	-	-	-	-	-	6.53	1.34	93.5	1.457	2.18	15.00
North Plume	G6M-96-22B	11/8/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	6,500						5.96	2.66	174	1.362	2.49	11.2
North Plume	G6M-96-24B	10/16/2001	18	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.37	0	81	0.42	19	14.44
North Plume	G6M-96-24B	3/1/2002	11	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.35	-6.27	106.7	0.43	2.8	17.01
North Plume	G6M-96-24B	1/31/2003	7.5	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.61
North Plume	G6M-96-24B	1/12/2004	11	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.41
North Plume	G6M-96-24B	9/24/2004	13	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.17	0.2	152.2	0.422	0.44	19.31
North Plume	G6M-96-24B	12/17/2004	8.1	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.05	0.46	259.6	0.384	2.43	15.12
North Plume	G6M-96-24B	4/13/2005	8.2	1U	2.8	1U	1U	1U	-	-	-	-	-	-	-	-	-	-	-	5.32	0.2	216.6	0.429	2.49	10.84
North Plume	G6M-96-24B	7/6/2005	7.6	2U	3.0	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.69	1.34	242.8	0.77	0.02	14.12
North Plume	G6M-96-24B	9/30/2005	7.2	2U	3.6	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.77	0.29	198.3	1.022	7.7	16.26
North Plume	G6M-96-24B	12/15/2005	7.4	2U	3.1	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.97	0.14	242.8	0.9	2.1	19.14
North Plume	G6M-96-24B	3/23/2006	4.2	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.99	0.23	404.5	0.458	1.31	12.78
North Plume	G6M-96-24B	6/23/2006	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	4.62	0.85	526.9	0.443	0.88	15.18
North Plume	G6M-96-24B	9/22/2006	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.93	0.3	141	0.407	4.23	16.89
North Plume	G6M-96-24B	12/14/2006	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.54	0.17	74.8	0.56	0.2	16.2
North Plume	G6M-96-24B	3/30/2007	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.90	0.5	-43.6	0.62	0.15	12.58
North Plume	G6M-96-24B	6/13/2007	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.10	0.16	138.9	0.727	220.2	12.48
North Plume	G6M-96-24B	9/13/2007	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.05	3.93	-95.7	0.689	9.9	11.3
North Plume	G6M-96-24B	12/12/2007	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.33	0.3	106.2	0.802	0.8	14
North Plume	G6M-96-24B	10/7/2008	0.4J	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	15	8.0U	0.352U	448	10U	46	0.13U	10	0.03UJ	6.04	0.54	92.4	0.51	30	14.4
North Plume	G6M-96-24B	1/22/2009	1.4U	2.3U	1.8U	1.3U	1.2U	1.3U	1.2U	1.5U	4.2	8.0U	226J	315	10UJ	32	0.13U	9.3	0.03U	6.16	0.45	149.6	0.479	65	13.4

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
North Plume	G6M-96-24B	5/11/2009	0.29J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	5.87	0.20	90.8	0.304	23.1	12
Area 1	G6M-03-01X	10/21/2009	380	65	670	25U	25U	25U	-	-	-	-	-	-	-	-	-	-	-	6.52	0.88	-153.5	0.559	7.25	11.99
Area 1	G6M-03-01X	10/16/2012	200	60	200	10U	10U	550	-	-	-	-	-	-	-	-	-	-	-	6.51	0.95	-69.4	1.776	2.28	20.17
Area 1	G6M-03-01X	6/12/2014	0.29J	37	19	0.59	0.51	68	-	-	-	-	-	-	-	-	-	-	-	6.52	1.95	11.7	0.812	13.1	16.73
Area 1	G6M-03-01X	10/31/2014	300	310	98	0.5U	0.5U	34	-	-	-	-	-	-	-	-	-	-	-	6.40	0.75	-106.6	1.263	8.57	9.6
Area 1	G6M-03-01X	6/18/2015	0.65 J	37	53	0.50 U	0.55 J	18.8	-	-	-	-	-	-	-	-	-	-	-	6.36	1.82	19.9	1.093	22.9	13.63
Area 1	G6M-03-01X	9/10/2015	103	67	65	2.40	1.40	62.8	10 U	68.9	8,640	46.0	41.8	7,080	5.30	-	0.076 J	10.30	2.0 U	6.00	0.61	-55.0	1.881	4.38	12.57
Area 1	G6M-03-01X	10/13/2015	126	190	141	5.20	1.50	57.5	-	-	-	-	-	-	-	-	-	-	-	6.27	0.28	-83.5	2.096	3.61	13.25
Area 1	G6M-03-01X	2/22/2016	1.0 U	81	87	1.9	1.0 U	50.6	10 U	95.5	16,300	23.5	20.0	6,330	6.4	144	0.11 U	3.4 J	2.0 U	6.62	2.11	33.6	1.162	4.98	8.46
Area 1	G6M-03-01X	6/15/2016	9.6	180	180	8.8	1.4	99	-	-	-	-	-	-	-	-	-	-	-	5.84	2.81	-48.3	1.726	5.61	12.87
Area 1	G6M-03-01X	11/10/2016	1.0 U	130	180	4.0	1.4	140	-	-	-	-	-	-	-	-	-	-	-	6.25	0.47	-84.7	1.097	2.4	8.21
Area 1	G6M-04-09X	9/24/2004	7,400	4.2	9.0	2U	1U	2U	-	-	-	5U	1UJ	160	-	-	-	-	-	5.15	3.84	637.6	0.495	0.82	9.54
Area 1	G6M-04-09X	9/28/2005	3,200	5U	5U	5U	5U	5U	-	-	-	5U	1U	37	-	-	-	-	-	5.92	3.41	678.4	0.169	2.07	10.21
Area 1	G6M-04-09X	9/21/2006	190	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	50	-	-	-	-	-	5.83	8.18	215.6	0.102	5.51	15.4
Area 1	G6M-04-09X	9/12/2007	440	22	31	2U	1U	2U	-	-	-	5U	0.83	390	-	-	-	-	-	6.22	2.18	49.7	0.179	4.3	14
Area 1	G6M-04-09X	10/17/2008	4,000	330	410	50U	50U	44	-	-	-	63.4	13.3	5,700	-	-	-	-	-	6.23	0.66	-36.2	0.497	9.2	10.50
Area 1	G6M-04-09X	10/21/2009	1,600	210	210	50U	50U	51	-	-	-	70.8	13	3,960	-	-	-	-	-	5.80	0.58	33.3	0.376	4.53	12.35
Area 1	G6M-04-09X	10/8/2010	1,000	420	990	0.79	0.89	7.8	-	-	-	69.9	14.3	15,300	-	-	-	-	-	6.17	0.99	-20.8	0.388	1.58	11.9
Area 1	G6M-04-09X	6/9/2011	260	140	950	0.56	1.7	200	-	-	-	203	43.3	9,820	-	-	-	-	-	6.14	0.35	-49.3	0.562	0.03	11.27
Area 1	G6M-04-09X	10/7/2011	20U	23	910	20U	20U	240	-	-	-	291	107	50,900	45	-	-	-	-	6.45	0.14	-105.8	0.626	2	10.1
Area 1	G6M-04-09X	5/9/2012	970	250	510	40U	40U	340	-	-	-	344	76.7	17,800	9.1J	-	-	-	-	6.66	0.08	-85.2	0.495	12.5	10.11
Area 1	G6M-04-09X	10/16/2012	260	70	100	20U	20U	350	-	-	-	225	41.7	13,800	3.0J	-	-	-	-	6.24	0.31	-79.9	0.289	10.3	10.75
Area 1	G6M-04-09X	5/22/2013	5.9	3.6	5.9	0.81	0.5U	9.9	-	-	-	321	135	30,800	11	-	-	-	-	6.29	0.15	-84.7	0.812	4.21	8.74
Area 1	G6M-04-09X	10/22/2013	0.5U	0.5U	52	0.53	0.5U	38	-	-	-	551	303	27,100	34	-	-	-	-	6.64	3.3	-130.9	0.917	18.5	10
Area 1	G6M-04-09X	6/12/2014	1.4	0.75	12	0.6	0.5U	26	-	-	-	607	315	19,200	29	-	-	-	-	6.37	0.26	-82.0	1.392	3.64	10.42
Area 1	G6M-04-09X	11/3/2014	0.21J	0.5U	0.43J	0.21J	0.5U	0.83	-	-	-	600	339	16,500	31	-	-	-	-	6.59	0.05	-129.2	1.03	21.8	10.47
Area 1	G6M-04-09X	6/17/2015	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-	-	-	351	159	3,560	14.10	-	-	-	-	6.33	0.64	-65.0	1.384	96	14.03
Area 1	G6M-04-09X	10/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	577	241	5,600	16.4	-	-	-	-	6.61	0.13	134.9	1.604	15.3	10.75
Area 1	G6M-04-09X	2/19/2016	1.0 U	1.0 U	0.55 J	1.0 U	1.0 U	1.0 U	10 U	10 U	16,700	514	202	3,600	13.4	439	0.37	4.5 J	2.0 U	6.74	1.09	-95.7	1.280	12.42	9.9
Area 1	G6M-04-09X	6/15/2016	1.0 U	0.85 J	1.0	1.0 U	1.0 U	0.61 J	-	-	-	550	200	3,100	14.0	-	-	-	-	6.38	2.56	-87.6	2.118	11.48	11.23
Area 1	G6M-04-09X	11/9/2016	1.0 U	1.0 U	0.67 J	1.0 U	1.0 U	0.56 J	-	-	-	430	160	2,600	-	-	-	-	-	7.32	0.52	-139.7	1.277	21.7	8.53
Area 1	G6M-04-11X	9/20/2004	8.5	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.54	3.42	374.7	0.782	16.8	14.39
Area 1	G6M-04-11X	9/26/2005	7.8	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.96	5.14	94.6	0.39	8.7	10.63
Area 1	G6M-04-11X	9/20/2006	4.0	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.24	6	129	0.38	5.99	14.35
Area 1	G6M-04-11X	9/11/2007	2.1	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.87	6.59	46.5	0.38	14.8	11.82
Area 1	G6M-04-11X	10/17/2008	1.4	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.53	5.62	98.1	0.302	3.5	9.54
Area 1	G6M-04-11X	10/16/2009	1.1	53	1U	1U	1U	1U	-	-	-	-	-	-	-	-	-	-	-	6.46	7.04	176	0.225	4.2	9.76
Area 1	G6M-04-11X	10/8/2010	0.41J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.71	6.95	152.6	0.247	3.15	9.59
Area 1	G6M-04-11X	10/6/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.77	2.5	87.7	0.219	4.0	10.61
Area 1	G6M-04-11X	10/16/2012	0.62	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.36	9.4	161.8	0.224	0	10.14
Area 1	G6M-04-11X	10/31/2014	0.54	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.88	7.12	167.7	0.163	0.91	10.43
Area 1	G6M-04-11X	11/10/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-	-	6.65	6.67	25.6	0.167	1.18	10.28
Area 1	G6M-04-12X	9/20/2004	310	7.5	56	2U	1U	2U	-	-	-	5U	1.0	44	-	-	-	-	-	11.03	0.86	102.6	2.003	5.22	9.63
Area 1	G6M-04-12X	9/26/2005	250	6.8	49	2U	1U	2U	-	-	-	15	1U	360	-	-	-	-	-	8.41	1.05	234.2	1.961	1.65	-
Area 1	G6M-04-12X	9/18/2006	470	9.4	60	2U	1U	2U	-	-	-	6.5	0.10U	550	-	-	-	-	-	7.21	3.22	253.5	1.764	7.11	12.69
Area 1	G6M-04-12X	9/10/2007	350	11	50	2U	1U	2U	-	-	-	2U	0.1U	580	-	-	-	-	-	6.84	1.73	90.2	2.613	29.8	12.19
Area 1	G6M-04-12X	10/16/2008	360	7.7J	35	10U	10U	10U	-	-	-	3.1J	0.2U	360	-	-	-	-	-	7.23	1.45	91.2	2.623	2.00	12.44
Area 1	G6M-04-12X	10/19/2009	170	22U	28	10U	10U	10U	-	-	-	2.3J	0.2U	308	-	-	-	-	-	6.72	1.8	66.7	2.543	5.91	11.5
Area 1	G6M-04-12X	10/8/2010	100	4.4	22	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	336	-	-	-	-	-	6.57	1.75	208.0	3.632	2.35	10.62
Area 1	G6M-04-12X	6/9/2011	180	3.9	19	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	209	-	-	-	-	-	7.26	1.38	25.6	2.816	9	10.24
Area 1	G6M-04-12X	10/4/2011	280	4.6	27	4.0U	4.0U	4.0U	-	-	-	5U	0.1U	200	-	-	-	-	-	6.62	1.06	63.8	2.332	2.44	13.35

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 1	G6M-04-12X	5/9/2012	160	5.0U	12	5.0U	5.0U	5.0U	-	-	-	4.1J	0.1U	155	-	-	-	-	-	6.7	1.34	85.1	2.68	1.42	12.32
Area 1	G6M-04-12X	10/16/2012	120	5.0U	14	5.0U	5.0U	5.0U	-	-	-	5U	0.1U	156	-	-	-	-	-	6.6	2.11	62.5	3.799	2.03	12.96
Area 1	G6M-04-12X	5/22/2013	220	3.4J	18	5.0U	5.0U	5.0U	-	-	-	3.8J	0.1U	92.5	-	-	-	-	-	6.55	0.87	120.8	2.927	2.58	12.5
Area 1	G6M-04-12X	10/22/2013	190	3.7J	23	4.0U	4.0U	4.0U	-	-	-	5U	0.1U	106	-	-	-	-	-	6.58	1.6	133.7	2.231	4.88	12.27
Area 1	G6M-04-12X	6/10/2014	130	2.7	13	0.50U	0.50U	0.50U	-	-	-	5U	0.1U	75	-	-	-	-	-	6.59	0.84	178.9	2.675	13.04	14.4
Area 1	G6M-04-15X	9/21/2004	5.2	2U	5.3	2U	1U	2U	-	-	-	5U	4.8	8,100	-	-	-	-	-	5.26	0.82	410	2.64	0.23	11.25
Area 1	G6M-04-15X	9/28/2005	9.1	2U	6.4	2U	1U	2U	-	-	-	33	1.8	4,400	-	-	-	-	-	5.11	0.39	248.1	0.674	0.29	11.78
Area 1	G6M-04-15X	9/20/2006	3.5	2U	5.2	2U	1U	2U	-	-	-	20	2.0	4,300	-	-	-	-	-	4.60	1.07	-100.3	1.555	0.95	11.07
Area 1	G6M-04-15X	9/11/2007	2.7	2U	2U	2U	1U	2U	-	-	-	18	0.75	2,100	-	-	-	-	-	6.21	3.21	85.1	1.353	3.5	11.29
Area 1	G6M-04-15X	10/17/2008	4.8	1.0	2.3	0.5U	0.5U	0.5U	-	-	-	36.3	3.01	3,010	-	-	-	-	-	6.34	1.5	-8.1	0.910	4.0	11.1
Area 1	G6M-04-15X	10/19/2009	1.9	14	3.2	0.5U	0.5U	0.5U	-	-	-	48.9	4.8	3,130	-	-	-	-	-	6.19	0.31	24.4	0.799	4.68	11.1
Area 1	G6M-04-15X	10/8/2010	0.65	0.34J	3.2	0.5U	0.5U	0.5U	-	-	-	59.1	4.76	2,900	-	-	-	-	-	6.14	0.3	3.2	0.704	1.34	10.85
Area 1	G6M-04-15X	10/6/2011	0.52	0.5U	3.7	0.5U	0.5U	0.5U	-	-	-	55.5	3.75	3,470	-	-	-	-	-	6.12	0.05	37.3	0.446	4.89	19.25
Area 1	G6M-04-15X	10/16/2012	1.0	0.5U	3.9	0.5U	0.5U	0.5U	-	-	-	111	11.1	4,300	-	-	-	-	-	6.15	0.49	-48.6	0.76	1.08	14.33
Area 1	G6M-04-15X	10/18/2013	0.97	0.27J	2.2	0.5U	0.5U	0.5U	-	-	-	112	14.5	3,530	-	-	-	-	-	5.68	0.24	14.1	0.838	1.33	18.79
Area 1	G6M-04-15X	11/4/2014	1.60	0.29J	2.2	0.5U	0.5U	0.5U	-	-	-	135	33.4	14,000	-	-	-	-	-	6.08	0.14	-16	1.937	3.61	12.98
Area 1	G6M-04-15X	10/14/2015	0.76 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	103	45.0	21,200	-	-	-	-	-	5.93	0.69	-38.2	4.011	1.24	13.62
Area 1	G6M-04-15X	11/10/2016	1.0 U	0.95 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	55	16	14,000	-	-	-	-	-	4.64	0.5	-21.4	2.929	4.6	13.9
Area 1	G6M-04-22X	9/21/2004	900	24	110	2U	1U	2U	-	-	-	5U	1U	990	-	-	-	-	-	6.30	4.78	192.2	0.897	19	13.17
Area 1	G6M-04-22X	9/28/2005	210	6.8	45	2.5	1U	2U	-	-	-	5U	1U	120	-	-	-	-	-	5.52	6.13	391.3	0.757	21	14.07
Area 1	G6M-04-22X	9/20/2006	200	8.7	54	2U	1U	2U	-	-	-	5U	0.43	4,500	-	-	-	-	-	5.68	2.8	197.8	1.048	6.98	15.37
Area 1	G6M-04-22X	9/11/2007	95	12	75	2U	1U	9.4	-	-	-	390	250	44,000	-	-	-	-	-	6.92	0.28	-160.8	2.25	20.7	13.43
Area 1	G6M-04-22X	10/17/2008	18	3.7	53	0.44J	1U	26	-	-	-	439	421	15,900	-	-	-	-	-	6.34	0.28	-106.1	2.104	18	12.88
Area 1	G6M-04-22X	10/19/2009	7.2	9.7	16	0.5U	0.5U	4.9	-	-	-	320	355	9,360	-	-	-	-	-	6.26	1.27	-48.7	2.181	290	14.32
Area 1	G6M-04-22X	10/8/2010	0.39J	2.2	7.1	0.23J	0.5U	4.7	-	-	-	522	210	3,020	-	-	-	-	-	6.32	2.51	-59.7	1.691	22.2	14.77
Area 1	G6M-04-22X	10/6/2011	0.5U	0.5U	13	0.5U	0.5U	7.5	-	-	-	534	232	15,800	-	-	-	-	-	6.25	0.39	-53.4	0.016	6.47	12.2
Area 1	G6M-04-22X	10/12/2012	0.5U	0.5U	5.7	0.5U	0.5U	6.6	-	-	-	657	162	9,080	-	-	-	-	-	6.41	0.6	-66.8	1.701	8.66	12.39
Area 1	G6M-04-22X	10/18/2013	-	-	-	-	-	-	-	-	-	767	-	-	-	-	-	-	-	6.12	0.29	-68.7	1.113	14.3	12.78
Area 1	G6M-04-22X	11/4/2014	0.5U	0.5U	2.0	0.72	0.5U	4.6	-	-	-	667	150	1,600	-	-	-	-	-	6.39	0.2	-64	0.951	42.9	13.26
Area 1	G6M-04-22X	10/13/2015	-	-	-	-	-	-	-	-	-	223	-	-	-	-	-	-	-	-	-	-	-	-	-
Area 1	G6M-04-22X	11/9/2016	2.5	1.4	1.2	1.0 U	1.0 U	1.0 U	-	-	-	650	150	960	-	-	-	-	-	6.92	1.22	-73.1	0.74	55.5	7.02
Area 1	G6M-04-31X	9/21/2004	1,600	2U	4.2	2U	1U	2U	-	-	-	5U	1U	190	-	-	-	-	-	5.69	5.1	211	1	2.99	13.27
Area 1	G6M-04-31X	9/28/2005	1,900	5U	5.2	5U	5U	5U	-	-	-	5U	1U	35	-	-	-	-	-	5.63	3.66	305.4	0.388	2.2	9.28
Area 1	G6M-04-31X	9/20/2006	600	6.1	2.5	2U	1U	2U	-	-	-	5U	0.10U	15U	-	-	-	-	-	6.52	0.28	-108.5	0.729	3.56	9.22
Area 1	G6M-04-31X	9/11/2007	340	260	330	2.8	1.3	2U	-	-	-	5U	0.1	890	-	-	-	-	-	6.38	5.61	101.6	0.217	6.9	10.90
Area 1	G6M-04-31X	10/17/2008	110	72	340	20U	20U	730	-	-	-	103	68.4	9,710	-	-	-	-	-	6.43	2	-72.7	0.636	9.0	9.42
Area 1	G6M-04-31X	10/21/2009	86	11	270	10U	10U	560	-	-	-	311	181	16,900	-	-	-	-	-	5.82	1.96	-102.01	0.626	6.23	10.26
Area 1	G6M-04-31X	10/8/2010	3.1	1.1	7.4	0.30J	0.5U	31	-	-	-	428	127	9,620	-	-	-	-	-	6.41	0.93	-107.6	0.728	1.21	9.54
Area 1	G6M-04-31X	10/6/2011	18	5.3	38	0.5U	0.5U	37	-	-	-	635	223	15,800	-	-	-	-	-	6.62	0.07	-112.4	1.333	2.89	11.23
Area 1	G6M-04-31X	10/12/2012	25	31	61	2.0U	2.0U	72	-	-	-	556	181	8,940	-	-	-	-	-	6.62	0.43	-104.6	1.193	4.58	11.36
Area 1	G6M-04-31X	10/18/2013	-	-	-	-	-	-	-	-	-	498	-	-	-	-	-	-	-	6.36	1.71	-87.6	1.656	1.13	10.83
Area 1	G6M-04-31X	11/4/2014	0.5U	0.51	6.9	0.23J	0.5U	3.4	-	-	-	468	121	9,690	-	-	-	-	-	6.51	0.12	-95.5	1.775	9.01	11.58
Area 1	G6M-04-31X	10/13/2015	-	-	-	-	-	-	-	-	-	420	-	-	-	-	-	-	-	5.93	0.84	-144.3	3.98	9.80	8.97
Area 1	G6M-04-31X	11/10/2016	1.0 U	0.95 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	430	-	-	-	-	-	-	-	6.15	0.89	-95.8	2.49	2.95	14.11
Area 1	G6M-13-05X	1/30/2014	250	10U	16	10U	10U	10U	-	-	-	-	-	-	-	-	-	-	-	8.63	0.37	-86.6	1.112	3.09	11.35
Area 1	G6M-13-05X	6/10/2014	1,200	12	70	0.40J	0.54	0.50U	-	-	-	10.7	0.299 J	556	-	-	-	-	-	7.65	0.46	-107	0.515	8.19	11.34
Area 1	G6M-13-05X	11/4/2014	1,700	13J	77	32U	32U	32U	-	-	-	6.6	0.233	565	-	-	-	-	-	7.43	0.47	-93.6	0.417	9.73	18.31
Area 1	G6M-13-05X	6/16/2015	1,520	12	62	0.50 U	0.50 U	0.50 U	-	-	-	5.20	0.05 U	229	-	-	-	-	-	7.04	1.63	57.0	0.398	33.2	12.71
Area 1	G6M-13-05X	10/13/2015	1,120	11	63	1.0 U	1.0 U	1.0 U	-	-	-	2.3 J	0.10 U	235	-	-	-	-	-	7.22	0.99	59.5	0.525	2.14	11.23
Area 1	G6M-13-05X	2/10/2016	770	5.2 J	24	10 U	10 U	10 U	10 U	10 U	10 U	4.0 U	0.10 U	199	1.0 U	25	1.4	10 U	2.0 U	6.2	4.39	244.6	0.523	20.2	9.67
Area 1	G6M-13-05X	6/15/2016	1,200	9.6	50	10 U	10 U	10 U	-	-	-	3.0	0.022 J	130	-	-	-	-	-	6.41	0.89	55.2	0.582	2.59	12.33

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 1	G6M-13-05X	11/10/2016	830	7.2 J	31	10 U	10 U	10 U	-	-	-	3.0 U	0.05 U	54	-	-	-	-	-	6.57	2.63	20.9	0.404	2.47	9.16
Area 1	G6M-95-20X	10/16/2001	4.4	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.90	7.2	212	0.27	4.1	11.2
Area 1	G6M-95-20X	2/25/2002	5.0	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.59	12.37	155.7	0.171	7.67	11.53
Area 1	G6M-95-20X	2/27/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7	-	-	-	-	-	-	-	10.42
Area 1	G6M-95-20X	9/21/2004	2.8	2U	2U	2U	1U	2U	-	-	-	5U	1U	15U	-	-	-	-	-	5.76	8.88	205.5	0.544	0	11.25
Area 1	G6M-95-20X	9/26/2005	2.3	2U	2U	2U	1U	2U	-	-	-	5U	1U	15U	-	-	-	-	-	5.62	8.75	328.7	0.741	0.95	11.42
Area 1	G6M-95-20X	9/19/2006	2.2	2U	42	2U	1U	2U	-	-	-	71	350	39,000	-	-	-	-	-	6.31	0.76	-108	2.715	4.19	12.17
Area 1	G6M-95-20X	9/12/2007	2U	2U	11	2U	1U	2U	-	-	-	160	110	15,000	-	-	-	-	-	6.49	3.19	-114.3	0.74	73.7	12.6
Area 1	G6M-95-20X	10/15/2008	0.38J	0.2J	2.5	0.5U	0.5U	0.5U	-	-	-	97.2	45.6	5,250	-	-	-	-	-	6.45	0.49	-104.4	0.511	4.2	9.54
Area 1	G6M-95-20X	10/16/2009	0.5U	37J	3.1	0.5U	0.5U	0.5U	-	-	-	166	206	7,660	-	-	-	-	-	6.61	0.29	-81.4	0.898	8.81	13.42
Area 1	G6M-95-20X	10/6/2010	0.5U	0.5U	5.1	0.5U	0.5U	1.8	-	-	-	149	546	12,200	-	-	-	-	-	6.49	0.11	-124.3	2.047	36.6	14.15
Area 1	G6M-95-20X	10/7/2011	0.5U	0.5U	1.5	0.5U	0.5U	0.5U	-	-	-	108	57.8	3,610	-	-	-	-	-	6.59	0.10	-112.9	0.234	4.0	14.3
Area 1	G6M-95-20X	10/15/2012	0.5U	0.5U	1.0	0.5U	0.5U	0.5U	-	-	-	112	67.9	3,140	-	-	-	-	-	6.58	0.60	-98.2	0.526	4.83	12.73
Area 1	G6M-95-20X	10/18/2013	0.5U	0.29J	0.59	0.5U	0.5U	0.5U	-	-	-	79.9	30	1,760	-	-	-	-	-	6.56	0.18	-79.5	0.41	3.37	12.63
Area 1	G6M-95-20X	10/31/2014	2.7	0.53	0.5U	0.5U	0.5U	0.5U	-	-	-	7.9	20.3	1,160	-	-	-	-	-	6.59	0.16	-105.1	0.688	4.03	10.88
Area 1	G6M-95-20X	10/13/2015	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	32.2	110	614	-	-	-	-	-	6.61	0.55	-55	0.722	2.86	12.15
Area 1	G6M-95-20X	11/8/2016	0.82 J	1.0	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	26	14	940	-	-	-	-	-	4.99	0.54	-5.6	0.799	7.04	13.62
Area 1	G6M-96-13B	10/15/2001	3,600	39	220	12	1U	1.1J	-	-	-	-	-	-	-	-	-	-	-	6.10	2.9	219	0.12	6.8	12.55
Area 1	G6M-96-13B	2/25/2002	5,200	34	200	1.4J	1U	1.5J	-	-	-	-	-	-	-	-	-	-	-	6.40	3.85	181.5	1.142	6.59	13.56
Area 1	G6M-96-13B	1/31/2003	3,800	31	190	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.13
Area 1	G6M-96-13B	9/20/2004	4,500	35	210	2U	1U	2.1	0.022	0.12	1.7	5U	1	15U	1U	38	5.4J	19	2.0	6.30	3.57	186.4	1.035	0.5	11.41
Area 1	G6M-96-13B	12/13/2004	2,500	24	150	2U	1U	2U	0.05	0.025	24	5U	1U	23	5U	35	5.0	31M	2U	6.26	2.57	316.5	0.787	2.68	12.51
Area 1	G6M-96-13B	3/28/2005	4,500	200U	180J	200U	200U	200U	0.17	0.22	37	5U	2.6M	1,600	5.7	47	0.46	17	2UJ	6.24	0.87	21.2	0.943	0.68	10.08
Area 1	G6M-96-13B	8/10/2005	2,800	190	1,500	3.6	4.8	6.8	0.15	0.44	2.9	32	24J	8,100	140	98.9	0.23	4.6	5.3	4.35	0.16	-35.6	0.838	3.5	-
Area 1	G6M-96-13B	9/26/2005	3,700	140	570	5U	5U	5U	0.054	0.33	18	44	51J	12,000	200	134	0.28	11	11	4.98	1.32	-45.9	1.071	4.54	13.5
Area 1	G6M-96-13B	12/13/2005	3,400	130	350	10U	5U	10U	0.069	0.35	31	46.3	63J	12,100	140	150	0.05U	11	4.5	5.51	0.13	-52.1	0.851	0.9	16.38
Area 1	G6M-96-13B	3/20/2006	2,100	250	400	2U	1.2	2.5	0.036	0.42	97	38	96	17,000	360	300	0.207	6.77	2.4	5.68	0.17	-161.5	0.759	7.1	15.13
Area 1	G6M-96-13B	6/20/2006	1,900	280	370	2U	1U	3.5	0.044	0.27	200	48J	100	16,000	110	310	0.2U	4.21	4.8	5.46	0.62	-86.8	1.252	2.63	13.27
Area 1	G6M-96-13B	9/18/2006	880	370	530	2U	1.3	9.4	0.022J	0.43	2,400	150	110	20,000	300	370	0.262	4.56	3.0	6.14	0.48	-120.9	1.555	2.19	12.5
Area 1	G6M-96-13B	12/11/2006	830	340	620	2U	1.6	7.3	0.020J	0.047	9,000	190	130	27,000	360	-	-	6.06	1.2	6.28	14.07	-260	1.93	2.1	11.04
Area 1	G6M-96-13B	3/27/2007	940	290	590	2.6	2.1	26	0.025U	0.96	22,000	250	230	35,000J	140	-	-	4.3	1.6	5.71	0.1	-16.8	1.861	1.79	12.5
Area 1	G6M-96-13B	6/11/2007	1,200	280	610	2U	1.7	55	0.025U	0.68	22,000	200	200	15U	260	-	-	8.17	2.2	6.24	0.15	-97.5	1.87	1322	12.04
Area 1	G6M-96-13B	9/10/2007	2,600	130J	590	2U	1.6	38	0.036	6.3	32,000	240	210	25,000	270	410	0.2U	580	2.8	6.25	0.4	-136.3	1.866	15.5	12.96
Area 1	G6M-96-13B	12/11/2007	750	99	830	2U	1.5	110	0.005J	3.6	26,000	260	230	25,000	240	-	-	429	2.4	6.11	1.92	-25.7	1.907	8.0	11.98
Area 1	G6M-96-13B	3/10/2008	1,200	140	1,000	2U	1.7	140	0.025U	8.3	29,000	240	240	26,000	210	-	-	5U	2.0	6.18	1.55	-90.2	1.958	6.4	11.33
Area 1	G6M-96-13B	10/15/2008	7.3J	6.5J	490	10U	10U	350	1.2U	5.7	9,700	172	290	39,500	91.8U	470	0.13U	21	0.03UJ	6.19	0.90	-59.2	2.046	11	12.96
Area 1	G6M-96-13B	5/7/2009	190	75	310	10U	10U	95	1.2U	13	46,000	169	323	38,600	74	740J	0.13U	32	0.03U	6.09	0.10	-97.6	1.909	4.0	10.53
Area 1	G6M-96-13B	10/19/2009	440	140	290	10U	10U	89	1.2U	9.2	52,000	173	325	36,000	54	630	0.022U	53	0.041	6.32	1.53	-93.1	2.054	13.6	-
Area 1	G6M-96-13B	4/21/2010	93	29	100	2.0U	2.0U	57	1.3U	15	37,000	217	400J	39,100	130	610	0.13U	0.71J	0.041	6.21	0.13	18.2	2.496	10.99	-
Area 1	G6M-96-13B	10/6/2010	360	150	150	1.5	0.70	65	1.2U	18	96,000	222	366	37,500	57	95	0.045J	1.1J	0.03U	6.19	0.22	-103.4	2.547	12.9	12.34
Area 1	G6M-96-13B	6/9/2011	740	90	270	1.9	1.4	86	3.7	44	110,000	242	304	25,100	75	300	0.023J	0.49J	0.03U	6.22	0.09	-112	2.126	13.1	11.49
Area 1	G6M-96-13B	10/4/2011	160	24	79	8.0U	8.0U	43	1.2U	1.5U	98,000	284	335	25,300	73	620	0.13U	0.35J	0.03U	6.36	0.02	-77.8	1.733	20	10.82
Area 1	G6M-96-13B	5/9/2012	130	47	150	5.0U	5.0U	38	44	100	29,000	298	231	16,600	51	500	0.13U	0.58J	0.13	6.47	1.7	-89.7	1.68	12.1	16.85
Area 1	G6M-96-13B	10/11/2012	130	48	130	5.0U	5.0U	76	81	190	62,000	282	209	17,100	38	480	0.13U	5.0U	0.14	6.26	0.44	-66.4	2.335	7.09	10.87
Area 1	G6M-96-13B	5/22/2013	170	55	230	2.7J	5.0U	100	1.1U	86	23,000	395	241	18,600	29	540J	0.13U	5.0U	0.12J	6.23	0.15	-84.3	2.27	13	9.71
Area 1	G6M-96-13B	10/17/2013	78	38	200	4.0U	4.0U	170	2.4	36	18,000	365	234	17,600	37	560	0.13U	5.0U	0.058	6.46	0.15	-113.1	1.728	17.3	10.91
Area 1	G6M-96-25B	10/15/2001	360	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.81	5.3	142	0.498	3.9	12
Area 1	G6M-96-25B	2/25/2002	130	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.70	11.51	158.5	0.15	9.75	13.7
Area 1	G6M-96-25B	2/27/2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	-	-	-	-	-	-	-	13.8
Area 1	G6M-96-25B	1/31/2003	52	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
Area 1	G6M-96-25B	9/20/2004	56	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	4.98	7.63	593	0.589	0.0	13.7

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 1	G6M-96-25B	9/26/2005	40	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.82	6.74	314.1	0.587	1.1	17
Area 1	G6M-96-25B	9/19/2006	44	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.20	7.64	223.5	0.496	1.46	12.2
Area 1	G6M-96-25B	9/11/2007	16	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.91	6.29	96.6	0.802	9.5	16.3
Area 1	G6M-96-25B	10/17/2008	1.7	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.80	8.41	89.7	0.151	4.0	14.5
Area 1	G6M-96-25B	10/16/2009	1.9	38J	0.5UJ	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.27	8.08	183.5	0.404	4.7	10.5
Area 1	G6M-96-25B	10/8/2010	3.1	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	5.80	6.70	190.2	0.622	1.59	16.3
Area 1	G6M-96-25B	10/6/2011	0.58	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.85	8.11	69.8	0.131	4.5	16.8
Area 1	G6M-96-25B	10/16/2012	2.0	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	5.87	7.09	181.7	0.572	7.76	12.7
Area 1/FDSA	G6M-02-08X	5/17/2002	2,300	35	250	2U	1U	5.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.04
Area 1/FDSA	G6M-02-08X	1/31/2003	3,600	46	480	2.3	1U	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.98
Area 1/FDSA	G6M-04-08X	9/24/2004	4.2	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.29	0.81	-75.5	0.632	52.8	15.68
Area 1/FDSA	G6M-02-08X	3/31/2005	1,300	38J	250	50U	50U	50U	0.049	0.79	1.2	5U	0.3J	770	15	62	1.1	6.2	2U	7.08	9.1	-50	0.563	24.6	9.64
Area 1/FDSA	G6M-02-08X	7/5/2005	1,000	130	1,800	12U	12U	12U	0.16	0.22	3	33	110	29,000	450	350	0.05U	3.7	8.3	4.23	1.66	19.1	1.616	4.72	14.95
Area 1/FDSA	G6M-02-08X	9/27/2005	560	26	1,300	1U	1.8	2.5	0.11	0.25	21	270	310J	75U	1,200	466	0.05U	320J	16	5.03	0.33	-68.6	1.965	3.16	18.79
Area 1/FDSA	G6M-02-08X	12/16/2005	300	24	1,200	4U	2U	4U	0.19	0.36	2.1	4.4B	350J	15U	1,500	520	0.05U	57	9.4	5.46	0.03	-31.4	1.999	66.4	9.72
Area 1/FDSA	G6M-02-08X	3/21/2006	180	25	1,300	2U	2.1	2.3	0.084	0.24	15	80	470	40,000	3,000	1,400	1U	245	14	5.46	0.33	-62.5	2.45	6.98	15.04
Area 1/FDSA	G6M-02-08X	6/21/2006	230	30	850	2U	1U	2U	0.14	0.23	19	100	970	44,000	5,700	1,800	1.67	759	40	4.80	1.32	-25.2	4.528	45.4	12.38
Area 1/FDSA	G6M-02-08X	9/20/2006	150	25	1,300	2U	1.6	2U	0.072	0.14	11	77	860	29,000	4,400	1,000	2U	655	16	5.20	1.57	-14.4	4.503	53.4	19.59
Area 1/FDSA	G6M-02-08X	12/12/2006	140	28	910	2U	1.1	2U	0.18	0.17	30	73	1,000	32,000	6,400	-	-	13.6	110	4.93	0.67	-38.3	6.436	108.6	7.42
Area 1/FDSA	G6M-02-08X	3/28/2007	60	14	500	2U	1U	2U	0.31	0.14	62	72	1,200	30,000J	7,200	-	-	1,170	80	4.46	0.21	-144.5	7.243	60.9	11.74
Area 1/FDSA	G6M-02-08X	6/13/2007	110	8.4	420	2U	1U	2U	0.092	0.11	180	130	1,200	33,000	6,800	-	-	1,160	82	4.70	1.78	24.1	6.948	1328.4	9.25
Area 1/FDSA	G6M-02-08X	9/13/2007	140	74	1,400	2U	1U	2U	0.22	0.17	120	410	1,100	37,000	4,400	3,000	0.2U	890	200	5.34	2.68	-150.5	6.823	28.2	11.52
Area 1/FDSA	G6M-02-08X	12/10/2007	250	66	1,100	2U	2.0	3.3	0.14	0.23	240	360	1,200	42,000	7,700	-	-	414	120	5.17	0.15	-115.7	7.569	10.8	11.11
Area 1/FDSA	G6M-02-08X	3/10/2008	32	5.5	170	2U	1U	2U	0.36	0.15	280	570	970	20,000	11,000	-	-	770	16	4.28	0.5	-55.7	7.828	13.8	15.4
Area 1/FDSA	G6M-02-08X	10/6/2008	49	4.5J	81	5U	5U	5U	6.3U	7.9U	3,000	103J	598	7,630	4,190	1,800	0.13U	610	0.75UJ	4.52	-0.12	-25.9	4.495	65	12.25
Area 1/FDSA	G6M-02-08X	1/21/2009	29	18U	39	11U	14U	11U	1.2U	1.5U	3,400	76	474J	6,650	2,900J	3,000	0.13U	710	0.39	4.76	0.15	39.2	3.739	46.4	13.10
Area 1/FDSA	G6M-02-08X	5/7/2009	25	20U	29	20U	20U	20U	1.3U	5.8	3,500	53.2	356	5,130	3,000	550J	0.092J	410	0.053	3.97	0.4	71.4	3.538	15.4	14.96
Area 1/FDSA	G6M-02-08X	10/20/2009	0.5U	0.5U	0.31J	0.5U	0.5U	0.5U	1.3U	1.6U	2,300J	70.6	486	6,840	2,300	40	1.3U	440	0.3UJ	4.61	1.88	79.4	3.973	20.1	12.49
Area 1/FDSA	G6M-02-08X	4/21/2010	11J	2.0UJ	75J	2.0UJ	2.0UJ	2.0UJ	1.3U	1.6U	4,400	98.9	447 J	8,720	3,400	40	1.3U	130	0.28	4.49	0.10	28.2	3.353	22.3	11.07
Area 1/FDSA	G6M-02-08X	10/7/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	27,000	73.4	381	8,080	2,400	860	2.6U	100	0.095	4.47	0.33	58.0	3.209	4.33	12.69
Area 1/FDSA	G6M-02-08X	6/9/2011	13	0.5U	140	0.5U	0.5U	1.6	1.2U	1.5U	83,000	155	473	14,000	2,800	1,100	6.5U	99J	0.38	4.64	0.11	18.9	2.968	11	11.14
Area 1/FDSA	G6M-02-08X	10/4/2011	8.0U	8.0U	210	8.0U	8.0U	8.0U	1.2U	1.5U	28,000	194	491	15,900	2,400	230	0.13U	86	0.091	4.81	0.02	18.1	2.376	4.99	13.73
Area 1/FDSA	G6M-02-08X	5/10/2012	9.8	8.0U	270	8.0U	8.0U	8.0U	1.2U	1.5U	14,000	184	581	19,000	1,900	730	0.13U	64	1.8	5.16	0.21	-9.9	3.338	3.29	11.46
Area 1/FDSA	G6M-02-08X	10/15/2012	12	4.0U	270	4.0U	4.0U	6.2	1.2U	1.5U	3,600	121	523	20,300	1,800	900	0.080J	37	0.096	4.85	0.32	-1.0	2.915	3.76	10.42
Area 1/FDSA	G6M-02-08X	5/23/2013	20	8.0U	510	8.0U	8.0U	24	1.2U	1.5U	11,000	160	460	18,200	1,600	610	0.041J	5.3	3.5J	4.88	0.10	9.4	2.618	4.01	-
Area 1/FDSA	G6M-02-08X	10/22/2013	13U	13U	500	13U	13U	51	3.6	84	40,000	200	428	15,400	1,100	630	0.13U	8.9	3.8	5.23	0.27	1.1	1.308	10.8	8.2
Area 1/FDSA	G6M-02-08X	6/12/2014	12	1.5	400	0.5U	0.7	140	1.3UJ	1.6UJ	9,400	241	420	10,100	670	700J	0.13U	1.0J	0.03U	5.23	0.21	11.2	2.023	6.68	16.6
Area 1/FDSA	G6M-02-08X	11/3/2014	8.3	5U	260	5U	5U	44	4.4	7.7	26,000	258	461	10,400	1,400	590	0.13U	0.96J	0.03U	5.28	0.12	-33.6	0.994	33.6	15
Area 1/FDSA	G6M-02-08X	6/16/2015	10 U	10 U	98.8	10 U	10 U	10 U	10 U	10 U	1,410	318	455	10,200	1,020	582	0.15	8.6 J	1.0 U	5.43	2.94	43.0	1.476	110	13.62
Area 1/FDSA	G6M-02-08X	9/9/2015	20 U	20 U	83.8	20 U	20 U	20 U	10 U	10 U	10,600	340	428	8,780	976	-	0.078 J	15.8	4.80	5.59	0.07	-39.2	1.337	12.0	13.71
Area 1/FDSA	G6M-02-08X	10/13/2015	20 U	21 U	83.5	21 U	21 U	21 U	10 U	10 U	18,400	320	483	9,410	1280	526	0.11 U	7.1 J	2.0 U	5.02	0.33	0.4	1.689	47.8	9.80
Area 1/FDSA	G6M-02-08X	2/10/2016	2.9	2.0 U	49.0	2.0 U	2.0 U	4.7	10 U	10 U	14,500	272	1,150	12,100	3,110	879	0.10 J	5.3 J	2.0 U	4.89	0.47	52.6	2.906	17.2	10.44
Area 1/FDSA	G6M-02-08X	6/14/2016	10 U	10 U	35.0	10 U	10 U	10 U	2.80	1.0 UJ	19,000	220	1,200	8,000	2,600	1,200	0.05 U	1.3	1.0 U	5.21	0.33	29.1	3.37	10.71	16.41
Area 1/FDSA	G6M-02-08X	11/10/2016	4.3	1.0 U	27	1.0 U	1.0 U	2.1	1.1 U	1.0 U	11,000	230	880	8,600	2,100	1,000	0.053 J	0.58 J	7.0	5.27	0.77	-0.9	1.37	9.44	8.3
Area 1/FDSA	G6M-03-02X	5/12/2003	1,300	2U	4.4	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.92
Area 1/FDSA	G6M-03-02X	10/11/2004	690	2U	5.6	2U	1U	2U	0.051	0.03	2.6	5U	1U	17	1U	12	3.7	20	1.7J	6.29	8.25	97.4	0.321	12.1	8.83
Area 1/FDSA	G6M-03-02X	12/15/2004	200	2U	5	2U	1U	2U	0.056	0.063	3.4	5U	1U	610	390	29	2.4	30	2U	5.86	1.75	-132.9	0.382	1.93	12.75
Area 1/FDSA	G6M-03-02X	3/29/2005	340	20U	14J	20U	10U	20U	0.15	0.34	5.1	640	140	49,000	1,300	366	0.2U	230	6.7J	5.23	0.65	-20.1	1.654	28.7	15.46
Area 1/FDSA	G6M-03-02X	6/29/2005	190	11	91	2.5U	2.5U	2.5U	0.29	0.65	43	130	220J	35,000J	1,200	431	0.05U	74	11	4.62	1.13	2.9	1.723	29.1	15.57
Area 1/FDSA	G6M-03-02X	9/29/2005	57	7.8	190	2.5U	2.5U	2.5U	0.2	0.29	560	150	260J	37,000	850	345	0.05U	62	16	4.94	0.53	-73.7	1.752	23.8	11.33
Area 1/FDSA	G6M-03-02X	12/15/2005	39	8U	190	8U	4U	8U	0.17	0.26	4,300	146	290J	38,000	1,100	550	0.05U	66	16	5.42	4.55	13.9	1.65	19.7	12.12

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 1/FDSA	G6M-03-02X	3/21/2006	17	2U	140	2U	1U	2U	0.016J	0.14	6,700	140	320	37,000	1,400	1,200	2U	88.4	8.8	5.56	0.16	-47.7	1.731	17.3	13.35
Area 1/FDSA	G6M-03-02X	6/21/2006	8.2	2U	160	2U	1U	2U	0.044	0.12	10,000	240	410	23,000	1,300	1,000	1U	120	9.6	3.21	0.89	140.1	2.428	11.6	10.08
Area 1/FDSA	G6M-03-02X	9/20/2006	9.7	2.3	230	2U	1U	2U	0.05	0.2	8,700	200	440	21,000	1,300	570	1U	115	8.4	5.55	0.71	-27.8	2.029	13.7	11.46
Area 1/FDSA	G6M-03-02X	12/12/2006	6.9	2U	180	2U	1U	2U	0.047	0.16	6,800	170	350	11,000	890	-	-	53	8.0	5.85	1.31	-43.1	2.326	26.7	12.11
Area 1/FDSA	G6M-03-02X	3/28/2007	13	2.2	320	2U	1U	2U	0.033	0.11	9,800	230	470	14,000J	920	-	-	74.5	9.2	5.38	0.17	-62.3	2.523	14.9	12.75
Area 1/FDSA	G6M-03-02X	6/12/2007	11	2U	650	2U	1.4	17	0.025U	0.14	21,000	200	360	10,000	840	-	-	39	8.4	5.77	0.38	-59.3	2.268	39.5	12
Area 1/FDSA	G6M-03-02X	9/12/2007	12	2.1	800	2U	1U	81	0.006J	0.6	17,000	230	350	12,000	740	790	0.2U	580	20	5.44	10.26	-122.8	2.156	18.1	12.29
Area 1/FDSA	G6M-03-02X	12/10/2007	3.8	2U	720	2U	1.8	94	0.005J	1.4	14,000	290	390	29,000	1,000	-	-	24.7	7.0	5.67	6.03	-80.2	2.802	5.3	12.33
Area 1/FDSA	G6M-03-02X	3/10/2008	2U	2U	590	2U	1.8	50	0.098	3.4	11,000	320	410	100,000	2,000	-	-	50U	4.8	5.47	0.51	-55.9	3.113	24.5	11.74
Area 1/FDSA	G6M-03-02X	10/15/2008	5U	5U	260	5U	5U	27	1.2U	10	12,000	193	366	108,000	454	860	0.13U	59	0.03UJ	5.6	0.75	-28.1	2.376	15	11
Area 1/FDSA	G6M-03-02X	5/7/2009	4.0U	4.0U	220	4.0U	4.0U	12	1.2U	18	23,000	188	396	56,700	900	1,100J	0.13U	44	0.03U	5.45	0.32	-46.7	1.962	4.81	11.27
Area 1/FDSA	G6M-03-02X	10/19/2009	10U	20U	290	10U	10U	9.5J	1.3U	14	18,000	205	423	43,400	290	920	0.13U	300	0.03U	5.99	2.56	-44.2	1.832	11.9	-
Area 1/FDSA	G6M-03-02X	4/21/2010	2.0UJ	2.0UJ	120J	2.0UJ	2.0UJ	9.3J	1.3U	16	16,000	189	566J	39,600	1,200	1,000	0.13U	0.28J	0.03U	5.85	0.29	18.9	1.902	7.28	18.13
Area 1/FDSA	G6M-03-02X	10/6/2010	0.5U	0.5U	3.2	0.5U	0.5U	0.42J	1.2U	20	35,000	118	580	36,100	810	1,100	0.29	0.40J	0.03U	5.65	0.57	-21.1	2.137	5.47	13.03
Area 1/FDSA	G6M-03-02X	10/4/2011	13U	13U	410	13U	13U	30	1.2U	63	47,000	379	352	12,400	190	3,300	0.13U	0.51J	0.035	6.32	0.09	-86.1	1.14	13	16.73
Area 1/FDSA	G6M-03-02X	10/11/2012	2.0U	2.0U	59	2.0U	2.0U	34	1.2U	540	39,000	270	295	10,200	140	500	0.051J	5.0U	0.49	6.13	0.46	-68.9	1.31	9.5	23.98
Area 1/FDSA	G6M-03-02X	10/22/2013	1.3U	1.3U	44	1.3U	1.3U	36	1.2U	200	44,000	296	212	6,750	57	300	0.13U	5.0U	0.19	6.24	0.41	-68.8	0.609	9.19	17.97
Area 1/FDSA	G6M-03-02X	10/30/2014	0.5U	0.27J	6.6	0.5U	0.5U	6.3	1.2U	12	38,000	254	251	6,090	340	450	0.13U	0.23J	0.03U	6.45	0.33	-61.7	0.82	13.6	10.2
Area 1/FDSA	G6M-03-02X	10/13/2015	1.0 U	1.0 U	6.0	1.0 U	1.0 U	5.30	10 U	10 U	17,600	168	116	3,540	33.0	156	0.062 J	10.2	2.0 U	5.85	0.39	-86.6	0.679	23.1	13.10
Area 1/FDSA	G6M-03-02X	11/10/2016	1.0 U	0.54 J	18	1.0 U	1.0 U	6.4	1.1 U	1.0 U	17,000	180	260	3,900	120	300	0.05 U	0.44 J	1.9	6.21	0.25	-57	0.73	8.87	9.15
Area 1/FDSA	G6M-03-04X	10/21/2009	4.2U	4.0U	81	4.0U	4.0U	4.1	-	-	-	-	-	-	-	-	-	-	-	6.04	0.7	-99.6	0.635	24.5	19.6
Area 1/FDSA	G6M-03-04X	10/16/2012	0.5U	0.5U	0.5U	0.5U	0.5U	1.3	-	-	-	-	-	-	-	-	-	-	-	6.79	0.7	-123	0.622	80.4	22.98
Area 1/FDSA	G6M-04-10A	9/20/2004	2,900	2.5	3.4	2U	1U	2U	0.021	0.03	1.1	5U	1	170	1U	41	4.5J	22	2	5.91	3.75	206.5	0.552	1.7	10.79
Area 1/FDSA	G6M-04-10A	12/14/2004	2,400	2U	2U	2U	1U	2U	0.015	0.096	1500	5U	1U	120	5U	25	1.7	13	2U	5.89	2.81	215.4	0.965	2.04	9.62
Area 1/FDSA	G6M-04-10A	3/30/2005	640	40U	40U	40U	40U	40U	0.33	0.07	1.4	8.4	1.2	8,100	52	107	0.33	16	2U	5.90	4.22	68.3	1.01	1.76	10.99
Area 1/FDSA	G6M-04-10A	8/11/2005	380	45	390	2U	2U	2U	0.24	0.23	3.4	77	87J	50,000J	240	359	.05U	7.8	1U	5.65	1.84	11.9	0.977	14.9	10.06
Area 1/FDSA	G6M-04-10A	9/27/2005	340	88	260	1U	1U	1U	0.08	0.15	110	190	230J	76,000	330	442	0.084	3.0J	5.9	6.33	1.89	-1.9	1.135	4.3	10.77
Area 1/FDSA	G6M-04-10A	12/14/2005	1,500	180	220	2U	1U	2U	0.048	0.13	6,800	179	250J	32,500	370	480	0.05U	3.7	7.4	6.41	1.57	-64.8	0.985	1.9	10.24
Area 1/FDSA	G6M-04-10A	3/21/2006	4,400	180	450	2U	1U	8.3	0.025U	0.69	20,000	180	220	8,100	180	390	0.2U	4.08	2	6.72	0.27	-121.4	0.676	7.51	9.75
Area 1/FDSA	G6M-04-10A	6/20/2006	6,100	650	330	2U	1U	27	0.025U	0.12	16,000	160	220	5,700	120	340	0.2U	4.32	3.2	6.34	0.22	-99.8	0.893	9.82	10.97
Area 1/FDSA	G6M-04-10A	9/19/2006	1,000	15	59	2U	1U	14	0.23	0.11	11,000	170	97	5,000	61	150	0.311	5.2	1.2	6.56	1.14	-86.9	0.43	6.0	14.64
Area 1/FDSA	G6M-04-10A	12/13/2006	450	37	860	2U	1.2	76	0.025U	0.12	22,000	150	96	4,800	73	-	-	1.82	1.6	6.91	0.14	-111	0.662	27.3	6.31
Area 1/FDSA	G6M-04-10A	3/28/2007	1,200J	230J	680J	2U	1.6J	60J	0.65	0.26	20,000	380	260	27,000J	130	-	-	2.07	1U	6.1	0.19	-89.9	1.188	15.4	11.18
Area 1/FDSA	G6M-04-10A	6/12/2007	760	140	900	2U	2.1	130	0.54	1.1	23,000	310	260	15,000	190	-	-	1U	2.4	6.58	0.19	-145.2	1.295	128.5	15.77
Area 1/FDSA	G6M-04-10A	9/11/2007	2,700	99J	400	2U	1U	91	0.35	0.47	18,000	240	290	13,000	220	440	0.2U	54	2.4	6.42	1.72	-138.2	0.864	42.3	13.97
Area 1/FDSA	G6M-04-10A	12/11/2007	830	8.8	280	2U	1U	90	0.3	0.52	31,000	330	280	12,000	270	-	-	3.57	3.0	6.4	1.2	-70.1	1.366	8.0	10.09
Area 1/FDSA	G6M-04-10A	3/10/2008	200	830	670	3.4	1.8	37	0.34	0.61	25,000	340	230	35,000	210	-	-	10	2.2	6.53	0.94	-123.8	1.362	24	9.82
Area 1/FDSA	G6M-04-10A	10/6/2008	4,000	450	990	100U	100U	1,400	1.3U	11	16,000	247	187	9,100	34	210	0.13U	12	0.03UJ	6.38	0.21	-168	0.948	15	15.25
Area 1/FDSA	G6M-04-10A	1/21/2009	1,500	390	1,400	1,100U	0.67J	1,200	1.2U	9.6	53,000	250	234J	7.8	46J	20U	0.13U	20	0.03UJ	6.6	0.2	-112.6	0.937	7.02	14.25
Area 1/FDSA	G6M-04-10A	5/7/2009	380	41	390J	10U	10U	420	1.2U	11	34,000	292	194	17,200	49	590J	0.13U	24	0.03U	6.4	0.8	-125	1.165	4.2	11.25
Area 1/FDSA	G6M-04-10A	10/20/2009	2,700	290	2,100	50U	50U	1,400	1.3U	15	11,000	220	127	8,960	21	350	0.13U	8.7	0.03U	6.42	0.17	-121.4	0.805	11.43	12.63
Area 1/FDSA	G6M-04-10A	4/21/2010	170	21	170	4.0U	4.0U	130	1.3U	15	21,000J	286	297J	18,200J	120	670	0.017J	0.65J	0.03U	6.58	0.70	-139.5	0.880	7.00	14.71
Area 1/FDSA	G6M-04-10A	10/6/2010	25	10J	600	20U	20U	190	1.2U	14	51,000	296	119	4,280	26	260	0.13U	0.98J	0.03U	6.32	0.17	-85.2	0.694	6.24	13.56
Area 1/FDSA	G6M-04-10A	6/9/2011	110	36	300	0.5U	0.5U	170	1.2U	5.7	92,000	295	198	9,140	63	660	0.13U	1.2J	0.03U	6.4	0.39	-105.1	1.243	5.1	10.45
Area 1/FDSA	G6M-04-10A	10/4/2011	850	170	1,100	40U	40U	270	1.2U	74	36,000	322	304	17,600	160	750	0.13U	1.1J	0.22	6.07	0.21	-94	0.629	8.18	8.25
Area 1/FDSA	G6M-04-10A	5/10/2012	180	120	610	20U	20U	200	1.1U	250	46,000	367	183	6,700	16	340	0.13U	0.70J	0.10	6.49	0.48	-107.7	0.71	9.05	10.96
Area 1/FDSA	G6M-04-10A	10/15/2012	2.0U	2.0U	26	2.0U	2.0U	110	1.2U	44	14,000	291	185	8,250	64	340	0.092J	5.0U	0.13J	6.43	0.6	-103.7	0.92	5.5	10.36
Area 1/FDSA	G6M-04-10A	5/23/2013	0.5U	0.5U	13	0.53	0.5U	15	1.2U	1.5U	18,000	342	400	7,110	200	650	0.11J	0.84J	0.1J	6.37	1.3	-84.4	1.311	11	10.6
Area 1/FDSA	G6M-04-10A	10/17/2013	360J	92J	130J	10U	10U	14J	1.2U	9.4	24,000J	292	341	5,000	150	650	0.13U	1.1J	0.034J	6.37	0.29	-95.5	1.756	9.78	10.48
Area 1/FDSA	G6M-04-10A	6/12/2014	0.5U	0.23J	1.4	0.5U	0.5U	5.1	2.2J	1.6UJ	9,500J	264	164	3,730	29	200J	0.13U	17	0.03U	6.36	0.59	-82.7	1.761	10.93	10.89
Area 1/FDSA	G6M-04-10A	11/3/2014	0.5U	0.5U	0.92	0.5U	0.5U	4.4	1.2U	3.6J	21,000	288	184	2,100	34	240	0.13U	16J	0.03U	6.62	0.15	-136.9	1.742	16.98	11.17

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 1/FDSA	G6M-04-10A	6/19/2015	0.50 U	0.50 U	0.50 J	0.50 U	0.50 U	5.00	5.0 U	5.0 U	7,510	274	145	1,940	18.3	278	0.11 U	21.70	1.0 U	6.62	0.51	-94.6	2.201	8.06	10.47
Area 1/FDSA	G6M-04-10A	10/13/2015	1.0 U	1.0 U	0.73 J	1.0 U	1.0 U	1.60	10 U	10 U	15,000	292	205	2,260	26.7	241	0.099 J	8.6 J	2.0 U	6.52	0.09	110.6	2.267	17	11.96
Area 1/FDSA	G6M-04-10A	6/14/2016	1.0 U	0.64 J	1.1	1.0 U	1.0 U	4.0	1.1 U	1.0 UJ	13,000	220	82	1,700	10.0	190	0.05 U	7.3	1.0 U	5.94	0.23	-66.6	1.878	7.73	11.89
Area 1/FDSA	G6M-04-10A	11/9/2016	1.0 U	0.49 J	0.96 J	1.0 U	1.0 U	1.40	1.1 U	1.0 U	7,100	220	92	3,200	5.5	86	0.05 U	17	1.5	6.50	0.37	-96.9	1.44	5.27	8.47
Area 1/FDSA	G6M-04-10X	9/20/2004	70	7.5	32	2U	1U	2U	0.019	0.039	1.0	5U	1.0	260	1U	11	6.7J	21	3.4	5.59	6.87	246.2	0.902	0.95	10.24
Area 1/FDSA	G6M-04-10X	12/14/2004	65	7.8	35	2U	1U	2U	0.022	0.053	2.2	5U	1U	200	5U	10U	6.6	23	2U	5.40	7.57	424.2	0.816	5.5	16.22
Area 1/FDSA	G6M-04-10X	3/31/2005	56	6.8	30	2U	2U	2U	0.022	0.86	1.1	5U	1U	190	0.4J	10U	1.5	25	2U	5.18	7.65	256.7	1.337	0.41	13.05
Area 1/FDSA	G6M-04-10X	7/1/2005	50	5.4	23	2U	1U	2U	0.035	0.05	12	4.2	1UJ	10U	5.9	43.5	1.7	12	1U	5.33	6.09	265.2	1.502	0.90	17.5
Area 1/FDSA	G6M-04-10X	9/27/2005	48	4.7	23	2U	1U	2U	0.010J	0.018J	16	5U	1U	170	4	7.7	1.4	26	1U	5.26	6.68	450.9	1.123	0.50	14.74
Area 1/FDSA	G6M-04-10X	12/14/2005	67	6.3	27	2U	1U	2U	0.016J	0.034	11	5U	1U	164	5U	9.8	1.5	28	1U	5.49	6.78	205.1	1.032	3.40	10.78
Area 1/FDSA	G6M-04-10X	3/22/2006	76	9.1J	32	2U	1U	2U	0.015J	0.025J	25	5U	.1U	200	5.6	10U	1.44	23.6	1U	5.57	6.74	195.7	0.94	1.45	10.62
Area 1/FDSA	G6M-04-10X	6/20/2006	87	10	47	2U	1U	2U	0.013J	0.012J	18	5U	0.1U	240	5U	10U	1.69	25.2	1U	5.08	6.23	248.8	1.512	1.9	10.93
Area 1/FDSA	G6M-04-10X	9/19/2006	65	6.8	32	2U	1U	2U	0.026	0.025J	13	5U	0.10U	240	2.2J	8.0	1.27	22.2	1U	5.21	6.94	273.9	1.66	4.68	12.18
Area 1/FDSA	G6M-04-10X	12/13/2006	64	7.2	35	2U	1U	2U	0.008J	0.011J	28	5U	0.1U	280	5U	-	-	27	1U	5.38	7.9	39.3	2.16	0.59	11.34
Area 1/FDSA	G6M-04-10X	3/28/2007	56	5.9	26	2U	1U	2U	0.017J	0.054	21	5U	0.21	290J	5U	-	-	27.9	1U	5.21	6.37	77.9	1.947	3.71	10.56
Area 1/FDSA	G6M-04-10X	6/12/2007	28	2.4	9.9	2U	1U	2U	0.010J	0.065	18	5U	0.1U	250	5U	-	-	31.2	1U	5.35	6.31	230.7	3.15	14	15.88
Area 1/FDSA	G6M-04-10X	9/11/2007	35	3.4	13	2U	1U	2U	0.008J	0.010J	13	6U	0.1U	270	5U	10U	1.4	2000	1U	5.29	8.98	-40.6	2.617	10.5	14.25
Area 1/FDSA	G6M-04-10X	12/11/2007	20	2U	6.4	2U	1U	2U	0.010J	0.028	5.3	5U	0.1U	230	5U	-	-	34.7	1U	5.46	5.62	27.7	3.66	2.8	14.5
Area 1/FDSA	G6M-04-10X	3/11/2008	22	2.1	9.7	2U	1U	2U	0.004J	0.010J	4.1	5U	0.16	250	5U	-	-	28	1U	4.99	6.42	213.5	2.89	0	13.63
Area 1/FDSA	G6M-04-10X	10/15/2008	18	1.6	8.4	0.5U	0.5U	0.5U	1.2U	1.5U	6.1	8.0U	0.2U	265	10U	30	1.4	27	0.03U	5.28	6.58	247.1	3.339	1.4	11.75
Area 1/FDSA	G6M-04-10X	5/7/2009	15	1.2	5	0.5U	0.5U	0.5U	1.3U	1.6U	0.76	8.0U	0.2U	213	10U	20UJ	1.2	33	0.03U	5.20	5.86	196.8	2.229	1.53	11.22
Area 1/FDSA	G6M-04-10X	10/20/2009	9.8	4.8	5.2	0.5U	0.5U	0.27J	1.3U	1.6U	19	8U	0.139U	197	10U	20U	1.1	29	0.03U	5.20	5.72	226.2	2.651	2.68	11.56
Area 1/FDSA	G6M-04-10X	4/21/2010	24	1.5	6.5	0.5U	0.5U	0.5U	1.3U	1.6U	87	5.0U	0.1U	200	10U	25	1.4	31	0.03U	5.26	5.13	187.2	2.760	4.00	14.4
Area 1/FDSA	G6M-04-10X	10/6/2010	24	1.8	7.9	0.5U	0.5U	0.5U	1.2U	1.5U	3.7	5U	0.1U	208	10U	25	1.8	28	0.03U	5.18	5.63	225.7	2.937	0.00	12.4
Area 1/FDSA	G6M-04-10X	10/4/2011	9.0	0.5U	1.9	0.5U	0.5U	0.5U	1.2U	1.5U	47	5U	0.1U	173	4.5J	20U	1.3	28	0.03U	5.01	4.46	192.8	1.078	1.16	11.3
Area 1/FDSA	G6M-04-10X	10/15/2012	15	0.72	1.9	0.5U	0.5U	0.5U	1.2U	1.5U	32	5U	0.103U	224	10U	20U	1.2	35	0.03U	5.53	5.25	204	3.135	0.33	12.88
Area 1/FDSA	G6M-04-10X	10/17/2013	6.2	0.28J	0.5J	0.5U	0.5U	0.5U	1.2U	1.5U	5,500	3.3J	1.27	262	2.7J	20U	0.95	37	0.03U	5.32	3.9	164.1	4.698	2.89	13.02
Area 1/FDSA	G6M-04-10X	11/3/2014	7.4	0.27J	0.47J	0.5U	0.5U	0.5U	1.2U	1.5U	200	2.5U	1.32	308	5U	20U	1.3J	30J	0.03U	5.27	5.28	148.4	2.562	0.97	12.55
Area 1/FDSA	G6M-04-10X	9/9/2015	2.8	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	5.0 U	2.0 U	0.114	383	0.81 U	-	0.92	34.7	1.0 U	5.38	3.32	169.9	2.257	4.98	13.13
Area 1/FDSA	G6M-04-10X	10/13/2015	3.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	344	1.0 U	7.2	1.10	35.4	2.0 U	5.31	2.86	202.1	3.174	28.5	12.33
Area 1/FDSA	G6M-04-10X	2/9/2016	2.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	6.9 J	4.0 U	0.053 J	274	1.0 U	7.1	0.91	35.1	2.0 U	5.49	2.49	196.7	1.922	19.3	8.62
Area 1/FDSA	G6M-04-10X	6/14/2016	3.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.3	5.1 J	27	3.0 U	0.073	330	0.63 J	9.4	1.0	35.0	1.0 U	5.72	1.77	102.1	3.364	0.96	11.60
Area 1/FDSA	G6M-04-10X	11/9/2016	2.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	170	3.0 U	0.036 J	420	0.72 J	10	0.58	32	2.2	5.70	0.76	67.9	1.546	4.27	9.16
Area 1/FDSA	G6M-04-13X	9/21/2004	8.0	2U	2U	2U	1U	2U	-	-	-	5U	1U	350	-	-	-	-	-	5.96	8	551.8	0.138	1.75	16.01
Area 1/FDSA	G6M-04-13X	9/26/2005	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	15U	-	-	-	-	-	6.43	10.5	180	0.042	3.8	17.24
Area 1/FDSA	G6M-04-13X	9/18/2006	2U	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	15U	-	-	-	-	-	5.65	8.63	213.9	0.076	12.1	13.33
Area 1/FDSA	G6M-04-13X	9/12/2007	2U	2U	2U	2U	1U	2U	-	-	-	5U	0.1U	15U	-	-	-	-	-	6.07	8.7	147.4	140	14.1	13.36
Area 1/FDSA	G6M-04-13X	10/17/2008	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	50U	-	-	-	-	-	5.22	9.98	124.4	0.046	45	10.56
Area 1/FDSA	G6M-04-13X	10/20/2009	25U	16J	25U	25U	25U	25U	-	-	-	2J	0.132U	50U	-	-	-	-	-	5.78	10.61	283.7	0.049	12.2	11.05
Area 1/FDSA	G6M-04-13X	10/7/2010	0.29J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.102U	25U	-	-	-	-	-	5.83	8.84	147.3	0.048	2.87	10.33
Area 1/FDSA	G6M-04-13X	10/4/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	14.0J	-	-	-	-	-	5.54	9.15	208.7	0.024	13.5	11.43
Area 1/FDSA	G6M-04-13X	10/16/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	5.1J	-	-	-	-	-	6.28	9.95	108.1	0.047	17.2	11.11
Area 1/FDSA	G6M-04-13X	10/22/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	5.92	10.69	120.9	0.021	45.6	10.28
Area 1/FDSA	G6M-04-13X	11/3/2014	0.36J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.0247U	7.5U	-	-	-	-	-	6.23	6.38	147.6	0.029	35.2	15.24
Area 1/FDSA	G6M-04-13X	10/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	15 U	-	-	-	-	-	6.85	8.83	114.7	0.045	1.07	14.69
Area 1/FDSA	G6M-04-13X	11/10/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	3.0 U	-	-	-	-	-	6.13	8.22	-8.8	0.027	2.69	6.8
Area 1/FDSA	G6M-07-02X	12/12/2007	50	2U	2U	2U	1U	2U	0.024J	0.022J	0.73	5U	0.1U	64	5U	-	-	16.2	1U	5.9	7.54	194.2	0.148	5.4	9.8
Area 1/FDSA	G6M-07-02X	3/11/2008	1,800	2U	2U	2U	1U	2U	0.014J	0.019J	7.1	5U	0.1U	35	5U	-	-	26	1U	5.7	7.5	165.5	0.108	0	10.96
Area 1/FDSA	G6M-07-02X	10/15/2008	170	5.0U	5.0U	5.0U	5.0U	5.0U	1.2U	10	12,000	5.5J	0.2U	21.2J	10U	20U	0.13U	11	0.030UJ	5.34	9.25	93.2	0.067	19	10.69
Area 1/FDSA	G6M-07-02X	5/11/2009	46	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	7	7.1	0.2U	5.8J	5.7J	20U	0.062	8.6J	0.030UJ	6.17	9.4	115.7	0.055	4	11.27
Area 1/FDSA	G6M-07-02X	10/20/2009	30J	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	6.2J	6.6	0.2U	50U	10U	20U	0.13U	7.2	0.03UJ	6	9.34	128.9	0.053	9.35	14.5
Area 1/FDSA	G6M-07-02X	4/21/2010	63	2U	2U	2U	2U	2U	1.2U	1.5U	3,200	6.2	0.176U	25U	10U	30	0.0098J	6.8	0.03U	6.10	0.33	139.3	0.034	12	16.26

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 1/FDSA	G6M-07-02X	10/6/2010	26J	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	28	3.4J	0.1U	25U	10U	32	0.21	5.6	0.03U	5.31	6.13	170	0.053	5.48	12.95
Area 1/FDSA	G6M-07-02X	10/4/2011	700	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	46,000	4.6J	0.1U	79.8	10U	31	0.13U	4.4J	0.03U	5.17	0.09	176.5	0.045	8.2	10.89
Area 1/FDSA	G6M-07-02X	10/11/2012	90	190	6.4	5.0U	5.0U	5.0U	1.2U	1.5U	46,000J	5U	0.286	40.1	10U	20U	0.056J	6.4	0.03U	6.28	1.60	76.1	0.068	11.31	19.81
Area 1/FDSA	G6M-07-02X	10/17/2013	1,000	8.7J	20U	20U	20U	20U	1.2U	1.5U	520J	5U	0.1U	31.7	10U	21	0.13U	4.5J	0.03U	6.03	4.25	143	0.060	1.17	20.19
Area 1/FDSA	G6M-07-02X	11/3/2014	14,000	40J	31J	50U	50U	50U	1.2U	1.5U	6,200	2.2J	0.421J	43.3	5U	22	0.13U	4.2J	0.03U	5.85	0.23	70.2	0.040	12.1	9.22
Area 1/FDSA	G6M-07-02X	12/11/2014	6,200	57	50U	50U	50U	50U	-	-	-	-	-	-	-	-	-	-	-	5.39	0.51	218.1	0.098	0.85	7.38
Area 1/FDSA	G6M-07-02X	10/13/2015	482	13.0	1.0 U	3.1 J	1.0 U	1.0 U	10 U	10 U	3,200 J	4.0 U	0.303	32.8	1.0 U	10.3	0.11 U	10.2	2.0 U	5.86	0.27	59.3	0.055	5.95	15.55
Area 1/FDSA	G6M-07-02X	6/14/2016	1,400	10 J	20 U	20 U	20 U	20 U	1.1 U	1.0 UJ	970	3.0 U	0.110	37	1.2	12	0.05 U	6.6	1.0 U	5.56	1.86	94.3	0.06	0.92	10.27
Area 1/FDSA	G6M-07-02X	11/9/2016	3,200	20 U	20 U	20 U	20 U	20 U	1.1 U	1.0 U	100	3.0 U	0.10	41	0.93 J	15	0.062 J	6.0	1.0 U	5.91	1.18	39.5	0.042	2.63	8.23
Area 1/FDSA	G6M-13-06X	1/30/2014	3.9J	8U	300	8U	8U	95	-	-	-	-	-	-	-	-	-	-	-	6.61	0.33	-38.3	2.521	35.9	10.81
Area 1/FDSA	G6M-13-06X	6/12/2014	0.5U	0.44J	180	0.68	0.37J	330	1.3UJ	33J	18,000J	444	365	16,900	160	710J	0.13U	0.68J	0.03U	6.42	0.24	-88.9	1.71	13.7	19.03
Area 1/FDSA	G6M-13-06X	10/30/2014	0.5U	0.5U	14	0.7	0.5U	15	1.2U	63	79,000	558	274	12,500	42	580	0.13U	0.42J	0.03U	6.31	0.24	-99	1.943	20.1	18.31
Area 1/FDSA	G6M-13-06X	6/16/2015	0.50 U	0.50 U	3.9	0.98 J	0.50 U	6.0	10 U	27.3	10,300	546	246	16,900	54.5	510	0.15	1.0 J	1.0 U	6.25	0.11	-40.1	1.989	31.9	11.27
Area 1/FDSA	G6M-13-06X	9/9/2015	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	4.0 J	5.0 U	36.6	18,200	511	269	22,500	82.2		0.11	10 U	6.50	6.02	0.16	-53.6	1.745	4.09	12.15
Area 1/FDSA	G6M-13-06X	10/14/2015	5.0 U	5.0 U	3.2 J	5.0 U	5.0 U	5.0 U	10 U	30.2	11,300	531	260	21,300	61.5	434	0071 J	1.70	1.50	5.71	1.19	100.7	0.904	1.46	19.27
Area 1/FDSA	G6M-13-06X	2/9/2016	1.0 U	1.0 U	2.0	0.80 J	1.0 U	4.6	10 U	31.7	14,500	536	226	12,000	46.0	409	0.17	10 U	2.0 U	6.35	1.07	-23.7	1.204	3.69	7.11
Area 1/FDSA	G6M-13-06X	6/14/2016	1.0 U	1.0 U	1.9	0.59 J	1.0 U	4.2	1.1 U	41.0	13,000	490	280	18,000	150	640	0.05 UJ	0.8 UJ	1.0 U	6.40	0.57	-48.4	2.223	2.27	10.67
Area 1/FDSA	G6M-13-06X	11/8/2016	1.0 U	1.0 U	9.8	0.55 J	1.0 U	7.7	1.1 U	23	11,000	470	250	9,600	55	560	0.05 UJ	1.0 U	5.8	6.42	1.47	-127.3	1.23	4.72	8.19
Area 1/FDSA	G6M-93-13X	10/15/2001	0.55J	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.30	9.9	355	6	1.2	14.88
Area 1/FDSA	G6M-93-13X	9/20/2004	3.8	2U	2U	2U	1U	2U	0.0081	0.014	0.89	5U	1.0	15U	1U	23	1.3J	10	2.7J	6.14	13.07	250.7	0.059	4.31	12.36
Area 1/FDSA	G6M-93-13X	12/13/2004	2U	2U	2U	2U	1U	2U	0.005U	0.005U	3.8	5U	1U	15U	5U	20	1.2	9.6M	2U	6.16	10.41	192.5	0.08	1.42	14.8
Area 1/FDSA	G6M-93-13X	3/29/2005	2U	2U	2U	2U	1U	2U	0.0063	0.28	3.1	5U	1UM	15U	0.6J	22	0.2U	9.1	2U	6.24	10.4	97.3	0.09	0.64	15.91
Area 1/FDSA	G6M-93-13X	6/28/2005	2U	2U	2U	2U	1U	2U	0.023	0.02	9.4	2U	1U	10U	4.9	41.2	0.081	8.2	1U	11.30	11.43	146.1	0.275	2.46	13.31
Area 1/FDSA	G6M-93-13X	9/26/2005	2U	2U	2U	2U	1U	2U	0.006J	0.018J	4.9	5U	1U	15U	3.1	27	0.083	9.5	1U	6.04	7.98	191.8	0.126	18.2	15.19
Area 1/FDSA	G6M-93-13X	12/13/2005	2U	2U	2U	2U	1U	2U	0.008J	0.011J	9.3	5U	1U	15U	4.4J	41	3.4	9.4	1U	6.48	9.55	69.6	0.086	0.5	13.7
Area 1/FDSA	G6M-93-13X	3/21/2006	2U	2U	2U	2U	1U	2U	0.025U	0.046	9.5	5U	0.1U	19	6.8	24	0.2U	6.83	1U	6.87	9.55	-9.4	0.058	0.61	13
Area 1/FDSA	G6M-93-13X	6/19/2006	2U	2U	2U	2U	1U	2U	0.008J	0.008J	5.3	5U	0.1U	28	1.4J	46	0.2UH	4.42	1U	6.33	9.14	190.1	0.087	1.34	11.49
Area 1/FDSA	G6M-93-13X	9/18/2006	2U	2U	2U	2U	1U	2U	0.006J	0.014J	5	5U	0.10U	15U	4.6J	22	0.2U	7.76	1U	6.22	9.33	173.6	0.062	4.62	10.39
Area 1/FDSA	G6M-93-13X	12/11/2006	2U	2U	2U	2U	1U	2U	0.008J	0.038	11	5U	0.1U	15U	5U	-	-	6.55	1U	6.38	10.68	91.3	0.076	2.23	12.11
Area 1/FDSA	G6M-93-13X	3/28/2007	2U	2U	2U	2U	1U	2U	0.005J	0.014J	9.6	5U	0.1U	15U	5U*	-	-	5.74	1U	6.14	9.8	-3.1	0.071	8.73	12.58
Area 1/FDSA	G6M-93-13X	6/11/2007	2U	2U	2U	2U	1U	2U	0.034	0.3	13	5U	0.1U	15U	0.4J	-	-	8.96	1U	6.64	10.12	125.4	0.121	3.3	13.98
Area 1/FDSA	G6M-93-13X	9/11/2007	3.0	2U	2U	2U	1U	2U	0.005J	0.025U	2.8	6U	0.1U	15U	0.7J	99	0.2U	12	1U	6.31	9.67	96.7	0.095	7.1	12.44
Area 1/FDSA	G6M-93-13X	12/10/2007	2U	2U	2U	2U	1U	2U	0.004J	0.007J	1.1	5U	0.1U	15U	5U	-	-	6.92	1U	6.25	8.81	71	0.156	0.6	11.83
Area 1/FDSA	G6M-93-13X	3/10/2008	2U	2U	2U	2U	1U	2U	0.008J	0.05	10	5U	0.2	12,000	34	-	-	100	1U	6.3	3.84	141	0.953	0	16
Area 1/FDSA	G6M-93-13X	10/15/2008	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	5.6	8.0U	0.2U	3,270	10U	110	3.6	34	0.03UJ	6.31	2.97	116.4	0.304	0	15.24
Area 1/FDSA	G6M-93-13X	5/7/2009	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	2.2	3.5J	0.2U	50U	10U	67J	0.71	16	0.03U	6.26	6.1	79.6	0.164	1.1	-
Area 1/FDSA	G6M-93-13X	10/19/2009	0.5U	15	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	6	8U	0.142U	50U	10U	54	0.058J	9.2	0.03UJ	6.42	4.79	182	0.110	1.01	15.69
Area 1/FDSA	G6M-93-13X	4/21/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	440	5.0U	0.115U	25U	6.5J	140	0.13U	10	0.03U	6.19	9.03	37.3	0.109	0.00	15.22
Area 1/FDSA	G6M-93-13X	10/6/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	16	5U	0.1U	25U	10U	63	0.050J	11	0.03U	6.12	4.77	114	0.116	3.42	17.33
Area 1/FDSA	G6M-93-13X	9/9/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	207	-	-	0.11 U	49.6	2.0 U	6.02	0.16	-53.6	1.745	4.09	12.15
Area 1/FDSA	G6M-93-13X	2/9/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	12 J	2.2	85.7	0.11 U	73.4	2.0 U	6.21	1.64	232.3	0.35	10.7	8.96
Area 1/FDSA	G6M-93-13X	6/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.045 J	130	-	-	-	-	-	6.35	1.01	63.1	0.306	14.0	13.39
Area 1/FDSA	G6M-93-13X	11/8/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.15	230	-	-	-	-	-	6.47	0.91	-29.7	0.192	11.39	9.52
Area 1/FDSA	G6M-95-19X	10/15/2001	110	6.6	42	1.5J	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.46	6.24	202	2.87	8.5	9.84
Area 1/FDSA	G6M-95-19X	9/20/2004	41	2.9	16	2U	1U	2U	-	-	-	5U	1	210	-	-	-	-	-	5.45	7.92	467.5	4.17	3.1	14.08
Area 1/FDSA	G6M-95-19X	9/26/2005	21	2U	5.4	2U	1U	2U	-	-	-	8.3	1U	160	-	-	-	-	-	4.00	4.51	595.3	4.361	0.72	14.45
Area 1/FDSA	G6M-95-19X	9/19/2006	12	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	160	-	-	-	-	-	3.82	6.77	281	4.236	2.41	11.78
Area 1/FDSA	G6M-95-19X	9/12/2007	21	2U	4	2U	1U	2U	-	-	-	5U	0.1U	200	-	-	-	-	-	5.28	7.62	175.1	6.566	0.4	12.46
Area 1/FDSA	G6M-95-19X	10/15/2008	14J	0.39J	1.6J	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	212	-	-	-	-	-	5.35	6.63	267.9	5.306	0.9	12.15
Area 1/FDSA	G6M-95-19X	10/16/2009	20U	540	20U	20U	20U	20U	-	-	-	8U	0.2U	153	-	-	-	-	-	5.22	4.53	232	4.529	1.49	11.54
Area 1/FDSA	G6M-95-19X	1/15/2010	6.9	0.5U	0.46J	0.75U	0.75U	1.0U	-	-	-	-	-	-	-	-	-	-	-	5.46	4.09	243.8	4.733	2.17	10.45

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 1/FDSA	G6M-95-19X	10/7/2010	1.8	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	186	-	-	-	-	-	5.34	3.35	159.4	4.211	3.88	9.77
Area 1/FDSA	G6M-95-19X	10/7/2011	2.2	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	242	-	-	-	-	-	5.51	2.9	132.2	2.319	1.1	12.69
Area 1/FDSA	G6M-95-19X	10/15/2012	3.3	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	1,450	-	-	-	-	-	5.53	2.8	225.1	7.618	0.19	9.91
Area 1/FDSA	G6M-95-19X	10/18/2013	2.4	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	2,250	-	-	-	-	-	5.49	1.44	154.9	3.827	5.42	10.34
Area 1/FDSA	G6M-95-19X	11/3/2014	3.0	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.0847U	1,190	-	-	-	-	-	5.73	3.06	202.5	2.189	2.78	10.00
Area 1/FDSA	G6M-95-19X	10/14/2015	1.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	739	-	-	-	-	-	5.85	1.10	170.4	4.126	1.43	10.94
Area 1/FDSA	G6M-95-19X	11/8/2016	1.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	760	-	-	-	-	-	2.68	1.7	67.5	2.952	3.39	12.48
Area 2	G6M-02-01X	2/28/2002	11	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.91	4.7	66.6	0.624	14	13.53
Area 2	G6M-02-01X	9/23/2004	24	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.64	2.54	145	0.784	6.11	19.41
Area 2	G6M-02-01X	9/30/2005	110	2U	3.1	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.07	3.82	384.8	0.555	10.9	18.04
Area 2	G6M-02-01X	9/20/2006	1,300	12	91	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.19	3.68	-108.2	0.708	9.07	17.33
Area 2	G6M-02-01X	12/14/2006	1,600	18	120	2U	1U	2U	-	-	-	-	-	-	5U	-	-	-	-	6.54	3.64	-34.8	0.831	2.81	14.32
Area 2	G6M-02-01X	3/30/2007	1,700	19	120	2U	1U	2U	0.012J	0.081	-	5U	0.1U	120J	3.3J	-	-	9.43	1U	6.64	4.22	-35.3	0.8	0.78	14.06
Area 2	G6M-02-01X	6/14/2007	1,700	16	97	2U	1U	2U	-	-	-	-	-	-	1.9J	-	-	-	-	6.72	3.3	69.6	0.853	10.4	14.82
Area 2	G6M-02-01X	9/14/2007	1,900	24	150	2U	1U	2U	-	-	-	-	-	-		-	-	-	-	6.57	3.32	102.4	0.747	0.1	14.44
Area 2	G6M-02-01X	12/13/2007	1,600	21J	130J	2U	1U	2U	-	-	-	-	-	-	3.6J	-	-	-	-	6.61	2.73	128	0.807	0	12.57
Area 2	G6M-02-01X	3/14/2008	520	70	600	2U	2.2	2U	0.052	0.16	12	150	26	23000	180	-	-	5U	1U	6.45	0.38	-99.2	1.62	2.7	13.35
Area 2	G6M-02-01X	10/7/2008	180	49	360	10U	10U	10U	6.3U	9.5	5,000	141	14.5	5,880	17.7	200	0.13U	11	0.03UJ	6.97	0.18	-112.9	1.193	8.4	12.07
Area 2	G6M-02-01X	1/21/2009	280	76U	170	1.3U	1.2J	94U	1.3U	24	4,000	148	11,200J	4,500	11J	170	0.13U	7.0U	0.03U	7.13	0.39	-142.7	1.279	1.2	11.08
Area 2	G6M-02-01X	5/6/2009	610	190	100	10U	10U	54	1.2U	29	29,000	133	18.7	3,950	13	220J	0.059J	8.4	0.03U	6.69	0.2	-127.7	1.085	1.15	11.42
Area 2	G6M-02-01X	10/20/2009	820	180	76	40U	40U	47	1.3U	9	5,000J	108	11.8	2,470	4.6J	130	0.074J	7.6	0.03UJ	6.66	1.24	32.9	0.925	3.52	11.45
Area 2	G6M-02-01X	4/21/2010	37J	53J	95J	2U	2U	69J	1.3U	43	12,000J	164	20.5J	4,480	40	280J	0.024J	4.0J	0.03U	6.70	0.42	-122.0	1.180	1.60	11.63
Area 2	G6M-02-01X	10/6/2010	470	120	72	1.4	1.4	84	1.2U	49	25,000	133	13.7	3,050	10U	120	0.13U	5.2	0.03U	6.39	0.28	-77.8	1.039	3.65	12.53
Area 2	G6M-02-01X	6/9/2011	0.5U	4.3	11	0.69	0.5U	12	1.2U	230	71,000	173	45.9	7,380	90	400	0.11J	3.3J	0.03U	6.42	0.3	-86.3	1.423	0	14.56
Area 2	G6M-02-01X	10/5/2011	0.5U	0.88	3.6	0.5U	0.5U	7.3	1.2U	290	72,000J	271	27.3	5,470	18	190	0.13U	1.4J	0.03U	6.6	0.02	-106	0.681	0.87	12.53
Area 2	G6M-02-01X	5/9/2012	250	310	65	8.0U	8.0U	63	1.1U	260	41,000	271	10.8	2,050	2.3J	86	0.13U	6.8	0.081	6.66	0.07	-79.2	0.798	1.6	12.38
Area 2	G6M-02-01X	10/10/2012	350	120	75	10U	10U	160	1.2U	250	37,000J	220	10.4	2,080	10U	120 J	0.13U	6.5	0.36 J	6.64	0.5	-80.5	0.906	3.71	13.24
Area 2	G6M-02-01X	5/21/2013	0.25J	4.7	8.4	0.67	0.5U	5.2	1.2U	220	22,000	272	35.6	7,450	43	240J	0.13UJ	3.0J	0.076J	6.57	0.14	-91.7	1.439	0.71	14.22
Area 2	G6M-02-01X	10/17/2013	0.5U	2.4	11	0.58	0.5U	14	1.2U	450J	52,000	323	40.3	4,000	2.6J	140	0.13U	5.0U	0.078	6.66	0.22	-117.5	0.753	2.24	13.12
Area 2	G6M-02-01X	6/11/2014	0.5U	0.5U	1.4	0.5U	0.5U	2.6	1.3UJ	16J	5,300J	449	83.9J	4,260	9.5J	210J	0.13U	1.2U	0.030U	6.73	0.25	-103.1	1.174	4.68	13.08
Area 2	G6M-02-01X	10/30/2014	0.5U	0.21J	1.5	0.5U	0.5U	0.87	15	40	24,000	384	47.9	1,820	5U	86	0.13U	2.3J	0.03U	6.57	0.23	-130.8	0.959	1.81	12.73
Area 2	G6M-02-01X	6/17/2015	0.50 U	0.50 U	0.53 J	0.50 U	0.50 U	0.50 U	5.0 U	6.0 J	712	418	61.9	1,760	6.20	66.6	0.11 U	0.50 U	1.0 U	6.80	0.25	-91.1	0.671	8.45	13.66
Area 2	G6M-02-01X	9/10/2015	1.0 U	0.5 J	1.0 U	1.0 U	1.0 U	1.0 U	10 U	5.3 J	8,550	374	60.9	1,750	2.10	-	0.061 J	0.96 J	2.0 U	6.77	0.24	-110.5	0.807	0.81	16.00
Area 2	G6M-02-01X	10/16/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	14,200	360	56.2	1,750	2.14	54.6	0.11 U	1.1 J	2.0 U	6.86	0.11	-128.2	1.109	2.79	16.08
Area 2	G6M-02-01X	2/18/2016	1.0 U	1.0 U	0.89 J	1.0 U	1.0 U	0.53 J	10 U	10 U	12,500	347	52.5	2,420	6.8	155	0.10 U	1.5 J	2.0 U	7.01	0.8	31.9	1.659	3.95	10.29
Area 2	G6M-02-01X	6/13/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 UJ	22,000	450	100	2,700	7.7	150	0.021 J	0.8 U	1.0 U	6.87	0.21	-145.7	1.691	5.91	17.21
Area 2	G6M-02-01X	11/9/2016	1.0 U	1.0 U	0.69 J	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	18,000	430	62	2,100	3.1	140	0.05 U	1.0 U	1.8	6.92	0.23	-13.04	1.743	4.67	13.12
Area 2	G6M-04-01X	9/23/2004	250	3.6	21	2U	1U	2U	-	-	-	5U	1U	220	-	-	-	-	-	6.82	3.92	245.2	2.391	9.42	15.38
Area 2	G6M-04-01X	9/28/2005	140	2U	9.2	2U	1U	2U	-	-	-	5.1	1U	170	-	-	-	-	-	6.49	5.85	202.3	2.699	7.29	13.21
Area 2	G6M-04-01X	9/20/2006	150	2U	7.2	2U	1U	2U	-	-	-	5U	0.10U	220	-	-	-	-	-	5.87	4.88	-91.4	2.92	3.53	11.85
Area 2	G6M-04-01X	9/14/2007	290	2U	8.6	2U	1U	2U	-	-	-	6U	0.1U	130	-	-	-	-	-	6.00	5.21	155.3	2.055	35.8	12.16
Area 2	G6M-04-01X	10/20/2008	270J	11J	10UJ	10UJ	10UJ	10UJ	-	-	-	8UJ	0.2UJ	53.1J	-	-	-	-	-	7.32	3.37	96.2	0.999	3.5	17.25
Area 2	G6M-04-01X	10/20/2009	190	130	360	13U	13U	15	-	-	-	8U	0.107U	113	-	-	-	-	-	5.79	2.25	342.4	0.908	4.8	13.38
Area 2	G6M-04-01X	10/7/2010	27	19	120	0.68	0.29J	140	-	-	-	5U	1.05	164	-	-	-	-	-	6.14	0.29	124.3	1.312	1.55	11.53
Area 2	G6M-04-01X	10/5/2011	14	7.6	36	0.71	0.5U	160	-	-	-	3.7J	0.381	261	-	-	-	-	-	6.27	0.48	69.9	1.132	3.3	12.65
Area 2	G6M-04-01X	10/12/2012	5.5	4.0U	18	4.0U	4.0U	130	-	-	-	3.5 J	0.742	925	-	-	-	-	-	6.36	0.38	19.1	1.7	1.85	12.4
Area 2	G6M-04-01X	10/17/2013	0.5U	0.78	0.99	0.29J	0.5U	14	-	-	-	6.0	1.06	8,890	-	-	-	-	-	6.46	0.40	17.4	2.509	2.49	14.53
Area 2	G6M-04-01X	10/31/2014	0.39J	0.52	0.56	0.37J	0.5U	7.9	-	-	-	164	59.4	28,900	-	-	-	-	-	6.69	0.48	-95.3	1.85	19.6	13.34
Area 2	G6M-04-01X	9/10/2015	1.0 U	1.0 U	0.93 J	1.0 U	1.0 U	0.75 J	10 U	10 U	6,240	162	31.7	9,040	18.9	-	0.12	3.6 J	2.0 U	7.15	0.45	-152.7	1.880	41.6	15.91
Area 2	G6M-04-01X	10/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	382	96.4	24,400	-	-	-	-	-	6.78	0.10	-133.0	2.878	4.83	12.46
Area 2	G6M-04-01X	2/18/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	7,060	75.5	16.4	7460	11.8	411	0.10 U	13.8	2.0 U	6.68	1.67	182.6	1.624	6.39	9.49

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 2	G6M-04-01X	6/13/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	380	80.0	19,000	-	-	-	-	-	6.69	0.65	-120.3	3.639	17.6	17.67
Area 2	G6M-04-01X	11/9/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	320	95	19,000	-	-	-	-	-	6.76	0.42	-82	2.631	4.6	11.4
Area 2	G6M-04-03X	9/23/2004	440	2U	3.3	2U	1U	2U	0.22	0.036	100	5U	1U	3,100	1.4	53	5.1	23	2.2	6.37	3.41	446.5	1.236	12.2	12.85
Area 2	G6M-04-03X	9/27/2005	680	14	10	1U	1U	1U	0.19	0.32	52	5U	0.6J	3,500	6.0	81.5	0.35	38J	1U	6.29	0.79	377.5	1.361	9.62	12.87
Area 2	G6M-04-03X	9/22/2006	2,600	420	6.3	2U	1U	2U	0.049	0.3	17	5U	0.10U	2,900	7.2	190	0.2U	16.6	1U	6.30	0.43	152.1	0.524	3.52	15.12
Area 2	G6M-04-03X	9/14/2007	770	68	2.7	2U	1U	2U	0.062	0.11	3	38	0.87	2,300	1.6J	100	0.2U	24	1U	7.29	0.49	-110.3	0.294	3.6	14.18
Area 2	G6M-04-03X	10/16/2008	160	18	7.6	5U	5U	5U	1.3U	1.6U	6.2J	94.8	0.2U	930	10U	150J	0.10U	8.0	0.03U	10.48	2.01	18	0.539	5.8	14
Area 2	G6M-04-03X	10/15/2009	16	8.4	8.6	0.5U	0.5U	0.5U	1.3U	1.6U	2,000	148	2.02	3,270	10U	240	0.13U	7U	0.03U	8.80	1.49	-46.9	0.227	5.0	13.3
Area 2	G6M-04-03X	10/7/2010	300	52	94	0.62	0.25J	29	1.2U	3.5	29,000	133	5.47	3,910	10U	120	0.13U	4.8J	0.03U	6.67	2.47	-35.2	0.345	9.09	14.76
Area 2	G6M-04-03X	10/5/2011	7.3	1.8	7.5	0.5U	0.5U	4.6	1.2U	1.5U	29,000	72.9	0.19U	559	3.1J	130	0.13U	6.0	0.03U	10.63	0.49	6.3	0.307	0	12.74
Area 2	G6M-04-03X	10/10/2012	8.7	1.9	6.3	0.5U	0.5U	16	1.2U	170	38,000	65.8	0.261	1,320	10U	160	0.096J	8.0	0.03U	10.65	1.09	-18.4	0.556	6.84	13.84
Area 2	G6M-04-03X	10/17/2013	190	87	200	4U	4U	86	1.2U	270	51,000	31.6	32.7	8,450	2.5J	67	0.13U	8.6	0.03U	6.55	0.69	-77.3	0.583	28	15.41
Area 2	G6M-04-03X	10/30/2014	20	15	53	0.38J	0.5U	19	1.2U	17	6,700	14.4	0.29	114	4.7J	420	0.13U	7.5	0.03U	10.60	1.99	-70.1	1.152	24.3	13.53
Area 2	G6M-04-03X	9/11/2015	11	9.3	39.6	1.0 U	1.0 U	5.5	10 U	10 U	3,450	105	22.9	2,720	5.30	-	0.068 J	7.0 J	2.0 U	7.71	0.36	-194.0	1.079	11.6	14.60
Area 2	G6M-04-03X	10/14/2015	5.0	3.20	43.0	1.0 U	1.0 U	6.8	10 U	10 U	8,190	232	75.1	11,300	8.2	337	0.13 J	7.0 J	2.0 U	6.79	1.03	-68.4	1.208	9.64	12.80
Area 2	G6M-04-03X	2/18/2016	0.60 J	0.59 J	25.3	1.0 U	1.0 U	7.3	10 U	10 U	12,500	673	97.0	15,200	8.1	456	0.10 U	1.2 J	2.0 U	8.56	0.99	212.9	0.799	11.2	6.66
Area 2	G6M-04-03X	11/10/2016	1.0 U	0.65 J	5.8	1.0 U	1.0 U	4.1	1.1 U	25 J	20,000	380	110	31,000	9.8	390	0.05 U	2.2	1.0 U	6.47	0.43	-74.1	1.018	6.66	11.47
Area 2	G6M-97-08B	10/18/2001	92	6.1	36	1.6J	1U	2U	-	-	-	-	-	-	-	-	-	0	-	5.60	4.8	224	0.13	18	14.17
Area 2	G6M-97-08B	2/26/2002	100	5.9	32	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.87	5.13	186.4	1.157	5.3	12.77
Area 2	G6M-97-08B	9/22/2004	220	9.3	41	2U	1U	2U	0.0075	0.005U	1.3	5U	1U	26	1U	10U	6.1	12	1.5J	5.69	4.66	252.8	1.516	18.3	12.89
Area 2	G6M-97-08B	12/16/2004	200	7.7	41	2U	1U	2U	0.13	0.072	0.92	5U	1U	25	5U	10U	6.1	12	5.4	5.79	8.78	165	1.633	3.81	16.41
Area 2	G6M-97-08B	3/30/2005	95	3.4J	16	4U	2U	4U	0.015	0.032	0.54	5U	1U	21	0.4J	12	0.8	7	2U	5.58	8.06	202.8	0.999	9.42	15.56
Area 2	G6M-97-08B	6/28/2005	140	8	36	1.4	1U	2U	0.016	0.041	35	2U	1J	27	7.1	16.7	1.4	12	1U	11.30	4.94	173.7	1.506	8.16	13.88
Area 2	G6M-97-08B	9/27/2005	180	7.5	42	2U	1U	2U	0.013J	0.027	0.39	5U	1U	33	4.4	15.9	1.3	16	1U	5.60	5.73	319.2	1.713	2.82	13.47
Area 2	G6M-97-08B	12/12/2005	120	5.7	27	2U	1U	2U	0.04	0.11	26	5U	1U	28.1	0.6J	23	0.05UJ	13	1U	5.87	4.19	171.1	1.11	0.7	15.76
Area 2	G6M-97-08B	3/23/2006	240	8.8	44	2U	1U	2U	0.022J	0.13	12	5U	0.1U	46	5U	13	1.25	13.7	1U	5.85	5.13	181.5	1.44	3.16	14.21
Area 2	G6M-97-08B	6/21/2006	220	11	35	2U	1U	2U	0.019J	0.086	24	5U	0.17	1,300	16	66	0.809	13.5	1	5.90	2.39	141.1	2.015	1.48	-
Area 2	G6M-97-08B	9/19/2006	190	14	55	2U	1U	2U	0.078	0.13	18	130	21	13,000	270	300	0.2U	23.6	2.8	5.79	1.58	47.6	2.287	4.58	12.47
Area 2	G6M-97-08B	12/13/2006	200	11	75	2U	1U	2U	0.004J	0.038	1,700	160	83	20,000	440	-	-	49.6	2.8	6.07	1.43	-72.8	3.107	5.21	13.56
Area 2	G6M-97-08B	3/30/2007	200	8.5	46	2U	1U	2U	0.028	0.19	6,000	130	170	26,000J	620	-	-	126	4.6	5.36	0.46	14.8	3.626	1.13	12.47
Area 2	G6M-97-08B	6/14/2007	140	5.5	37	2U	1U	2U	0.025U	0.021J	7,900	100	370	24,000	760	-	-	120	6.4	5.66	1.68	-45.4	3.659	1.0	9.9
Area 2	G6M-97-08B	9/12/2007	170	8.4	43	2U	1U	3	0.004J	0.05	8,400	120	370	18,000	630	650	0.2U	1500	3.2	5.66	2.72	-31.4	3.924	5.5	11.04
Area 2	G6M-97-08B	12/14/2007	150J	5.7J	31J	2UJ	1UJ	4.5J	0.006J	0.054	10,000	150	280	12,000	520	-	-	92	5.6	5.84	0.75	-45.3	3.673	0	11.83
Area 2	G6M-97-08B	3/12/2008	150	6.5	32	2U	1U	6.8	0.008J	0.15	9,800	160	190	8,100	270	-	-	38	2.8	5.94	2.15	-66.4	3.091	0	12.36
Area 3	G6M-03-07X	5/12/2003	1,200	7.2	34	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.74
Area 3	G6M-03-07X	9/24/2004	1,700	6.3	31	2U	1U	2U	0.035	0.28	5.7	5U	1UJ	20	1U	10U	4.3J	12	1.6J	5.77	7	168.3	0.341	84.6	16.04
Area 3	G6M-03-07X	12/16/2004	1,500	6	35	2U	1U	2U	0.026	0.08	0.39	5U	1U	190	5U	10U	4.2	12	2.9	6.02	17.09	321.7	0.348	8.46	14.01
Area 3	G6M-03-07X	3/30/2005	1,100	91	140	40U	20U	40U	0.078	0.21	1.8	18	18	10,000	29	76	0.33	8	2U	6.33	1.9	-54.6	0.671	0.7	14.14
Area 3	G6M-03-07X	6/29/2005	940	78	940	40U	20U	40U	0.06	0.34	3.9	31	39J	15,000J	83	118	0.079	6.4	1U	11.97	1.12	-20.1	0.915	5.93	8.48
Area 3	G6M-03-07X	9/29/2005	300	44	1000	2.3	2.7	1U	0.068	0.45	660	46	210J	30,000	290	307	0.05U	3.2	12	6.20	2.7	-62	1.266	7.68	14.74
Area 3	G6M-03-07X	12/12/2005	92	22	710	20U	10U	20U	0.078	0.13	13,000	96.1	190	46,600	220	320	0.05UJ	2U	6.2	6.5	0.22	-82.1	1.038	3.6	14.16
Area 3	G6M-03-07X	3/24/2006	110	23	430	2U	2	270	0.010J	2	22,000	130	280	48,000	260	590	0.2U	1	8.6	6.87	0.17	-130.5	1.39	10.1	11.35
Area 3	G6M-03-07X	6/21/2006	9.5	3.6	180	2U	1U	310	0.073	21	21,000	140	460	59,000	280	570	0.2U	1U	4.8	5.13	0.7	-170.4	2.258	31.4	13.04
Area 3	G6M-03-07X	9/19/2006	47	7.9	260	2U	1U	300	0.037	9.2	25,000	140	470	44,000	290	460	0.926	1.27	5	6.48	0.27	-147.2	2.15	15.1	12.69
Area 3	G6M-03-07X	12/14/2006	190	30	310	2U	1.3	160	0.025	5.9	26,000	220	400	38,000	300	-	-	2.44	2.8	6.37	0.17	-160	2.155	6.19	12.57
Area 3	G6M-03-07X	3/29/2007	2U	2U	35	2U	1U	360	0.08	5.1	15,000	190	420	20,000J	130	-	-	1U	4.4	6.32	2.46	-69.3	1.787	39.6	13.39
Area 3	G6M-03-07X	6/14/2007	37	8.1	190	2U	1U	200	0.025U	2.3	25,000	220	490	37,000	310	-	-	10.5	2.4	6.40	1.31	-159	2.386	9.7	13.63
Area 3	G6M-03-07X	9/13/2007	27	13	290	2.2	1.1	140	0.008J	12	26,000	210	500	29,000	72	560	0.2U	420	4.8	6.26	3.08	-174.9	2.743	117.6	14.45
Area 3	G6M-03-07X	12/14/2007	2.6	2U	9.8	**3.0**	1U	120	0.010J	34	25,000	270	320	12,000	140	-	-	10U	4.0	6.51	0.99	-123.7	2.138	70.9	13.23
Area 3	G6M-03-07X	3/14/2008	2U	2U	2.3	2U	1U	4.3	0.11	26	30,000	210	230	11,000	130	-	-	5U	4.0	6.41	1.06	-85.5	1.897	235.9	14.9
Area 3	G6M-03-07X	10/7/2008	5U	2.2J	5U	21	5U	5U	6.3U	12	14,000	246	348	5,370	64.3	190	190	24	0.03UJ	6.24	0.10	-44.4	1.742	16	14.09

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 3	G6M-03-07X	1/22/2009	1.4U	2.3U	1.7J	15	1.7U	3.6	1.2U	10	16,000	227	338J	5,000	110J	20U	0.13U	37	0.03U	6.6	1.20	-74.9	1.743	30	14.38
Area 3	G6M-03-07X	5/6/2009	0.5U	0.5U	1.8	20	0.5U	2.6	1.2U	9.9	28,000	351	361	5,500	66	720J	0.025J	32	0.03U	5.88	0.21	-117.9	1.735	20.3	14.21
Area 3	G6M-03-07X	10/15/2009	0.27J	0.5U	2.3	19	0.5U	2.2	1.1U	7.3	16,000	318	251	4,870	44	550	0.13U	30	0.03UJ	6.25	0.88	-100.4	1.362	5.6	13.4
Area 3	G6M-03-07X	4/21/2010	0.5U	0.5U	0.88	5.3	0.5U	1.3	1.3U	6.3	27,000	339	176J	2,000	46	320	0.13U	0.11J	0.03U	6.46	0.69	-106.3	1.086	8.9	16.20
Area 3	G6M-03-07X	10/5/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	14	48,000	346	164	4,650	16	35	0.13U	0.27J	0.03U	6.35	0.11	-106.1	1.276	4.56	-
Area 3	G6M-03-07X	6/8/2011	0.5U	0.5U	1.7	7.8	0.5U	2.1	1.2U	13	72,000	381	158	3,540	41	460	0.13U	5.0U	0.10	6.25	0.08	-87	0.841	9.82	15.28
Area 3	G6M-03-07X	10/5/2011	0.5U	0.5U	0.86	5.6	0.5U	1.4	1.2U	1.5U	48,000	375	133	2,500	39	320	0.13U	5.0U	0.049	6.4	0.02	-42	0.764	6.0	9.73
Area 3	G6M-03-07X	5/9/2012	0.5U	0.5U	1.2	4.4	0.5U	0.92	1.2U	200	74,000	388	131	3,090	31	320	0.13U	0.35J	0.063	6.52	0.14	-111.7	1.046	2.43	12.88
Area 3	G6M-03-07X	10/11/2012	0.5U	0.5U	0.74	3.4	0.5U	1.5	1.2U	800	97,000	365	116	2,900	26	270	0.027J	5.0U	0.04	6.5	0.34	-96.2	0.962	4.81	15.32
Area 3	G6M-03-07X	5/21/2013	0.5U	0.5U	1	3.4	0.5U	0.77	1.2U	1.5U	22,000	413	114	2,150	23	180J	0.13UJ	5.0U	0.03UJ	6.01	0.17	-64.9	0.923	1.28	14.79
Area 3	G6M-03-07X	10/16/2013	0.5U	0.5U	0.86	2.9	0.5U	1.3	1.2U	33	31,000	434	120	2,340	26	340	0.13U	5.0U	0.065	6.53	0.21	-102.4	0.901	1.01	9.71
Area 3	G6M-03-07X	6/11/2014	0.40J	0.5U	0.72	3	0.5U	2.5	1.3UJ	3.5J	10,000J	422	105J	1,670	45	260J	0.13U	0.52U	0.03J	6.32	0.28	-48.4	0.787	2.54	11.63
Area 3	G6M-03-07X	10/30/2014	0.5U	0.5U	0.69	2.8	0.5U	1.1	1.2U	1.8	54,000	355	78.5	1,400	22	180	0.13U	0.38J	0.03U	6.49	0.24	-120.7	0.532	5.63	12.93
Area 3	G6M-03-07X	6/18/2015	0.50 U	0.50 U	0.62 J	2.10	0.50 U	0.77 J	5.0 U	5.7 J	12,400	97.1	107	1,810	27.1	262	0.15 U	0.50 U	1.0 U	6.40	0.16	-94.9	0.626	15.1	16.20
Area 3	G6M-03-07X	9/14/2015	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	6.0 J	11,900	436	103	1,700	25.2	-	0.086 J	0.94 J	2.0 U	6.45	0.56	-112.8	0.545	5.16	14.23
Area 3	G6M-03-07X	10/14/2015	1.0 U	1.0 U	0.59 J	1.80	1.0 U	0.73 J	10 U	6.5 J	16,600	441	102	1,660	243	161	0.085 J	2.3 J	2.0 U	6.61	0.24	-76.2	0.754	5.37	12.30
Area 3	G6M-03-07X	2/10/2016	1.0 U	1.0 U	1.0 U	1.80	1.0 U	0.78 J	10 U	5.0 J	12,800	461	96.7	1,360	24.7	194	0.18	10 U	2.0 U	6.49	0.84	-68.8	0.704	16.1	11.20
Area 3	G6M-03-07X	6/16/2016	1.0 U	0.61 J	0.73 J	1.50	1.0 U	0.73 J	1.1 U	1.0 U	28,000	440	90	1,600	26	200	0.05 U	0.8 U	1.0 U	6.46	0.29	-71.9	0.759	9.0	17.00
Area 3	G6M-03-07X	11/10/2016	1.0 U	1.0 U	0.44 J	1.4	1.0 U	0.63 J	1.1 U	16	23,000	420	81	1,400	22	170	0.05 UJ	1.0 U	1.0 U	5.50	0.29	-86	0.48	17.4	14.89
Area 3	G6M-04-02X	9/23/2004	1,900	2U	3.8	2U	1U	2U	-	-	-	5U	1U	86	-	-	-	-	-	6.59	7.25	152.4	0.704	9.52	13.09
Area 3	G6M-04-02X	9/28/2005	1,800	5U	5U	5U	5U	5U	-	-	-	5U	1U	15U	-	-	-	-	-	5.21	6.54	294	0.607	12	18.36
Area 3	G6M-04-02X	9/20/2006	1,100	170	2.2	2U	1U	2U	-	-	-	5U	0.10U	24	-	-	-	-	-	5.22	2.88	-101.5	0.696	10.61	17.15
Area 3	G6M-04-02X	9/14/2007	710	98	290	21	1U	2U	-	-	-	48	16	13,000	-	-	-	-	-	6.52	2.91	-31.3	1.356	2.3	15.3
Area 3	G6M-04-02X	10/16/2008	320	47	290	5U	5U	5U	-	-	-	135	56.6	6,530	-	-	-	-	-	6.32	0.74	-143.6	1.302	3.8	15.75
Area 3	G6M-04-02X	10/15/2009	400	110	15	8U	8U	8U	-	-	-	78.3	20.8	3,580	-	-	-	-	-	6.19	0.9	-25	1.011	4.0	14.12
Area 3	G6M-04-02X	10/6/2010	380	54	27	20U	20U	20U	-	-	-	182	40.2	5,530	-	-	-	-	-	6.25	0.51	-50.1	1.071	3.53	13
Area 3	G6M-04-02X	6/8/2011	-	-	-	-	-	-	-	-	-	317	42.7	4,540	-	-	-	-	-	6.44	0.76	-95.9	0.678	1.9	13.61
Area 3	G6M-04-02X	10/5/2011	630	93	13U	13U	13U	13U	-	-	-	172	18.1	4,370	-	-	-	-	-	6.24	0.41	1	0.669	6.6	15.18
Area 3	G6M-04-02X	5/8/2012	-	-	-	-	-	-	-	-	-	225	15.5	3,980	-	-	-	-	-	6.36	0.2	-25.6	0.475	1.12	14.93
Area 3	G6M-04-02X	10/12/2012	160	30	5.0U	5.0U	5.0U	5.0U	-	-	-	228	16.9	4,890	-	-	-	-	-	6.33	0.44	-33.5	0.534	2.02	15.92
Area 3	G6M-04-02X	5/21/2013	-	-	-	-	-	-	-	-	-	143	7.29	5,400	-	-	-	-	-	5.98	0.36	18.3	0.699	0.74	13.55
Area 3	G6M-04-02X	10/17/2013	140	31	5.7	4.0U	4.0U	4.0U	-	-	-	231	20.6	6,800	-	-	-	-	-	5.70	0.37	-12.3	0.485	3.75	15.8
Area 3	G6M-04-02X	6/11/2014	-	-	-	-	-	-	-	-	-	137	13.9J	5,900	-	-	-	-	-	6.15	0.62	4.5	0.795	2.48	18.26
Area 3	G6M-04-02X	10/30/2014	480	70	33	0.5U	0.5U	2.7J	-	-	-	160	40.5	5,980	-	-	-	-	-	6.34	0.28	-63.1	0.628	1.86	19.03
Area 3	G6M-04-02X	6/18/2015	62	20.3	15.7	0.50 U	0.50 U	1.8	-	-	-	362	82.4	7,220	-	-	-	-	-	6.300	0.320	-101.0	0.500	10.900	13.09
Area 3	G6M-04-02X	9/11/2015	16	7.4	8.8	1.0 U	1.0 U	1.8	10 U	10 U	7,390	343	91.4	6,920	3.3	-	0.067 J	0.87 J	2.0 U	6.590	0.390	-147.8	0.663	2.500	14.02
Area 3	G6M-04-02X	10/16/2015	105	30.5	1.0 U	1.0 U	1.0 U	1.6	-	-	-	237	65.8	7,570	-	-	-	-	-	6.320	0.230	-56.1	0.818	2.430	12.79
Area 3	G6M-04-02X	2/10/2016	333	60.2 J	12.3	2.0 U	2.0 U	1.5 J	10 U	10 U	4,410 J	118	28.3	8,730	2.1	118.0	0.11	10.1	2.0 U	6.740	0.870	-112.9	0.536	10.800	10.04
Area 3	G6M-04-02X	6/13/2016	120	48.0	23.0	1.0 U	1.0 U	3.40	-	-	-	200	44.0	8,000	-	-	-	-	-	6.43	0.34	-56.2	0.875	1.59	13.40
Area 3	G6M-04-02X	11/10/2016	160	60	58	0.37 J	1.0 U	8.40	-	-	-	180.00	48.00	9100.00	-	-	-	-	-	6.62	0.51	-67.3	0.629	4.32	10.3
Area 3	G6M-04-04X	9/24/2004	2,300	7.8	24	2U	1U	2U	0.037	0.12	13	5U	1UJ	560	1U	10U	5.5	20	2U	5.75	5.05	197.3	1.637	169	12.51
Area 3	G6M-04-04X	9/29/2005	1,600	5.4	15	2.5U	2.5U	2.5U	0.018J	0.06	0.44	5U	1U	430	0.5J	5.3	1.4	23	1U	5.34	5.66	295.9	1.666	7.39	13.87
Area 3	G6M-04-04X	9/19/2006	1,600	45	260	2U	1U	2U	0.12	0.095	33	110	84	31,000	120	190	0.2U	10.2	1.6	6.22	0.32	-71.5	1.765	7.64	13.53
Area 3	G6M-04-04X	9/13/2007	600	130	210	2.0	1.2	300	0.005J	7.0	18,000	280	130	25,000	63	270	0.2U	890	1.2	6.57	3.2	-186.6	2.398	3.5	13.04
Area 3	G6M-04-04X	10/16/2008	6.0	8.1	48	2.8	2.5U	150J	1.3U	62	18,000	523	248	19,300	34.6U	520	0.10U	7	0.03UJ	6.40	2.39	-106.2	2.239	4.0	13.16
Area 3	G6M-04-04X	10/15/2009	0.5U	0.5U	4.8	5.2	0.5U	6.9	1.3U	61	38,000J	615	239	16,800	32	520	0.13U	23J	0.03UJ	6.47	0.86	-123.0	1.744	5.0	14.24
Area 3	G6M-04-04X	10/5/2010	0.5U	0.5U	2.8	2.6	0.5U	3.2	1.2U	210	52,000J	529	155	16,900	15	81J	0.13U	5.0U	0.03U	6.35	0.40	-112.0	2.133	3.1	13.59
Area 3	G6M-04-04X	10/5/2011	0.5U	0.5U	1.1	4.1	0.5U	2.7	1.2U	160	31,000J	615	145	16,400	17	350J	0.13U	5.0U	0.049	6.61	0.10	-88	1.042	5	12.99
Area 3	G6M-04-04X	10/11/2012	0.5U	0.5U	0.80	3.7	0.5U	2.6	1.3U	460	51,000	590	133	15,700	13	220	0.13U	5.0U	0.052	6.66	0.39	-108.6	1.693	1.53	14.02
Area 3	G6M-04-04X	10/16/2013	0.5U	0.5U	1.8	3.1	0.5U	3.0	3.5	420	44,000	601	114	11,000	11	240	0.13U	0.94J	0.049	6.57	0.24	-109.9	1.345	4.75	10.96
Area 3	G6M-04-04X	10/30/2014	0.5U	0.5U	0.5U	1.7	0.5U	0.39J	1.2U	85	43,000	453	113	8,520	9.0J	180	0.098J	0.18J	0.03U	6.59	0.42	-145.8	1.537	6.54	11.41

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 3	G6M-04-04X	9/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.91 J	10 U	32.6	9,170	486	11.9 J	10,700 J	7.50	-	0.068 J	3.4 J	2.0 U	6.7	0.28	-180.4	1.264	3.25	14.95
Area 3	G6M-04-04X	10/16/2015	0.76 J	1.0 U	1.0 U	1.0 U	2.80	1.0 U	10 U	61.3	20,000	505	115	10,000	8.5	167	0.11 U	1.6 J	2.0 U	5.99	0.57	-114.6	1.727	3.13	10.70
Area 3	G6M-04-04X	2/19/2016	1.0 U	1.0 U	0.50 J	2.8	1.0 U	1.0	10 U	65.1	13,900	550	114	9,760	7.3	278	0.10	1.3 J	2.0 U	7.68	1.29	-38.7	1.173	3.97	11.53
Area 3	G6M-04-04X	6/16/2016	1.0 U	1.0 U	0.65 J	1.0 U	1.0 U	1.1	9.2	86	31,000	580	120	10,000	8.6	160	0.05 U	30.0	1.0 U	6.51	1.46	-108.1	1.407	4.2	16.19
Area 3	G6M-04-04X	11/8/2016	1.0 U	1.0 U	0.43 J	1.2	1.0 U	0.57 J	3.0	38	20,000	530	120	9,700	7.3	180	0.05 UJ	1.0 U	4.4	6.01	0.32	-106.9	1.402	3.49	13.83
Area 3	G6M-13-03X	1/30/2014	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	5.58	0.69	205	0.2483	1.11	10.87
Area 3	G6M-13-03X	10/30/2014	0.5J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.0285U	407	-	-	-	-	-	6.39	1.65	183.6	0.1922	15.3	6.67
Area 3	G6M-13-03X	10/16/2015	0.57 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	100 U	362	-	-	-	-	-	5.53	1.58	157.6	2.539	36.6	11.90
Area 3	G6M-13-03X	11/10/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	2.2 J	0.45	420	-	-	-	-	-	4.15	0.43	40	1.54	31.6	12.48
Area 4	G6M-02-03X	2/26/2002	210	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	11.61	2.21	11	1.154	18.1	18.88
Area 4	G6M-02-03X	9/23/2004	48	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	4.95	1.17	632.1	1.374	3.8	17.6
Area 4	G6M-02-03X	9/29/2005	12	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.70	2.9	204.9	1.138	10.67	17.62
Area 4	G6M-02-03X	9/18/2006	10	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.20	0.35	219.4	0.993	4.32	14.39
Area 4	G6M-02-03X	9/14/2015	0.82 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	284	4.0 U	0.10 U	79	1.10	-	1.30	9.7 J	2.0 U	5.67	5.09	93.2	0.722	3.00	14.06
Area 4	G6M-02-03X	6/16/2016	-	-	-	-	-	-	-	-	-	3.0 U	0.05 U	310	-	-	-	-	-	4.87	0.45	139.6	1.658	19.87	16.74
Area 4	G6M-02-03X	11/8/2016	-	-	-	-	-	-	-	-	-	3.0 U	0.029 J	99	-	-	-	-	-	7.58	1.03	-53.7	0.96	3.88	11.73
Area 4	G6M-02-04X	2/26/2002	470	0.88J	1.3J	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.47	3.4	189.5	0.26	24	17.99
Area 4	G6M-02-04X	9/23/2004	170	2U	2.9	2U	1U	2U	-	-	-	5U	1U	15U	-	-	-	-	-	6.29	3.03	175.5	0.453	8.48	19.59
Area 4	G6M-02-04X	9/28/2005	150	2U	6.2	2U	1U	2U	-	-	-	5U	1U	15U	-	-	-	-	-	5.61	2.75	302.3	0.502	12.6	17.26
Area 4	G6M-02-04X	9/20/2006	48	2U	2U	2U	1U	2U	-	-	-	5U	0.10U	15U	-	-	-	-	-	5.84	4.57	189	0.467	8.45	14.49
Area 4	G6M-02-04X	9/13/2007	21	4.2	2U	2U	1U	2U	-	-	-	6U	0.1U	15	-	-	-	-	-	6.39	3.13	93	0.927	4.8	14.85
Area 4	G6M-02-04X	10/16/2008	9.0	2.5U	150	2.5U	2.5U	2.5U	-	-	-	78.2	8.56	7,370	-	-	-	-	-	6.91	1.05	-80	1.126	4.0	12.08
Area 4	G6M-02-04X	10/15/2009	5U	17	120	5U	5U	10	-	-	-	309	82	10,900	-	-	-	-	-	6.55	1.52	-139.8	0.766	2.18	15.6
Area 4	G6M-02-04X	10/4/2010	5.3	2.6	2.1	0.5U	0.5U	0.5U	-	-	-	101	20.2	1,240	-	-	-	-	-	6.48	0.98	-86.9	0.975	2.8	14.68
Area 4	G6M-02-04X	6/9/2011	-	-	-	-	-	-	-	-	-	246	28.2	3,180	-	-	-	-	-	6.67	0.28	-88.3	0.856	0	13.32
Area 4	G6M-02-04X	10/6/2011	0.69	0.80	0.67	0.5U	0.5U	0.5U	-	-	-	292	35.6	2,480	-	-	-	-	-	6.84	0.26	-112.5	0.601	3.71	12.68
Area 4	G6M-02-04X	5/9/2012	-	-	-	-	-	-	-	-	-	451	43.4	2,510	-	-	-	-	-	6.94	0.52	-114.8	0.487	2.9	13.7
Area 4	G6M-02-04X	10/9/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	374	30	1,860	-	-	-	-	-	6.87	0.43	-129.3	0.591	0	13.4
Area 4	G6M-02-04X	5/21/2013	-	-	-	-	-	-	-	-	-	313	28.1	1,890	-	-	-	-	-	6.88	0.3	-110.5	0.745	2.26	13.62
Area 4	G6M-02-04X	10/16/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	370	23.9	1,390	-	-	-	-	-	6.92	0.38	-124.4	0.522	1.32	13.21
Area 4	G6M-02-04X	6/11/2014	-	-	-	-	-	-	-	-	-	175	14.2	997	-	-	-	-	-	6.60	0.59	-10.8	0.956	3.35	13.12
Area 4	G6M-02-04X	11/3/2014	0.5U	0.24J	0.5U	0.5U	0.5U	0.5U	-	-	-	350	15.6	971						7.08	1.42	-111.1	0.55	1.38	14.70
Area 4	G6M-02-04X	6/26/2015	0.60 J	0.52 J	0.91 J	0.50 U	0.50 U	0.50 U				157	10.4	1,060						7.39	0.71	-55.4	1.238	1.55	14.70
Area 4	G6M-02-04X	9/14/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	4,350	408	20.4	995	1.60		0.057 U	9.6 J	2.0 U	7.01	0.40	-152.4	0.40	1.30	14.56
Area 4	G6M-02-04X	10/16/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	320	15.1	1,000	-	-	-	-	-	6.78	0.43	-97.3	0.665	0.86	13.02
Area 4	G6M-02-04X	2/12/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	964	353	22	1,370	1.1	42.3	0.12	8.0 J	2.0 U	7.08	0.79	-79.7	0.711	1.94	11.26
Area 4	G6M-02-04X	6/15/2016	1.0 U	0.59 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	470	27	1,400	4.4	250	0.05 U	0.8 U	1.0 U	6.88	0.30	-106.2	1.031	2.84	16.74
Area 4	G6M-02-04X	11/8/2016	1.0 U	1.0 U	1.2	1.0 U	1.0 U	1.0 U	-	-	-	470	21	1,100						7.00	0.89	-153.6	0.268	2.57	13.15
Area 4	G6M-02-13X	8/2/2002	4,600	4	2U	2U	1U	2U	-	-	-	5U	-	-	-	-	-	-	-	6.17	0.54	141	0.665	7.62	13.98
Area 4	G6M-02-13X	9/23/2004	5,000	13	16	2U	1U	2U	0.27	0.15	57	5U	1U	1,200	1U	31	2.3	17	1.8J	6.37	0.34	170.8	0.618	2.14	16.73
Area 4	G6M-02-13X	12/13/2004	4,600	14	21	2U	1U	2U	0.27	0.11	88	5U	1U	1,300	5U	34	2.5	16M	2U	5.79	0.89	274.8	0.518	2.63	18.3
Area 4	G6M-02-13X	3/30/2005	2,100	64J	210	100U	50U	100U	0.16	0.11	38	36	4.2	4,000	8.1	60	0.23	13	2U	5.97	0.89	-22.6	0.735	2.91	15.02
Area 4	G6M-02-13X	8/11/2005	2,300	190	460	5.9	2U	2U	0.026	0.045	46	150	34J	12,000J	66	230	0.05U	2.3	1U	5.82	0.74	-68.8	0.897	5.6	14.76
Area 4	G6M-02-13X	9/29/2005	3,700	120	470	10U	10U	10U	0.16	0.12	420	74	22	6,800	37	110	0.05U	8.9	2.4	6.41	1.26	-89.1	0.71	6.99	15.48
Area 4	G6M-02-13X	12/14/2005	210	50	850	2U	2	2U	0.057	0.087	11,000	477	200J	36,200	290	420	0.083	2U	8.2	6.6	0.11	-134.4	1.389	0.6	15.43
Area 4	G6M-02-13X	3/22/2006	660	37J	640	2U	1U	2U	0.025U	0.009J	21,000	320	170	29,000	280	480	0.2U	8.08	3.0	6.67	0.9	-214.4	1.379	2.37	14.28
Area 4	G6M-02-13X	6/22/2006	160	8.8	440	2U	1U	280	0.025J	0.51	25,000	750	420	30,000	140	480	0.2U	1.15	20	6.54	0.28	-138.7	2.175	16.1	14.68
Area 4	G6M-02-13X	9/18/2006	550	52	160	2U	1U	280	0.15	1.1	24,000	420	160	9,900	52	140	0.2U	8.09	2.8	6.12	0.36	-119.3	1.19	6.9	13.37
Area 4	G6M-02-13X	12/14/2006	460	20	190	2U	1U	220	0.025	0.35	23,000	460	260	12,000	140	-	-	4.25	3.6	6.49	0.19	-73.7	1.748	8.3	10.99
Area 4	G6M-02-13X	3/27/2007	460	39	120	2U	1U	170	0.031	3.7	27,000	400	170	8,400J	37	-	-	9.74	1.6	6.08	0.12	-14.6	1.378	11.2	13.81
Area 4	G6M-02-13X	6/13/2007	440	45	48	2U	1U	46	0.025U	6.3	26,000	380	300	9,400	78	-	-	12.7	3.6	6.58	0.46	-178.7	1.926	47.5	12.34

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AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 4	G6M-02-13X	9/13/2007	510	150	120	2U	1U	53	0.14	26	20,000	230	88	4,800	18	74	0.2U	480	1U	6.54	0.45	-145.3	1.332	18.2	13.69
Area 4	G6M-02-13X	12/14/2007	690	84J	58J	2U	1U	21J	0.068	21	16,000	210	46	4,500	11	-	-	13	1U	6.51	0.27	-133.2	1.133	3.6	14.17
Area 4	G6M-02-13X	3/12/2008	130	96	29	2U	1U	12	0.092	35	21,000	260	68	7,600	17	-	-	9	1U	6.48	0.57	-140.5	1.221	7.7	14.51
Area 4	G6M-02-13X	10/6/2008	5U	9.7	7.9	5U	5U	7.5	6.5U	8.8	14,000	380	91	4,940	24.3	300	0.13U	11	0.03UJ	6.56	0.28	-173.6	1.071	5.2	13.58
Area 4	G6M-02-13X	1/21/2009	1.4U	5	5.4	1.3U	1.7U	5.7	.25U	3.8	17,000	371	72.1J	3,990	11J	200	0.13U	14	0.03U	6.88	0.28	-121.2	0.821	4	13.07
Area 4	G6M-02-13X	5/6/2009	0.5U	5.1	9.8	0.24J	0.5U	6.2	1.2U	2.6	26,000	351	69.4	3,820	9.4J	300J	0.012J	12	0.03U	6.01	0.29	-93.4	0.916	2.09	14.16
Area 4	G6M-02-13X	10/15/2009	0.92	8.6	16	0.7	0.5U	8.5	1.2U	2.2	7,400	369	93.3	6,800	7J	370	0.13U	13	0.03UJ	6.47	0.24	-148.8	0.932	1.71	14.48
Area 4	G6M-02-13X	4/20/2010	0.5U	0.29J	14	0.42J	0.5U	13	1.3U	6.4	44,000	322	134J	5,790	36	500	0.13U	5.0U	0.03U	6.47	0.28	-7.3	1.219	2.98	14.34
Area 4	G6M-02-13X	10/4/2010	0.30J	1.6	8.3	0.24J	0.5U	8.4	1.2U	9.5	48,000	281	58.5	4,690	10U	370	0.046J	3.3J	0.03U	6.57	0.18	-124.5	1.168	0.90	13.69
Area 4	G6M-02-13X	6/9/2011	-	-	-	-	-	-	-	-	-	302	72.3	6,820	-	-	-	-	-	6.49	0.21	-110.8	1.21	2.19	13.41
Area 4	G6M-02-13X	10/6/2011	0.5U	0.5U	0.96	0.5U	0.5U	2.4	1.2U	1.5U	12,000	258	36.2	5,690	6.7J	110	0.13U	0.45J	0.056	6.65	0.07	-94.6	1.235	2	14.62
Area 4	G6M-02-13X	5/9/2012	-	-	-	-	-	-	-	-	-	205	25.9	6,670	-	-	-	-	-	7	0.16	-118.5	1.281	1.01	11.53
Area 4	G6M-02-13X	10/11/2012	0.5U	0.83	0.69	0.5U	0.5U	0.5U	1.3U	87	22,000	159	24.9	8,190	2.7J	380	0.013J	5.0U	0.03U	6.68	0.34	-109.8	1.195	0	12.32
Area 4	G6M-02-13X	5/21/2013	-	-	-	-	-	-	-	-	-	212	22.3	12,500	-	-	-	-	-	6.88	0.12	-118	0.9	4.89	11.97
Area 4	G6M-02-13X	10/16/2013	0.5U	0.78	1.8	0.27J	0.5U	1.1	1.8	3.9	34,000	140	19.1	11,400	2.5J	350	0.13U	5.0U	0.037	6.87	0.37	-110	0.916	0	11.96
Area 4	G6M-02-13X	6/11/2014	-	-	-	-	-	-	-	-	-	195	20.4	15,800	-	-	-	-	-	6.74	0.27	-85	0.958	3.92	13.63
Area 4	G6M-02-13X	10/29/2014	0.5U	1.3	2.8	0.5U	0.5U	1.8	1.2U	1.5U	7,300	128	12J	7,920J	5U	280	0.13U	0.61J	0.03U	6.86	0.26	-81	0.822	6.49	-
Area 4	G6M-02-13X	6/23/2015	0.50 U	1.7	3.4	0.50 U	0.50 U	2.5	5.0 U	5.0 U	1,840	142	12.5	11,100	2.90	250	0.11 U	2.6 J	1.0 U	6.74	1.24	-107.2	0.817	5.37	14.62
Area 4	G6M-02-13X	9/11/2015	1.0 U	2.8	5.2	1.0 U	1.0 U	4.9	10 U	10 U	832	142	10.5	9,980	2.30		0.067 J	0.52 J	2.0 U	6.45	0.25	-76.0	0.619	2.85	13.41
Area 4	G6M-02-13X	10/16/2015	1.0 U	3.6	1.0 U	1.0 U	1.0 U	3.3	10 U	10 U	473	114	9.77	12,300	3.2	261	0.11 U	1.5 J	2.0 U	6.84	0.31	-87.2	0.667	2.90	8.40
Area 4	G6M-02-13X	2/12/2016	4.5	13.7	13.2	0.51 J	1.0 U	7.7	10 U	10 U	500	145	10.2	11,100	2.1	252	0.11	10 U	2.0 U	7.02	0.59	-102.3	0.671	2.00	9.48
Area 4	G6M-02-13X	6/16/2016	1.0 U	22.0	20.0	0.65 J	1.0 U	9.4	0.87 J	8.2	3,400	96	7.90	11,000	2.4	210	0.05 U	0.8 U	1.0 U	7.03	0.66	-86.6	0.618	4.63	16.47
Area 4	G6M-02-13X	11/8/2016	1.0 U	9.7	65	0.59 J	1.0 U	23	1.1 U	7.8	1,500	110	7.70	12,000	1.7	190	0.05 U	0.63 J	1.0 U	6.98	0.77	-152.9	0.383	2.97	12.31
Area 4	G6M-06-01X	3/30/2006	30	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.03	3.73	-87.8	0.652	70.7	8.22
Area 4	G6M-06-01X	3/30/2007	72	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.73	2.87	138.5	1.005	10.21	10.01
Area 4	G6M-06-01X	9/13/2007	83	2U	2.1	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.60	10.68	-93.9	0.967	6.3	12.69
Area 4	G6M-06-01X	12/14/2007	110	2U	2.3	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.96	2.43	132.9	0.991	3.9	17.46
Area 4	G6M-06-01X	10/16/2008	71	1.8	1.4	1U	1U	1U	-	-	-	-	-	-	-	-	-	-	-	5.51	3.08	118.6	0.956	20	10.8
Area 4	G6M-06-01X	10/15/2009	170	28	6.3J	8U	8U	8U	-	-	-	8U	0.321	50U	-	-	-	-	-	5.82	2.69	85.3	0.832	0.13	13.69
Area 4	G6M-06-01X	10/4/2010	120	3.4J	7.2	4U	4U	4U	-	-	-	5U	0.211U	33.2U	-	-	-	-	-	6	1.72	57.1	1.16	25.1	13.21
Area 4	G6M-06-01X	6/8/2011	190	7.7	7.2	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	5.81	1.39	122	0.979	4.01	17.13
Area 4	G6M-06-01X	10/6/2011	96	30	46	1.3U	1.3U	3.5	-	-	-	3.7J	0.139	38.5	-	-	-	-	-	6.22	0.59	40.8	0.825	13.1	11
Area 4	G6M-06-01X	5/8/2012	310	18	16	10U	10U	10U	-	-	-	5U	0.1U	9.4J	-	-	-	-	-	6.14	0.65	87.4	0.943	2.59	13.07
Area 4	G6M-06-01X	10/10/2012	180	7.6	9.1	4.0U	4.0U	4.0U	-	-	-	5U	0.0522 J	8.8 J	-	-	-	-	-	5.94	0.54	56.2	0.819	2.61	10.6
Area 4	G6M-06-01X	5/21/2013	170	30	17	5.0U	5.0U	2.0J	-	-	-	5U	0.1U	25U	-	-	-	-	-	5.96	0.36	81	1.058	8.89	13.06
Area 4	G6M-07-01X	10/15/2008	26	0.24J	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	7.78	2.22	53.9	0.591	608	12.35
Area 4	G6M-07-01X	10/20/2009	21	15	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	7.44	4.11	171.9	0.532	283	27.28
Area 4	G6M-07-01X	10/7/2010	50	0.31J	0.25J	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	7.03	3.62	139	0.414	4.78	10.05
Area 4	G6M-07-01X	10/5/2011	11	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	11.5J	-	-	-	-	-	7.06	4.43	72.9	0.285	130	11.95
Area 4	G6M-07-01X	10/12/2012	19	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	.0886 J	10.8 J	-	-	-	-	-	6.92	3.56	59	0.437	30.2	11.92
Area 4	G6M-07-01X	10/17/2013	15	0.37J	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	5.4J	-	-	-	-	-	6.86	4.34	95.1	0.45	16.4	12.71
Area 4	G6M-13-02X	1/30/2014	120	20	34	0.34J	0.5U	14	-	-	-	-	-	-	-	-	-	-	-	6.44	0.88	53.9	1.099	3.11	16.01
Area 4	G6M-13-02X	6/11/2014	170	54	81	0.53	0.29J	6	-	-	-	3.2J	0.472	32.5	-	-	-	-	-	6.05	0.71	144.8	0.9	4.29	11.56
Area 4	G6M-13-02X	11/3/2014	210	39	95	5U	5U	6.7	-	-	-	2.5U	0.146UJ	20.3J	-	-	-	-	-	6.31	1.3	75.8	0.625	2.27	5.69
Area 4	G6M-13-02X	6/26/2015	105	49.6	38.1	0.50 U	0.50 U	1.10				2.1 J	0.050 U	9.4 J						5.99	1.03	101.6	0.917	9.69	17.13
Area 4	G6M-13-02X	10/16/2015	70	31	1.0 U	1.0 U	1.0 U	1.4 J	-	-	-	4.0 U	0.087	15	-	-	-	-	-	6.27	0.35	72	1.069	2.97	8.03
Area 4	G6M-13-02X	2/22/2016	85.8	24.6	21.1	0.54 J	1.0 U	0.65 J	10 U	10 U	3,560	4.0 U	0.10 U	21.9	0.81 J	56.4	0.28	15.9	2.0 U	6.23	0.9	21.6	0.818	4.89	11.54
Area 4	G6M-13-02X	6/16/2016	77	34	61.0	0.89 J	1.0 U	1.50	-	-	-	1.8 J	0.190	20	-	-	-	-	-	6.17	1.29	3.6	0.937	11.33	16.70
Area 4	G6M-13-02X	11/8/2016	84	27	38	1.0 U	1.0 U	0.93 J	-	-	-	3.0 U	0.05 U	4.7 J						6.30	0.94	-136.1	0.689	2.01	11.9
Area 4	G6M-97-28X	9/14/2015	0.57 J	62.8	37.3	1.60	1.0 U	22.3	10 U	10 U	85.0	4.0 U	0.23	2,110	1.10		0.11 U	12.10	2.0 U	6.21	0.30	67.7	0.256		14.43
Area 4	G6M-97-28X	2/12/2016	1.0 U	1.1	1.4	1.0 U	1.0 U	0.53 J	10 U	10 U	235	47.9	2.49	5,690	1.6	111	0.085 J	4.2 J	2.0 U	6.92	1.99	72.8	0.21	8.64	6.05

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 4	G6M-97-28X	6/16/2016	-	-	-	-	-	-	-	-	-	190	6.0	2,200	-	-	-	-	-	6.68	0.28	-85.3	0.312	2.15	23.12
Area 4	G6M-97-28X	11/8/2016	-	-	-	-	-	-	-	-	-	27	2.2	18,000	-	-	-	-	-	6.72	0.86	-70.9	0.537	11.87	12.8
Area 5	G6M-02-05X	2/28/2002	130	2U	1.9J	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.15	6.61	181.1	0.597	11	15.72
Area 5	G6M-02-05X	1/30/2003	170	2U	2.3	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.65
Area 5	G6M-02-05X	9/30/2005	200	2U	2.6	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	4.73	3.61	441.8	0.512	7.9	15.78
Area 5	G6M-02-05X	9/22/2006	350	2U	2.2	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	5.52	2.14	94.8	0.543	7.38	12.66
Area 5	G6M-02-05X	9/12/2007	510	50	7.9	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.39	0.78	-57.8	0.723	30.6	12.27
Area 5	G6M-02-05X	10/20/2008	390	17	4.4J	10U	10U	10U	-	-	-	-	-	-	-	-	-	-	-	7.00	1.83	-41.9	0.588	3.0	12.42
Area 5	G6M-02-05X	10/19/2009	370	53	10U	10U	10U	10U	1.3U	1.6U	410	49.2	3.82	2,490	10U	57	0.26	19	0.03U	6.22	0.31	30.6	0.699	1.4	12.53
Area 5	G6M-02-05X	10/5/2010	240	100	4.0J	5U	5U	5U	1.2U	1.5U	160	71.2	5.42	2,420	10U	20U	0.025J	13	0.03U	6.25	0.25	-37.5	0.749	5.99	12.27
Area 5	G6M-02-05X	6/8/2011	200	230	78	3.7	0.62	18J	1.2U	10	5,400	105	8.58	2,700	2.6J	180	0.13U	11	0.03U	6.16	0.24	-42.8	0.708	0	12.27
Area 5	G6M-02-05X	10/6/2011	37	140	59	2.0U	2.0U	25	1.2U	15	6,600	125	10.8	2,300	2.1J	530	0.012J	14	0.03U	6.18	0.73	-4.0	0.959	1.4	11.6
Area 5	G6M-02-05X	10/6/2011	37	140	59	2.0U	2.0U	25	1.2U	15	6,600	125	10.8	2,300	2.1J	530	0.012J	14	0.03U	6.18	0.73	-4.0	0.959	1.4	12.36
Area 5	G6M-02-05X	5/9/2012	140	68	17	0.5U	0.5U	0.5U	1.3U	1.6U	3,900	103	8.63	2,060	10U	75	0.13U	14	0.03U	6.19	0.78	9.0	0.682	1.52	12.56
Area 5	G6M-02-05X	10/10/2012	94	44	16	2.0U	2.0U	2.0U	1.2U	1.5U	4,400	73	6.78	1,460	10U	64	0.11J	14	0.03U	6.14	1.92	15.2	0.809	0	11.16
Area 5	G6M-02-05X	5/21/2013	38J	33J	78	0.48J	0.30J	2.3	1.2U	1.5U	2,200	84.1	8.43	1,310	10U	100J	0.13UJ	12	0.03UJ	6.26	0.75	-19.1	0.753	0.77	14.01
Area 5	G6M-02-06X	3/1/2002	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.16	8.91	134.8	0.135	32	12.18
Area 5	G6M-02-06X	9/24/2004	5.5	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.33	9.48	152.8	0.09	0.02	12.31
Area 5	G6M-02-06X	9/30/2005	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.22	8.22	66.4	0.107	4.39	13.26
Area 5	G6M-02-06X	9/21/2006	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.30	7.84	139.3	0.098	10.85	11.26
Area 5	G6M-02-06X	9/14/2007	2U	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	6.94	8.5	-140.7	0.149	7.7	10.88
Area 5	G6M-02-06X	10/20/2008	0.47J	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	7.09	7.71	88.8	0.109	6.5	11.28
Area 5	G6M-02-06X	10/14/2009	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	8U	0.2U	50U	-	-	-	-	-	6.98	8.96	26.1	0.115	0.2	11.43
Area 5	G6M-02-06X	10/5/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	6.90	7.66	63.6	0.128	4.38	11.62
Area 5	G6M-02-06X	10/7/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5J	0.1U	25U	-	-	-	-	-	6.87	6.3	24.7	0.076	18.6	11.76
Area 5	G6M-02-06X	10/10/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	7.11	8.89	16.8	0.134	10.53	11.39
Area 5	G6M-02-06X	10/15/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	7.36	9.84	110.9	0.134	2.62	12.86
Area 5	G6M-02-06X	10/30/2014	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.155U	6.0J	-	-	-	-	-	7.21	7.73	73.1	0.101	2.18	13.93
Area 5	G6M-02-06X	10/19/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	15 U	-	-	-	-	-	7.29	8.05	82.5	0.114	2.23	12.89
Area 5	G6M-02-06X	11/11/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	3.0 U	-	-	-	-	-	7.86	6.8	-32.7	0.84	4.92	9.57
Area 5	G6M-02-07X	2/26/2002	24	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.34	-0.68	110.3	0.259	46	11.54
Area 5	G6M-02-07X	9/23/2004	26	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.26	1.72	332.8	0.423	25	12.39
Area 5	G6M-02-07X	9/30/2005	16	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.69	6.98	121.2	0.389	7.7	11.08
Area 5	G6M-02-07X	9/21/2006	11	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.58	3.72	143.6	0.251	14.3	10.8
Area 5	G6M-02-07X	9/13/2007	12	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.68	3.78	43.3	0.334	3	10.49
Area 5	G6M-02-07X	10/20/2008	9.8J	0.27J	0.5UJ	0.5UJ	0.5UJ	0.5UJ	-	-	-	-	-	-	-	-	-	-	-	7.46	3.15	42.8	0.271	12	10.50
Area 5	G6M-02-07X	10/15/2009	6.7J	210	10U	10U	10U	10U	-	-	-	8U	0.127U	50U	-	-	-	-	-	7.41	1.15	-14	0.413	3	11.54
Area 5	G6M-02-07X	1/15/2010	5.7	0.5U	0.5U	0.75U	0.75U	1.0U	-	-	-	-	-	-	-	-	-	-	-	7.53	3.26	150.2	0.344	1.88	11.62
Area 5	G6M-02-07X	10/5/2010	4.7	0.24J	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	7.39	2.57	60.3	0.296	1.33	11.83
Area 5	G6M-02-07X	10/3/2011	3.6	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	7.54	1.58	26.6	0.198	5.12	11.79
Area 5	G6M-02-07X	10/11/2012	4.6	0.5U	0.57	0.5U	0.5U	0.5U	-	-	-	5U	0.0278J	25U	-	-	-	-	-	7.68	1.31	98.1	0.352	2.69	-
Area 5	G6M-02-07X	10/15/2013	1.1	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.9J	0.1U	5.1J	-	-	-	-	-	7.62	2.39	99.8	0.911	1.05	-
Area 5	G6M-02-07X	10/29/2014	3.9	0.27J	0.62	0.5U	0.5U	0.5U	-	-	-	2.4J	0.025U	7.8J	-	-	-	-	-	7.41	0.22	10.9	0.535	3.71	11.44
Area 5	G6M-02-07X	10/19/2015	4.5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.10 U	15 U	-	-	-	-	-	7.64	0.35	75.3	0.362	3.69	15.95
Area 5	G6M-02-07X	11/11/2016	5.4	0.75 J	1.0	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05	11	-	-	-	-	-	7.86	6.8	-32.7	0.084	4.92	9.57
Area 5	G6M-02-11X	8/1/2002	450	2.8	2U	2U	1U	2U	-	-	-	5U	-	-	-	-	-	-	-	6.01	0.46	184	0.984	8.13	13.9
Area 5	G6M-02-11X	8/28/2002	540J	2U	2U	2U	1U	2U	-	-	-	5U	-	-	5U	44	-	-	-	6.05	0.51	173	0.905	6.49	10.7
Area 5	G6M-02-11X	10/29/2002	970	22	3	2U	1U	2U	-	-	-	5U	1U	1700	5U	51	0.10U	17	2.0U	6.02	0.49	51	0.92	5.04	13.2
Area 5	G6M-02-11X	2/3/2003	710	22	2U	20U	1U	2U	-	-	-	5U	1U	-	5U	65	-	-	-	6.22	0.71	178	0.971	12.7	14.12
Area 5	G6M-02-11X	7/16/2003	530	54	33	2U	1U	2U	0.005U	0.014	460	5U	1U	-	5U	120	-	16M	2.0U	6.31	0.86	166	0.813	11.9	16.05
Area 5	G6M-02-11X	9/26/2003	590	31	37	2U	1U	2U	0.005U	0.005U	1,200	5U	-	1,700	19	-	-	-	-	6.60	0.41	146	0.921	7.2	8.61

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 5	G6M-02-11X	1/8/2004	300	15	49	2U	1U	2U	0.005U	0.0093	2,300	5U	1U	1,900	5U	150	-	12J	2.0U	6.29	0	104	0.729	0.6	6.55
Area 5	G6M-02-11X	3/10/2004	160	11	53	2U	1U	2U	0.005U	0.068	14,000	5U	1U	2,200	1.8	130	-	9.6	2U	6.39	0.82	103	0.847	7.5	15.58
Area 5	G6M-02-11X	6/4/2004	440	23	54	2U	1U	2U	0.005U	0.01	2,300	5U	1U	1,900	2.4J	110	-	12	1.9J	6.72	12.13	54.5	0.807	21.3	13.72
Area 5	G6M-02-11X	9/22/2004	540	50	140	2U	1U	2U	0.005U	0.005U	13,000	5U	1U	2,400	1.2	100	0.5U	12	1.5J	6.19	0.96	412.7	0.996	1.25	11.09
Area 5	G6M-02-11X	12/15/2004	760	47	120	2U	1U	2U	0.005U	0.021	9,700	5U	1U	2,100	5U	95	1	15	2U	6.35	1.36	200.1	0.675	21.2	13.83
Area 5	G6M-02-11X	3/28/2005	1,100	41	45	40U	40U	40U	0.005U	0.065	10,000	5U	1U	2,200	3.6J	90	0.2U	13	2UJ	6.19	1.02	84.3	0.938	48.3	16.04
Area 5	G6M-02-11X	7/1/2005	1,500	90	280	10U	10U	10U	0.028	0.42	15,000	2.1	1UJ	1,800	9.4	98.4	0.05U	14	1U	5.78	0.37	221.6	0.806	6.66	14.87
Area 5	G6M-02-11X	9/27/2005	240	78	260	2U	1U	16	0.020J	8.1	21,000	5U	1U	2,500	3.4	148	0.05U	5.9J	1U	5.92	0.4	93.6	0.755	0.69	13.00
Area 5	G6M-02-11X	12/12/2005	220	28	50	2U	1U	9.1	0.082	29	24,000	7.8	0.2J	3,100	5.5	270	1.3J	3.5	1U	6.28	0.18	64.8	1.107	8.9	12.95
Area 5	G6M-02-11X	3/21/2006	520	94	230	2.3	1U	60	0.025U	34	17,000	5U	0.1U	1,500	8.2	120	0.2U	8.81	1U	6.45	12	326.6	0.765	7.15	14.52
Area 5	G6M-02-11X	6/22/2006	130	44	20	20	1U	9.2	0.051	78	22,000	5U	1U	6,300	6.1	210	0.2U	2.45	1U	6.19	0.27	59.7	1.231	5.04	14.02
Area 5	G6M-02-11X	9/22/2006	37	17	8.6	2.8	1U	4	0.089	15	21,000	6.9	0.58	9,300	9.8	180	0.2U	4.87	1U	5.93	1.22	-158.9	1.079	4.55	12.97
Area 5	G6M-02-11X	12/13/2006	45	7.9	3.6	4.4	1U	2U	0.24	19	28,000	22	1	16,000	9.3	-	-	1.06	1.2	6.39	0.19	169.6	1.277	6.94	13.71
Area 5	G6M-02-11X	3/27/2007	38	21	3.6	9.8	1U	2U	6.8	28	23,000	120	7.1	24,000J	10	-	-	-	-	6.25	0.61	-39.6	0.912	19	12.57
Area 5	G6M-02-11X	6/13/2007	30	28	12	10	1U	2.8	4.8	33	27,000	310	6.8	18,000	12	-	-	9.62	1.6	6.22	0.65	-36.4	1.198	2.1	11.24
Area 5	G6M-02-11X	9/11/2007	4.4	24	7.9	12	1U	4.3	2.8	36	30,000	420	18	18,000	14	270	0.2U	470	1U	6.24	3.52	-11.1	1.423	9.7	10.99
Area 5	G6M-02-11X	12/13/2007	2.8J	19J	6J	5.5J	1U	4.4J	8.3	16	29,000	470	47	18,000	15	-	-	5U	1	6.36	0.52	-117.9	1.409	0.5	11.79
Area 5	G6M-02-11X	3/11/2008	2U	6.2	2.5	9.7	1U	2U	24	5.8	28,000	570	59	27,000	17	-	-	5U	2.8	6.35	0.41	-90.5	1.56	0.3	11.69
Area 5	G6M-02-11X	10/16/2008	1.3	7.3	6.9	0.8	0.5U	2.2	1.2U	5.4	39,000	1,170	116	8,420	21.2U	240	0.10U	9.3	0.03U	5.8	1.51	-20.6	0.1535	4.0	13.68
Area 5	G6M-02-11X	5/7/2009	0.5U	0.76	0.47J	0.92	0.5U	0.5U	3.1	3.5	42,000	1,060	125	3,950	31	370J	0.13U	17	0.03U	6.04	0.24	-117.5	1.605	0.32	12.08
Area 5	G6M-02-11X	10/14/2009	0.23J	1.4	0.58	0.63	0.5U	0.46J	1.2U	1.5U	55,000	1,070	126	2,390	8.7J	430	0.13U	9.7	0.03U	6.46	0.52	-114.9	1.342	5.0	11.1
Area 5	G6M-02-11X	4/20/2010	0.5U	1.6	24	0.24J	0.5U	5.8	1.2U	2.0	17,000	1,050	106J	3,760	8.7J	500	0.13U	5U	0.03U	6.75	0.38	-130.5	0.778	1.5	11.58
Area 5	G6M-02-11X	10/5/2010	0.5U	0.94	0.52	0.38J	0.5U	0.66	1.2U	1.5U	47,000	956	93.8	1,590	10U	700	0.13U	1.4J	0.03U	6.51	0.72	-136	1.368	0.86	11.57
Area 5	G6M-02-11X	6/9/2011	-	-	-	-	-	-	-	-	-	804	91.6	2,480	-	-	-	-	-	6.6	0.1	-111.1	1.131	4.53	11.66
Area 5	G6M-02-11X	10/3/2011	0.5U	0.5U	0.64	0.5U	0.5U	1.2	1.2U	1.5U	19,000	901	99.9	2,670	7.6J	520	0.13U	5U	0.03U	6.58	0.44	-114.4	0.74	0.95	11.7
Area 5	G6M-02-11X	5/8/2012	-	-	-	-	-	-	-	-	-	769	84.2	2,560	-	-	-	-	-	6.83	0.14	-128.1	1.014	1.03	11.58
Area 5	G6M-02-11X	10/10/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	3.9	1.5U	12,000	683	69.9	1,840	4.2J	390	0.11J	1.3J	0.03U	6.52	0.28	-122.8	1.341	0.84	12.54
Area 5	G6M-02-11X	5/21/2013	-	-	-	-	-	-	-	-	-	649	59.5	3,660	-	-	-	-	-	6.7	0.24	-124.88	1.247	0	18.2
Area 5	G6M-02-11X	10/16/2013	0.5U	0.5U	0.26J	0.20J	0.5U	0.5U	17	1.6U	56,000	616	53	3,230	4.2J	320	0.13U	5.0U	0.03U	6.8	0.22	-114.8	1.243	0.39	14.2
Area 5	G6M-02-11X	6/11/2014	-	-	-	-	-	-	-	-	-	573	50	8,010	-	-	-	-	-	6.84	0.32	-104.4	1.069	1.38	13.5
Area 5	G6M-02-11X	10/29/2014	0.5U	0.5U	0.42J	0.34J	0.5U	0.44J	8.1J	1.5U	15,000	624	64.3J	4,860J	5U	340	0.13U	0.17J	0.03U	6.96	0.35	-156.8	1.224	0.65	12.8
Area 5	G6M-02-11X	6/26/2015	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	8,180	578	51.1	10,800	5.80	312	0.17	2.0 J	1.0 U	5.98	2.49	-62.1	0.934	9.2	12.54
Area 5	G6M-02-11X	9/10/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.5 J	10 U	11,500	546	44.4	9,920	5.30		0.087 J	0.78 J	2.0 U	6.29	3.21	44.2	0.570	5.37	14.62
Area 5	G6M-02-11X	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.8 J	10 U	9,710	551	44.2	10,400	4.9	229	0.062 J	10 U	2.0 U	7.03	0.26	-132.7	0.942	1.12	14.83
Area 5	G6M-02-11X	2/11/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	4,980	584	45.9	9,880	5.1	219	0.10 J	10 U	2.0 U	7.02	0.6	-117.2	0.717	2.14	10.14
Area 5	G6M-02-11X	6/15/2016	1.0 U	1.0 U	0.63 J	1.0 U	1.0 U	1.0 U	4.6	1.0 UJ	11,000	550	35.0	9,000	4.4	250	0.05 U	0.80 U	1.0 U	6.81	2.29	-130.1	0.861	20.9	18.18
Area 5	G6M-02-11X	11/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.6	1.0 U	11,000	530	32.0	7,600	4.1	220	0.05 U	1.0 U	1.0 U	7.16	0.92	-127.9	0.632	5.71	11.82
Area 5	G6M-02-12X	8/1/2002	330	2U	2U	2U	1U	2U	-	-	-	5U	-	-	-	-	-	-	-	6.24	0.64	19	0.924	37.6	14.01
Area 5	G6M-02-12X	8/28/2002	520	6.5	2U	2U	1U	2U	-	-	-	5U	-	-	5U	54	-	-	-	6.15	0.19	156	0.868	2.96	14.12
Area 5	G6M-02-12X	10/29/2002	790	10	2U	2U	1U	2U	-	-	-	5U	1U	1,100	2.0J	40	0.10U	17	2.0U	6.14	0.27	68	0.927	2.08	14.83
Area 5	G6M-02-12X	2/3/2003	580	4	2U	2U	1U	2U	-	-	-	5U	1U	-	5U	52	-	-	-	6.04	-	78	0.947	5.06	12.49
Area 5	G6M-02-12X	7/14/2003	-	-	-	-	-	-	-	-	-	-	-	-	5U	-	-	-	-	-	-	-	-	-	11.03
Area 5	G6M-02-12X	9/22/2004	1,000	43	110	2U	1U	2U	0.005U	0.005U	2,900	5U	1U	450	1U	84	0.5U	13	2U	5.87	0.35	570.2	0.873	4.95	11.59
Area 5	G6M-02-12X	9/27/2005	1,100	38	250	1.4	1U	5.4	0.025U	1.1	14,000	5U	1U	690	3.5	106	0.05U	13J	1U	6.11	1.17	238.5	6.92	24.5	11.73
Area 5	G6M-02-12X	9/21/2006	190	88	64	23	1U	67	0.038	46	15,000	5U	0.37	3,200	7.6	170	0.2U	5.72	1U	6.23	0.17	78	0.799	60.6	11.65
Area 5	G6M-02-12X	9/12/2007	62	50	28	4.4	1U	18	0.4	8.4	11,000	20U	0.58	5,500	2.6J	180	0.2U	340	1.0	6.52	3.06	52.8	0.934	5.8	11.75
Area 5	G6M-02-12X	10/16/2008	0.37J	7.1	18	1.6	0.5U	4.8	1.2U	3.1	19,000	174	11.8	15,800	10U	310	0.10U	7U	0.03U	6.09	0.53	-67.4	1.091	10	11.66
Area 5	G6M-02-12X	10/14/2009	0.5U	0.3J	13	0.74	0.5U	1.6	1.3U	1.6U	6,900	540	24.4	11,000	4.6J	350	0.13U	7U	0.03U	6.27	1.27	-40.0	1.025	1.5	19.7
Area 5	G6M-02-12X	10/5/2010	0.5U	0.5U	5.6	0.27J	0.5U	1.5	1.2U	2	40,000	1,040	72.2	13,700	10U	810	0.050J	2.8J	0.03U	6.34	0.58	-88.1	1.217	1.11	17.11
Area 5	G6M-02-12X	10/4/2011	0.5U	0.5U	6.3	0.5U	0.5U	4.3	1.2U	1.5U	21,000	1,020	71.2	9,540	6.4J	440	0.13U	0.33J	0.03U	6.65	0.48	-89.1	0.807	1.9	13.11
Area 5	G6M-02-12X	10/10/2012	0.5U	0.5U	1.0	0.5U	0.5U	1.0	1.8	1.5U	14,000	865	65.8	5,010	4.0J	320	0.13U	0.59J	0.03U	6.76	0.7	-111.4	1.068	1.68	14.37

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 5	G6M-02-12X	10/16/2013	0.5U	0.5U	0.7	0.21J	0.5U	0.54	10	1.5U	55,000	809	61.3	4,910	4.2J	83	0.13U	5.0U	0.03U	6.85	0.45	-127.7	1.01	1.87	21.32
Area 5	G6M-02-12X	10/29/2014	0.5U	0.5U	0.9	0.56	0.5U	0.79	9.2	1.5U	25,000	760	56J	4,870J	6.2J	330	0.13U	0.22J	0.03U	6.96	0.83	-103.4	0.995	2.48	15.51
Area 5	G6M-02-12X	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	11,300	714	42.6	8,540	6.4	243	0.11 U	10 U	2.0 U	7.26	1.07	-108.0	0.63	6.17	13.71
Area 5	G6M-02-12X	11/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.2	1.0 U	9,400	720	40.0	7,700	4.5	210	0.05 U	2	1.0 U	6.90	1.24	-131	0.53	13.9	11.88
Area 5	G6M-03-08X	5/14/2003	750	2U	2U	2U	1U	2U	-	-	-	5U	1U	-	-	-	-	-	-	-	-	-	-	-	13.25
Area 5	G6M-03-08X	9/22/2004	690	6.3	5.4	2U	1U	2U	0.005U	0.005U	1.8	5U	1U	15U	1U	16	8.3	13	1.5J	5.89	1.81	247.6	0.463	3.22	14.12
Area 5	G6M-03-08X	12/16/2004	1,100	11	9.6	2U	1U	2U	0.069	0.03	4.7	5U	1U	17	5U	20	5.7	13	2.9	5.93	0.7	135.7	0.495	8.98	13.25
Area 5	G6M-03-08X	3/31/2005	340	20U	9.6J	20U	20U	20U	0.011	0.45	14	5U	1U	15U	0.3J	12	2.3	17	2U	5.94	1.96	166.3	0.205	0.93	12.82
Area 5	G6M-03-08X	7/6/2005	780	8.2	15	2U	1U	2U	0.11	0.068	410	4U	1U	10U	5.5	28.6	1.8	14	1U	5.85	0.78	236.1	0.463	5.37	13.36
Area 5	G6M-03-08X	9/28/2005	620	4.8	14	1U	1U	1U	0.025U	0.009J	2,400M	5U	1U	15U	5U	28.3	1.6	12	1U	5.60	3.56	172.3	0.352	8.3	10.8
Area 5	G6M-03-08X	12/14/2005	700	8	17	2U	1U	2U	0.025U	0.025U	7,000	5U	1U	15UJ	5U	32	1.2	12	1U	6.16	0.54	153.8	0.404	3.7	11.48
Area 5	G6M-03-08X	3/22/2006	1,100	21J	34	2.6	1U	2U	0.025U	0.006J	12,000	5U	0.1U	15U	6.5	29	0.586	11.7	1U	6.28	5.43	394.2	0.299	9.75	10.71
Area 5	G6M-03-08X	6/21/2006	610	16	48	2U	1U	2U	0.004J	0.14	16,000	5U	1.8	42	5U	41J	0.33	10.2	1U	5.91	0.29	141.6	0.49	21.4	10.62
Area 5	G6M-03-08X	9/21/2006	660	47	110	2U	1U	5.2	0.023J	0.55	14,000	5U	0.10U	15U	3.2J	41	0.228	9.64	1U	6.00	2.36	122.5	0.325	17.1	11.03
Area 5	G6M-03-08X	12/12/2006	750	45	120	2U	1U	7.8	0.013	0.59	16,000	5U	.01U	15U	5U	-	-	-	-	5.98	0.22	145	0.350	7.0	11.9
Area 5	G6M-03-08X	3/29/2007	570	37	74	2U	1U	11	0.006J	0.72	14,000	5U	0.1U	15U	5U	-	-	-	-	5.79	0.07	21.3	0.392	1.41	11.59
Area 5	G6M-03-08X	6/12/2007	740	55	88	2U	1U	14	0.025U	0.7	15,000	5U	0.1U	15U	0.6J	-	-	-	-	5.93	0.25	135.2	0.413	41.3	10.18
Area 5	G6M-03-08X	9/10/2007	520	75	75	2U	1U	21	0.025U	1.7	14,000	2U	0.1U	15U	5U	42	0.2U	200	1U	5.92	2.55	154.2	0.385	9.7	11.35
Area 5	G6M-03-08X	12/11/2007	390	53	49	2U	1U	15	0.004J	1.6	15,000	5U	0.1U	20	5U	-	-	-	-	5.76	0.23	129.3	0.437	0.8	11.11
Area 5	G6M-03-08X	3/13/2008	390	5	10	2U	1U	2U	0.003J	0.051	2,800	5U	0.1U	20	5U	-	-	-	-	5.89	0.22	111.6	0.195	0.3	11.55
Area 5	G6M-03-08X	10/20/2008	290	61	140	5U	5U	26	1.3U	2.1	21,000	8U	0.2U	33.2	10U	110	0.13U	14	0.03U	6.42	1.58	68.9	0.548	2.0	12.1
Area 5	G6M-03-08X	5/6/2009	120	38	150	4.0U	4.0U	15	1.2U	1.6	37,000	3.1J	0.2U	144	10U	190J	0.13U	10	0.03U	5.93	0.32	100.8	0.701	1.5	13.18
Area 5	G6M-03-08X	10/14/2009	5U	20	120	5U	5U	11	1.3U	1.6U	7,300J	8.0U	0.139U	1,470	10U	240	0.13U	8.3	0.03U	5.91	0.33	152.3	0.643	2.11	-
Area 5	G6M-03-08X	4/20/2010	26J	9.9J	88J	2UJ	2UJ	1.5J	1.3U	1.6U	3,500	9.0	0.194U	6,520	10U	250	0.13U	7.8	0.03U	6.31	0.90	87.9	0.382	0.3	14.33
Area 5	G6M-03-08X	10/4/2010	8.2	5.2	80	2U	2U	3.5	1.2U	1.5U	890	3.4J	0.132U	11,300	10U	360	0.13U	5.5	0.03U	6.07	0.68	84.9	0.549	0.0	10.23
Area 5	G6M-03-08X	6/8/2011	-	-	-	-	-	-	-	-	-	14.1	0.266	16,100	-	-	-	-	-	6.28	0.21	49.5	0.686	0.5	11.28
Area 5	G6M-03-08X	10/3/2011	4.3	3.4	62	2.5U	2.5U	9.6	1.2U	1.5U	590	5.1J	0.194J	16,800	10U	360	0.13U	3.2J	0.03U	6.17	0.43	77.2	0.603	0.51	15.19
Area 5	G6M-03-08X	5/8/2012	-	-	-	-	-	-	-	-	-	5.0U	0.127U	17,700	-	-	-	-	-	6.58	1.87	39.7	0.618	0.55	13.06
Area 5	G6M-03-08X	10/9/2012	0.5U	0.78	9.8	0.76	0.5U	7.4	1.3U	3.6	110	5U	0.152	18,600	2.5J	380	0.13U	1.4J	0.03U	6.34	0.43	53.9	0.648	1.42	11.87
Area 5	G6M-03-08X	5/22/2013	-	-	-	-	-	-	-	-	-	3.1J	0.117U	12,500	-	-	-	-	-	6.56	1.4	36.5	0.591	0.14	11.9
Area 5	G6M-03-08X	10/15/2013	0.5U	0.87	2.8	1.2	0.5U	1.6	1.8	1.5U	360	5.2	0.121U	12,300	3.0J	450	0.13U	5.0U	0.03U	6.57	0.39	82.7	0.851	0.0	16.01
Area 5	G6M-03-08X	6/12/2014	-	-	-	-	-	-	-	-	-	4.3J	0.152	9,850	-	-	-	-	-	6.57	1.84	58.9	0.592	6.31	13.03
Area 5	G6M-03-08X	6/18/2015	0.50 U	0.51 J	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	5.0 U	2.5 J	0.05 U	2,320	5.40	83.2	0.11 U	8.4 J	1.0 U	6.32	1.11	113.0	0.273	8.42	13.18
Area 5	G6M-03-08X	10/14/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area 5	G6M-03-08X	2/24/2016	1.0 U	1.0 U	3.0	1.0 U	1.0 U	1.0 U	10 U	10 U	90.7	8.2	1.03	4,710	1.8	155	0.10 U	3.1 J	2.0 U	6.79	1.03	-54.7	0.244	3.93	7.53
Area 5	G6M-03-08X	11/14/2016	1.0 U	0.96 J	0.84 J	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	170	12	0.18	4,200	1.3	140	0.053 J	9.8	1.0 U	7.03	1.19	-99.6	0.339	7.46	8.32
Area 5	G6M-03-09X	5/14/2003	2U	2U	2U	2U	1U	2U	-	-	-	5U	1U	-	-	-	-	-	-	-	-	-	-	-	13.34
Area 5	G6M-03-09X	9/23/2004	3.7	2U	2U	2U	1U	2U	0.005U	0.005U	1.9	5U	1U	15U	1U	23	19	15	2.2	6.23	8.67	176.2	0.13	4.57	13.22
Area 5	G6M-03-09X	12/14/2004	2U	2U	2U	2U	1U	2U	0.015	0.026	2	5U	1U	15U	5U	25	11	15	2U	6.08	8.17	417.6	0.106	12.1	12.43
Area 5	G6M-03-09X	3/29/2005	1.5J	2U	2U	2U	1U	2U	0.013	0.26	1.4	5U	1UM	15U	0.3J	18	1.5	13	2U	6.18	6	113.2	0.123	72.4	13.27
Area 5	G6M-03-09X	6/30/2005	5.8	2U	2U	2U	1U	2U	0.077	0.032	1.2	2U	1UJ	10U	15	25.1	1.3	13	1U	5.75	2.81	160.2	0.135	53.6	10.23
Area 5	G6M-03-09X	9/28/2005	2U	2U	2U	2U	1U	2U	0.006J	0.009J	29	5U	1U	15U	4J	38.2	3.7	13	1U	5.90	10.56	181	0.108	7.6	11.2
Area 5	G6M-03-09X	12/13/2005	2U	2U	2U	2U	1U	2U	0.005J	0.014J	790	5U	1U	15U	5U	53	0.05U	13	1U	6.21	3.06	259.3	172	4.9	10.62
Area 5	G6M-03-09X	3/22/2006	2U	2U	2U	2U	1U	2U	0.006J	0.016J	39	5U	0.1U	20	7.9	36	1.81	12.1	1U	6.40	3	415.5	0.102	10.83	10.99
Area 5	G6M-03-09X	6/23/2006	2U	2U	2U	2U	1U	2U	0.025U	0.042	390	5U	0.1U	15U	5U	39	2.65	13.2	1U	5.92	4.55	164.9	0.156	16.9	11.02
Area 5	G6M-03-09X	9/21/2006	2U	2U	2U	2U	1U	2U	0.014J	0.12	140	5U	0.10U	15U	0.8J	36	2.51	9.19	1UJ	6.71	2.24	127.6	0.212	4.56	13.75
Area 5	G6M-03-09X	12/13/2006	2U	2U	2U	2U	1U	2U	0.025U	0.019J	870	5U	0.10U	15U	5U	-	-	-	-	6.21	3.38	142.8	0.162	5.6	11.45
Area 5	G6M-03-09X	3/29/2007	2U	2U	2U	2U	1U	2U	0.006J	0.032	1,600	5U	0.1U	15U	1.8J	-	-	-	-	6.08	0.16	16.4	0.217	2.45	10.57
Area 5	G6M-03-09X	6/13/2007	3.8	2U	2U	2U	1U	2U	0.005J	0.011J	870	5U	0.1U	15U	0.5J	-	-	-	-	6.26	0.36	111	0.154	7.6	11.36
Area 5	G6M-03-09X	9/10/2007	2U	2U	2U	2U	1U	2U	0.025U	0.025U	18,000	6U	0.1U	15U	5U	53	2.01	20	1U	6.26	2.74	128	0.193	9.9	11.07
Area 5	G6M-03-09X	12/11/2007	2U	2U	2U	2U	1U	2U	0.006J	0.022J	2,200	5U	0.1U	15U	5U*	-	-	-	-	6.03	0.11	110.3	0.19	2.1	11.41

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 5	G6M-03-09X	3/12/2008	2U	2U	2U	2U	1U	2U	0.027	0.016J	5,200	5U	0.11	18	5U	-	-	-	-	6.33	0.24	24.6	0.159	0.5	11.51
Area 5	G6M-03-09X	10/20/2008	0.37J	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	1,600	8U	0.2U	50U	10U	48	0.84	19	0.03U	5.98	0.24	177.8	0.129	6.5	11.28
Area 5	G6M-03-09X	5/6/2009	0.78	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	340	8U	0.2U	50U	10U	52J	0.9	14	0.03U	5.99	0.33	104	0.171	1.0	11.35
Area 5	G6M-03-09X	10/14/2009	0.35J	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	230	8U	0.2U	50U	10U	53	0.32	13	0.03U	5.49	0.26	-89.9	0.161	0	-
Area 5	G6M-03-09X	4/20/2010	0.5UJ	0.5UJ	0.5UJ	0.5UJ	0.5UJ	0.5UJ	1.3U	1.6U	700	5U	0.1U	25U	10U	90	0.13U	12	0.03U	6.19	0.40	166	0.102	0.6	15.41
Area 5	G6M-03-09X	10/4/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	35J	5U	0.1U	25U	10U	44	0.86	12	0.03U	5.90	1.18	146.6	0.159	0.6	12.1
Area 5	G6M-03-09X	6/8/2011	-	-	-	-	-	-	-	-	-	5U	1.68	11.4J	-	-	-	-	-	5.99	0.42	122.8	0.154	0.4	11.09
Area 5	G6M-03-09X	10/3/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	230	20U	0.2U	50U	10U	35	0.39	11	0.03U	5.82	0.61	163.2	0.107	0.23	16.6
Area 5	G6M-03-09X	5/8/2012	-	-	-	-	-	-	-	-	-	5.0U	0.1U	25U	-	-	-	-	-	6.12	2.27	186.4	0.095	0.71	13.41
Area 5	G6M-03-09X	10/9/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	2.6	5U	0.1U	6.2 J	10U	25	2.8	8.9	0.03U	5.71	4.36	167.9	0.136	0.58	12.12
Area 5	G6M-03-09X	5/22/2013	-	-	-	-	-	-	-	-	-	5U	0.1U	25U	-	-	-	-	-	6.01	0.46	172.9	0.084	1.83	13.94
Area 5	G6M-03-09X	10/15/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	7,600	5U	0.1U	9.6J	10U	29	0.82	10	0.03U	6.08	1.16	150.3	0.144	0	15.96
Area 5	G6M-03-09X	6/12/2014	-	-	-	-	-	-	-	-	-	5U	0.0219U	7.4J	-	-	-	-	-	5.89	0.54	163.9	0.102	2.49	14.07
Area 5	G6M-03-09X	10/28/2014	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.4	1.5U	20	2.5U	0.268J	13.4J	5U	35	1.6	11	0.03U	6.24	1.65	124.1	0.139	2.78	13.61
Area 5	G6M-03-09X	6/18/2015	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	30	2.0 U	0.05 U	20	0.70 U	27.0	0.057 U	8.6 J	1.0 U	5.39	0.45	169.7	0.191	2.25	11.35
Area 5	G6M-03-09X	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	1,090	4.0 U	0.10 U	57	1.0 U	27.8	0.11 U	11.4	2.0 U	6.06	0.22	123.1	0.144	0.81	15.66
Area 5	G6M-03-09X	2/19/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	14.1	6.4 J	270	4.0 U	0.10 U	99.5	1.0 U	36.9	0.19	10.5	2.0 U	8.64	2.29	513.6	0.100	3.99	9.63
Area 5	G6M-03-09X	6/16/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	8.8	3.0 U	0.05 U	81	0.78 J	43.0	0.05 U	16.0	1.0 U	6.02	1.8	131.6	0.22	3.32	11.76
Area 5	G6M-03-09X	11/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.58 U	3.0 U	0.05 U	90	0.78 J	31	1.5	8.4	1.0 U	6.23	1.27	8.0	0.119	4.19	9.4
Area 5	G6M-03-10X	5/14/2003	15	2U	2U	2U	1U	2U	-	-	-	5U	1.0U	-	-	-	-	-	-	-	-	-	-	-	14.23
Area 5	G6M-03-10X	9/22/2004	27	2U	2U	2U	1U	2U	0.05	0.68	680	5U	1U	340	1U	51	2.8	12	1.5J	6.28	1.28	-77.2	0.539	20.5	13.06
Area 5	G6M-03-10X	12/14/2004	19	2U	44	2U	1U	2U	0.02	0.025	1.9	5U	1U	880	5U	110	3.8	21	2U	6.52	0.94	62	0.801	1.57	13.92
Area 5	G6M-03-10X	3/29/2005	14	0.98J	68	1.2J	1U	2U	0.005U	0.38	2,600	5U	1UM	1,200	5.9	146	0.2U	12	2U	6.44	0.59	-14.5	0.869	6.77	11.8
Area 5	G6M-03-10X	6/30/2005	3.6	2U	2U	2U	1U	2U	0.026	0.021	8,600	2U	1UJ	1,900	19	199	0.1	11	1U	5.18	0.39	273.2	0.702	5.06	12.45
Area 5	G6M-03-10X	9/28/2005	6.7	2U	2U	2U	1U	2U	0.025U	0.020J	1,100	5U	1U	720	0.6J	140	0.2	16	1U	6.43	4.3	74.1	0.588	7.36	11.31
Area 5	G6M-03-10X	12/13/2005	3.4	2U	2U	2U	1U	2U	0.009J	0.027	12,000	6.9	1U	3,020	5U	250	0.48	8.4	1U	6.73	0.15	57.2	1.032	1.3	12.28
Area 5	G6M-03-10X	3/23/2006	9.9	2U	2U	2U	1U	2U	0.020J	0.052	7,000	5U	0.22	3,800	3.5J	170	0.2U	8.9	1U	6.64	0.67	36.6	0.663	5.39	12.15
Area 5	G6M-03-10X	6/22/2006	2.6	2U	2U	2U	1U	2U	0.004J	0.042	14,000	5U	0.74	7,300	5J	200	0.2U	4.44	1U	4.87	0.64	610.8	0.77	0.64	13.95
Area 5	G6M-03-10X	9/20/2006	2.2	2U	2U	2U	1U	2U	0.006J	0.14	14,000	5U	0.21	6,200	6	180	0.2U	6.95	1U	6.41	1.26	-140.2	0.856	3.9	12.27
Area 5	G6M-03-10X	12/13/2006	2.8	2U	3.4	2U	1U	2U	0.025U	0.025U	20,000	5U	0.27	8,500	2J	-	-	-	-	6.45	0.26	168.2	0.870	5.0	11.38
Area 5	G6M-03-10X	3/29/2007	2.2	2.1	4.2	2U	1U	2U	0.007J	0.16	24,000	8.6	0.3	9,100J	4.8J	-	-	-	-	6.20	0.32	-60.7	0.97	2.99	12.14
Area 5	G6M-03-10X	6/11/2007	2.5	2U	4.1	2U	1U	2U	0.025U	0.095	29,000	23	1	11,000	6.7	-	-	-	-	6.27	0.41	45.5	0.947	8.5	11.61
Area 5	G6M-03-10X	9/10/2007	2U	2U	3.8	2U	1U	2U	0.1	0.057	620	29	0.4	8,100	3.5J	150	0.2U	290	1U	6.28	0.24	61.3	0.859	13.6	12.27
Area 5	G6M-03-10X	12/12/2007	2U	2U	2.8	2U	1U	2U	0.025U	0.043	20,000	26	0.33	9,200	5.8	-	-	-	-	6.14	0.66	69.8	0.755	7.5	12.45
Area 5	G6M-03-10X	3/11/2008	16	8.7	16	2U	1U	4	0.04	59	28,000	91	15	9,200	5J	-	-	-	-	6.32	0.22	-62.9	1.029	7.3	11.74
Area 5	G6M-03-10X	10/20/2008	1.0	2.0	5.4	0.5U	0.5U	1.0	1.3U	1.6U	21,000	248	7.07	10,300	170	170	0.13U	8.3	0.03U	5.98	0.21	-10.9	0.781	8.2	18.11
Area 5	G6M-03-10X	5/6/2009	1.0	5.0	9.1	0.5U	0.5U	1.5	1.2U	1.5U	31,000	522	54.4	9,210	11	230J	0.0076J	9.3	0.03U	5.91	0.33	-64.0	1.04	0.5	18.59
Area 5	G6M-03-10X	10/14/2009	0.61	3.7	10	0.5U	0.5U	2.2	1.3U	1.6U	9,000J	518	57.8	7,410	7.4J	310	0.13U	21	0.03U	6.32	0.67	-62.2	0.896	1.2	19.1
Area 5	G6M-03-10X	4/20/2010	1.2	5.6	2.0	0.21J	0.5U	1.1	1.2U	1.5U	4,100	648	60.5J	4,910	4.7J	130	0.13U	6.5	0.03U	6.78	0.77	-101.1	0.799	1.4	16.25
Area 5	G6M-03-10X	10/4/2010	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	6.2	20,000	475	58.1	5,650	10U	230	0.13U	5.9	0.03U	6.52	0.22	-115.6	0.729	0.5	11.33
Area 5	G6M-03-10X	6/9/2011	-	-	-	-	-	-	-	-	-	520	53.9	2,550	-	-	-	-	-	6.74	0.58	-118.8	0.704	4.62	12.12
Area 5	G6M-03-10X	10/3/2011	0.5U	2.7	1.2	0.5U	0.5U	0.53	1.2U	1.5U	9,800	528	54.5	3,980	3.0J	100	0.21	7.6	0.030U	6.75	0.10	-85.8	0.633	0.85	12.31
Area 5	G6M-03-10X	5/8/2012	-	-	-	-	-	-	-	-	-	480	56	4,070	-	-	-	-	-	7	0.15	-119.1	0.817	0.77	13.02
Area 5	G6M-03-10X	10/9/2012	0.5U	0.55	0.5U	0.5U	0.5U	0.5U	22	1.6U	13,000	456	47.5	2,280	10U	100	0.13U	8.4	0.03U	6.88	0.43	-109.6	0.94	0	12.11
Area 5	G6M-03-10X	5/22/2013	-	-	-	-	-	-	-	-	-	514	57.1	2,340	-	-	-	-	-	6.8	0.16	-137.6	1.111	0.4	12
Area 5	G6M-03-10X	10/15/2013	0.5U	0.68	0.52	0.5U	0.5U	0.5U	1.8	1.5U	23,000	452	50.6	2,770	10U	80	0.042U	9.2	0.03U	6.87	4.57	-122.7	1.018	0.19	12.22
Area 5	G6M-03-10X	6/12/2014	-	-	-	-	-	-	-	-	-	510	51.9	2,400	-	-	-	-	-	6.82	0.51	-88	0.857	Overrange	22.11
Area 5	G6M-03-10X	10/29/2014	0.5U	0.77	0.92	0.5U	0.5U	0.41J	1.2U	1.5U	14,000	418	42.9J	3,090J	5U	92	0.13U	8.6	0.03U	7.02	0.29	-122.4	0.787	4.94	19.6
Area 5	G6M-03-10X	9/10/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	8,910	453	68.1	2,020	1.50	-	0.080 J	10.8	2.0 U	6.56	0.51	-107.5	0.787	3.00	12.58
Area 5	G6M-03-10X	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	11,500	457	69.3	2,410	1.9	64.9	0.11 U	7.8 J	2.0 U	7.03	0.49	-128.0	1.206	1.74	19.32
Area 5	G6M-03-10X	2/11/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	7,550	492	72	2,370	3.3	105	0.11	2.0 J	2.0 U	7.02	0.4	-131.1	1.345	0.1	9.96

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 5	G6M-03-10X	6/16/2016	16	0.65 J	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	14,000	400	61	1,600	1.8	88	0.05 U	3.3	1.0 U	6.18	1.16	-86.0	1.407	8.39	13.13
Area 5	G6M-03-10X	11/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	8,000	430	68	2,700	1.6	110	0.05 U	3.7	1.0 U	7.11	11.66	-101.7	0.745	6.94	7.4
Area 5	G6M-04-05X	9/22/2004	140	2U	2U	2U	1U	2U	0.005U	0.0092	1.3	5U	1U	15U*	1U	14	4.9	14	2U	6.10	9.68	233.9	0.099	0.68	11.28
Area 5	G6M-04-05X	12/15/2004	17	2U	2U	2U	1U	2U	0.005U	0.016	1.4	5U	1U	15U	5U	14	7.5	13	2U	5.87	1.17	228.7	0.098	1.04	11.37
Area 5	G6M-04-05X	3/30/2005	130	10U	10U	10U	5U	10U	0.0074	0.028	15	5U	1U	15U	0.5J	14	1.2	10	2U	6.04	2.8	123.1	0.093	1.92	11.81
Area 5	G6M-04-05X	6/30/2005	200	2U	2U	2U	1U	2U	0.041	0.022	96	2U	1UJ	10U	2.4	15.9	0.87	8.9	1U	5.48	0.88	207.1	0.094	8.19	11.49
Area 5	G6M-04-05X	9/29/2005	110	2U	2U	2U	1U	2U	0.006J	0.012J	220	5U	1U	33	5U	3.3	0.98	14	1U	6.08	0.2	215.3	0.061	2.1	10.48
Area 5	G6M-04-05X	12/14/2005	36	2U	2U	2U	1U	2U	0.007J	0.016J	550	5U	1U	15U	5U	21	1.6	11	1U	6.10	0.23	179.3	0.091	0.3	11.31
Area 5	G6M-04-05X	3/22/2006	330	2U	2U	2U	1U	2U	0.025U	0.019J	2,200	5U	0.1U	15U	3.4J	13	1.11	9.33	1U	6.21	0.77	343.3	0.062	0.86	11.08
Area 5	G6M-04-05X	6/22/2006	38	2U	2U	2U	1U	2U	0.025U	0.082	33	5U	0.1U	15U	5U	22J	1.82	9.01	1U	4.40	2.55	760.6	0.083	0	11.56
Area 5	G6M-04-05X	9/22/2006	30	2U	2U	2U	1U	2U	0.009J	0.084	140	5U	0.10U	15U	5U	15	1.51	10.8	1U	5.78	1.48	-127.3	0.123	0.34	11.56
Area 5	G6M-04-05X	12/12/2006	8.7	2U	2U	2U	1U	2U	0.025U	0.010J	850	5U	0.1U	15U	5U	-	-	-	-	5.66	0.39	156.7	0.105	0	11.24
Area 5	G6M-04-05X	3/29/2007	16	2U	2U	2U	1U	2U	0.025U	0.022J	460	5U	0.12	15U	1.4J	-	-	-	-	5.79	0.13	57.9	0.185	0.01	-
Area 5	G6M-04-05X	6/12/2007	12	2U	2U	2U	1U	2U	0.005J	0.041	330	5U	0.1U	15U	0.4J	-	-	-	-	5.89	0.52	168.2	0.116	4.4	15.84
Area 5	G6M-04-05X	9/10/2007	43	2U	2U	2U	1U	2U	0.24	0.089	340	2U	0.1U	15U	5U	20	1.61	17	1U	5.89	2.6	142.8	0.103	3.9	12.77
Area 5	G6M-04-05X	12/11/2007	7.2	2U	2U	2U	1U	2U	0.025U	0.013J	1,900	5U	0.19	15U	5U	-	-	-	-	5.75	0.23	134.1	0.118	0.6	15.25
Area 5	G6M-04-05X	3/13/2008	2.5	2U	2U	2U	1U	2U	0.009J	0.020J	1,300	5U	0.1U	17	5U	-	-	-	-	5.9	0.18	121	0.129	0.2	17.23
Area 5	G6M-04-05X	10/20/2008	3.7	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	3,300	8U	0.2U	50U	10U	30	1.5	10	0.03U	5.92	0.73	80	0.152	0	15.18
Area 5	G6M-04-05X	5/6/2009	16	0.38J	0.84	0.5U	0.5U	0.27J	1.3U	1.6U	2,200	8U	0.2U	50U	10U	49J	0.37	17	0.03U	5.72	0.2	125.5	0.187	0	11.92
Area 5	G6M-04-05X	10/14/2009	8.2	0.5U	0.29J	0.5U	0.5U	0.5U	1.3U	1.6U	2,000J	8.0U	0.127U	60U	10U	29	0.39	15	0.03U	5.62	0.5	184	0.203	0	14.07
Area 5	G6M-04-05X	4/20/2010	2.3J	0.5UJ	0.5UJ	0.5UJ	0.5UJ	0.5UJ	1.2U	1.5U	3,200	5U	0.1U	25U	10U	80	0.30	15	0.03U	5.92	0.4	152.5	0.144	0.20	17.68
Area 5	G6M-04-05X	10/4/2010	0.28J	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	18	5U	0.1U	25U	10U	30	1.7	13	0.03U	5.67	1.51	145.5	0.131	0.8	15.25
Area 5	G6M-04-05X	6/8/2011	-	-	-	-	-	-	-	-	-	5U	0.1U	12.7J	-	-	-	-	-	5.78	0.12	134.1	0.193	1.0	13.15
Area 5	G6M-04-05X	10/3/2011	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	2,000	20U	0.2U	11.4J	2.3J	39	0.47	19	0.03U	5.76	0.20	158.9	0.174	0.44	14.14
Area 5	G6M-04-05X	5/8/2012	-	-	-	-	-	-	-	-	-	5.0U	0.1U	10.9J	-	-	-	-	-	6.01	0.83	157.2	0.16	0.56	14.76
Area 5	G6M-04-05X	10/9/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	1,800	5U	0.1U	21.8 J	10U	32	0.063J	16	0.03U	5.76	0.27	108.4	0.171	0.84	14.36
Area 5	G6M-04-05X	5/22/2013	-	-	-	-	-	-	-	-	-	2.7J	0.1U	25U	-	-	-	-	-	5.9	0.25	134.1	0.156	1.75	13.2
Area 5	G6M-04-05X	10/15/2013	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	28,000	5U	0.1U	15.4J	10U	60	0.13U	18	0.03U	6.01	0.47	145.8	0.199	0.00	14.17
Area 5	G6M-04-05X	6/12/2014	-	-	-	-	-	-	-	-	-	2.4J	0.195U	13.3J	-	-	-	-	-	6.09	0.41	86.2	0.193	0.68	12.29
Area 5	G6M-04-05X	10/28/2014	0.42J	0.5U	0.5U	0.5U	0.5U	0.5U	2.8	1.6	48	4.1J	0.029	12.2J	10U	39	0.31	13	0.03U	6.49	0.62	81.9	0.182	0.48	11.61
Area 5	G6M-04-05X	6/17/2015	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	22.4 J	2.0 U	0.05 U	11.8 J	0.81 U	22.9	0.29	23.30	1.0 U	-	-	-	-	-	-
Area 5	G6M-04-05X	9/10/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	7.5 J	1.0 U	-	0.21	25.40	2.0 U	5.75	0.95	67.6	0.245	2.08	12.07
Area 5	G6M-04-05X	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	53	4.0 U	0.10 U	20	1.1	31.9	0.20	21.9	2.0 U	5.96	0.50	116.4	0.264	2.44	11.84
Area 5	G6M-04-05X	2/22/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	305	4.0 U	0.10 U	21.9	1.0 U	34.7	0.11 U	26.8	2.0 U	5.93	1.03	112.9	0.187	1.92	10.35
Area 5	G6M-04-05X	11/14/2016	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	15	3.0 U	0.05 U	20	0.75 J	36	0.19	24	1.0 U	6.33	1.22	23.9	0.176	4.16	9.56
Area 5	G6M-04-06X	9/22/2004	160	2U	2U	2U	1U	2U	0.056	0.005U	3.4	5U	1U	15U	1U	110	5.3	8.7	2U	11.01	9.17	-0.6	0.341	1.34	11.37
Area 5	G6M-04-06X	12/16/2004	24	2U	2U	2U	1U	2U	0.017	0.028	0.47	21	1U	15U	5U	54	7.9	10	2.9	10.89	9.42	106.9	0.254	2.26	13.13
Area 5	G6M-04-06X	3/30/2005	37	2U	2U	2U	1U	2U	0.0087	0.051	0.58	7.5	1U	15U	5U	37	2	12	2U	9.47	10.46	10.6	0.235	0.32	11.56
Area 5	G6M-04-06X	7/1/2005	140	2U	2U	2U	1U	2U	0.034	0.056	9.7	2U	1UJ	190	2.8J	10.3	1.5	25	1U	9.08	9.77	457.2	0.214	0.95	11.76
Area 5	G6M-04-06X	9/29/2005	32	2U	2U	2U	1U	2U	0.009J	0.018J	0.7	11	1U	15U	5.4	70.4	1.9	12	1U	9.32	9.43	390.6	0.192	1.99	11.46
Area 5	G6M-04-06X	12/15/2005	26	2U	2U	2U	1U	2U	0.009J	0.022J	3.3	80.9	1U	150	7.6	39	1.9	12	1U	9.74	10.17	151.2	0.226	0.3	14.61
Area 5	G6M-04-06X	3/23/2006	100	2U	2U	2U	1U	2U	0.006J	0.036	3.1	5U	0.1U	15U	5U	23	1.71	9.29	1U	8.94	9.46	452.5	0.188	1.72	10.34
Area 5	G6M-04-06X	6/23/2006	190	2U	2U	2U	1U	2U	0.012J	0.041	10	13J	0.1U	15U	5U	41	1.69	9.43	1U	8.66	9.75	165.3	0.254	3.55	12.76
Area 5	G6M-04-06X	9/21/2006	45	2U	2U	2U	1U	2U	0.016J	0.11	6.3	5U	0.10U	15U	1.9J	31	1.03	10.9	1U	9.46	9.75	66.6	0.347	1.45	17.93
Area 5	G6M-04-06X	12/11/2006	37	2U	2U	2U	1U	2U	0.010J	0.044	4.3	5U	0.1U	15U	5U	-	-	-	-	9.67	9.67	108	0.257	4.4	14.21
Area 5	G6M-04-06X	3/29/2007	18	2U	2U	2U	1U	2U	0.011J	0.021J	13	5U	0.1U	15U	5U*	-	-	-	-	8.99	14.57	150.7	0.137	11.1	11.92
Area 5	G6M-04-06X	6/12/2007	25	2U	3.5	2U	1U	2U	0.010J	0.061	19	5U	0.1U	15U	5U	-	-	-	-	8.82	10.12	118.1	0.272	4.9	13.9
Area 5	G6M-04-06X	9/10/2007	23	2U	3	2U	1U	2U	0.005J	0.007J	0.13	8U	0.1U	15U	5U	38	1.32	82	1U	8.14	6.73	50.1	0.248	9.9	16.14
Area 5	G6M-04-06X	12/12/2007	22	2U	6.3	2U	1U	2U	0.004J	0.025U	0.21	5U	0.1U	15U	5U	-	-	-	-	7.36	12.25	81.7	0.335	0.2	13.66
Area 5	G6M-04-06X	3/14/2008	14	2U	2.4	2U	1U	2U	0.005J	0.025U	2.8	5U	0.1U	15U	5U	-	-	-	-	7.29	10.89	186.9	0.224	0.3	13.13
Area 5	G6M-04-06X	10/16/2008	24	0.68	2.2	0.5U	0.5U	0.5U	1.3U	1.6U	2	8.5	0.2U	11.5J	10U	34	1.47U	11	0.03U	7.69	9.11	209.6	0.198	1	13.01

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 5	G6M-04-06X	5/6/2009	13	0.51	1.8	0.5U	0.5U	0.5U	1.3U	1.6U	1.6	6.9	0.2U	50U	10U	44	1.3	14	0.03U	7.35	9.41	9.2	0.209	1.9	15.25
Area 5	G6M-04-06X	10/14/2009	10	0.46J	1.8	0.5U	0.5U	0.5U	1.3U	1.6U	22J	7.4U	0.2U	50U	10U	44	1.3	11	0.03U	7.15	9.4	150	0.197	0	13.65
Area 5	G6M-04-06X	4/20/2010	3.0J	0.5UJ	0.5UJ	0.5UJ	0.5UJ	0.5UJ	1.2U	1.5U	150	7.3	0.1U	25U	10U	60	1.8	11	0.03U	6.75	2.86	27.1	0.147	0.0	12.92
Area 5	G6M-04-06X	10/4/2010	0.95	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	2,000	6.1	0.1U	25U	10U	57	1.8	9.1	0.03U	6.50	0.38	121.6	0.216	0.0	14.01
Area 5	G6M-04-06X	10/3/2011	4.0	0.5U	2.0	0.5U	0.5U	0.5U	1.2U	1.5U	9,200	4.7J	0.2U	10.7J	10U	71	0.74	11	0.03U	6.06	1.46	70.2	0.133	0.24	11.95
Area 5	G6M-04-06X	10/9/2012	3.7	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	14,000	5U	0.1U	21.2 J	10U	62	0.48	16	0.03U	6.05	0.31	135.7	0.239	0	11.64
Area 5	G6M-04-06X	10/15/2013	4.5	0.37J	0.55	0.5U	0.5U	0.5U	1.2U	1.5U	36,000	5U	0.1U	88.2	10U	140	0.13U	12	0.03U	6.09	1.07	171.1	0.242	0.04	10.6
Area 5	G6M-04-06X	10/28/2014	1.2	0.78	0.41J	0.5U	0.5U	0.5U	8.1J	1.5U	1,200	2.5U	0.0243U	157J	5U	70	0.29	15	0.03U	6.51	0.29	164.7	0.205	1.63	11.28
Area 5	G6M-04-06X	10/19/2015	1.7	0.70 J	1.0 U	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	74	1.0	59.7	0.11 U	13.0	2.0 U	-	-	-	-	-	-
Area 5	G6M-04-06X	11/14/2016	1.5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.82	3.0 U	0.017 J	77	1.0	62	0.05 U	15	2.0	6.47	1.01	-8.6	0.189	5.87	9.97
Area 5	G6M-04-07X	9/22/2004	900	2.7	8.4	2U	1U	2U	0.061	0.12	3.1	5U	1U	260	1U	56	5.4	32	2U	7.10	3.42	110.1	0.243	9.28	11.98
Area 5	G6M-04-07X	12/17/2004	1,100	2	9.3	2U	1U	2U	0.11	2.2	2.1	28	1U	47	0.6J	43	6.4	14	2U	7.51	1.98	-38.9	0.246	74.7	11.89
Area 5	G6M-04-07X	3/29/2005	240	10U	10U	10U	5U	10U	0.031	0.64	1.9	12	1UM	27	0.5J	43.2	1.5	14	2U	6.88	4.19	22	0.229	4.2	10.79
Area 5	G6M-04-07X	7/5/2005	170	2U	2U	2U	1U	2U	0.07	0.042	1.8	4	1U	37	5U	41.1	1.7	14	1U	5.83	5.44	369.9	0.186	23.4	11.51
Area 5	G6M-04-07X	9/29/2005	470	3.0	8.3	2U	1U	2U	0.010J	0.010J	2.4	5U	1U	43	5U	1U	1.9	16	1U	6.19	0.86	478.3	0.277	6.62	11.28
Area 5	G6M-04-07X	12/14/2005	390	2U	2	2U	1U	2U	0.006	0.016	7.9	3.8	1U	17.9	6.1	40	1.6	13	1U	6.65	4.72	149.3	0.218	34.1	11.66
Area 5	G6M-04-07X	3/23/2006	260	2U	2U	2U	1U	2U	0.005J	0.029	250	5U	0.1U	15U	5U	36	1.57	13.3	1U	6.28	2.14	619.7	0.267	4.09	12.09
Area 5	G6M-04-07X	6/23/2006	150	2U	2U	2U	1U	2U	0.005J	0.022J	22	5U	0.1U	24	0.3J	30	1.28	12.5	1U	6.29	5.5	117.8	0.24	8.07	11.75
Area 5	G6M-04-07X	9/21/2006	110	2U	2U	2U	1U	2U	0.014J	0.088	2.4	5U	0.10U	19	3.4J	32	2.54	10	1U	6.34	4.43	99.8	0.197	2.63	14.46
Area 5	G6M-04-07X	12/11/2006	87	2U	2U	2U	1U	2U	0.007J	0.033	2.2	5U	0.10U	15	5U	-	-	-	-	6.65	6.99	116.4	0.134	10.52	17.2
Area 5	G6M-04-07X	3/29/2007	45	2U	2U	2U	1U	2U	0.006J	0.018J	5.2	5U	0.1U	17J	5U	-	-	-	-	6.55	10.3	143.7	0.123	3.71	15.42
Area 5	G6M-04-07X	6/12/2007	44	2U	2U	2U	1U	2U	0.010J	0.079	46	5U	0.67	18	1.2J	-	-	-	-	6.26	8.12	162.7	0.129	16.1	13.18
Area 5	G6M-04-07X	9/10/2007	25	2U	2U	2U	1U	2U	0.006J	0.006J	0.11	2U	0.1U	15U	5U	19	1.89	45	1U	6.20	8.68	117.7	0.13	31.2	14.72
Area 5	G6M-04-07X	12/12/2007	23	2U	2U	2U	1U	2U	0.004J	0.013J	0.48	5U	0.1U	15U	5U	-	-	-	-	6.48	10.14	140.2	0.134	3.0	10.24
Area 5	G6M-04-07X	3/13/2008	19	2U	2U	2U	1U	2U	0.003J	0.025U	1.6	5.2	0.1U	15U	5U	-	-	-	-	6.54	10.52	83.4	0.143	0.3	10.47
Area 5	G6M-04-07X	10/16/2008	11	0.5U	0.5U	0.5U	0.5U	0.5U	1.2U	1.5U	390	8.0U	0.2U	15.1J	10U	28	1.81U	10	0.03U	5.85	1.62	205	0.129	0.45	10.72
Area 5	G6M-04-07X	5/6/2009	2.2	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	660	2.9J	0.2U	50U	10U	41J	2.3	12	0.03U	5.90	0.7	119.2	0.103	1.25	13.18
Area 5	G6M-04-07X	10/14/2009	1.3	0.5U	0.5U	0.5U	0.5U	0.5U	1.3U	1.6U	2,500J	8U	0.2U	50U	10U	32	1.9	15	0.03U	6.00	0.35	141.6	0.104	0	10.81
Area 5	G6M-04-07X	4/20/2010	13J	0.5UJ	0.5UJ	0.5UJ	0.5UJ	0.5UJ	1.3U	1.6U	630	5U	0.1U	31.8U	10U	50	1.5	12	0.03U	5.90	1.11	24.2	0.167	0	10.3
Area 5	G6M-04-07X	10/4/2010	19	2.2	4.5	0.5U	0.5U	0.5U	1.2U	1.5U	5,100	5U	0.1U	25U	10U	43	1.1	10	0.03U	6.06	0.94	116.9	0.181	0.32	10.45
Area 5	G6M-04-07X	6/8/2011	-	-	-	-	-	-	-	-	-	5U	0.148	67.9	-	-	-	-	-	5.81	1.06	34.1	0.172	0	10.36
Area 5	G6M-04-07X	10/3/2011	8.7	1.2	2.2	0.5U	0.5U	0.5U	1.2U	1.5U	8,300	20U	0.2U	68.0	10U	53	0.59	12	0.03U	5.76	0.28	-57.7	0.105	0.96	10.69
Area 5	G6M-04-07X	5/8/2012	-	-	-	-	-	-	-	-	-	4.0J	0.1U	27.2	-	-	-	-	-	6.26	0.35	122	0.198	0.48	10.51
Area 5	G6M-04-07X	10/9/2012	31J	6.2	33J	0.5U	0.5U	0.97	1.2U	1.5U	6,400	5U	0.1U	35.4	10U	99	0.5	10	0.03U	6.05	0.41	138.9	0.264	0	10.25
Area 5	G6M-04-07X	5/22/2013	-	-	-	-	-	-	-	-	-	3.9J	0.1U	51.4	-	-	-	-	-	6.14	0.39	154.1	0.22	0	14.03
Area 5	G6M-04-07X	10/15/2013	26	5.7	16	0.5U	0.5U	0.5U	1.2U	1.5U	37,000	3.8J	0.1U	3,480	10U	110	0.30	11	0.03U	6.24	0.37	218.4	0.262	0.05	13.59
Area 5	G6M-04-07X	6/10/2014	-	-	-	-	-	-	-	-	-	3.0J	0.021UJ	6,710	-	-	-	-	-	6.01	0.32	210.9	0.257	5.18	8.84
Area 5	G6M-04-07X	10/28/2014	55	11	54	0.31J	0.5U	0.61	1.3U	1.6U	4,900	9.5	0.195J	4,370J	5U	130	0.13	9.6	0.03U	6.57	0.24	108	0.254	4.69	10.62
Area 5	G6M-04-07X	10/19/2015	59	12	1.0 U	1.0 U	1.0 U	1.00	10 U	10 U	3,120	14.1	564	4,590	0.98 J	143	0.11 U	11.0	2.0 U	6.35	0.05	23.3	0.324	1.68	10.67
Area 5	G6M-04-07X	11/14/2016	78	18	73	0.42 J	1.0 U	1.8	1.1 U	1.0 U	1,000	29	1.9	4,400	1.2	160	0.05 U	9.4	1.0 U	6.42	1.01	-28.3	0.278	6.77	10.19
Area 5	G6M-13-01X	1/30/2014	12	0.42 J	0.73	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	6.21	1.64	188.4	0.86	38	16.43
Area 5	G6M-13-01X	10/28/2014	150	2.8	7.80	0.5U	0.5U	0.5U	-	-	-	2.5U	0.025U	26.8J	-	-	-	-	-	6.25	1.77	100.3	0.495	9.14	12.81
Area 5	G6M-13-01X	6/22/2015	16	0.65 J	1.30	0.50 U	0.50 U	0.50 U				2.3 J	0.05 U	8.7 J						5.80	0.89	172.2	0.848	1.11	17.46
Area 5	G6M-13-01X	10/16/2015	26	1.10	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.0613 J	16	-	-	-	-	-	5.57	0.52	42.7	0.727	22.1	13.66
Area 5	G6M-13-01X	2/11/2016	10.3	0.69 J	1.6	1.0 U	1.0 U	1.0 U	10 U	10 U	126	4.0 U	0.10 U	10.3 J	1.0 U	31.5	0.31	16.7	2.0 U	6.05	0.57	38.8	0.880	1.02	10.34
Area 5	G6M-13-01X	6/15/2016	18	1.1	2.8	1.0 U	1.0 U	1.0 U	-	-	-	2.1 J	0.083	14	-	-	-	-	-	6.09	0.65	36.9	0.891	25.0	15.57
Area 5	G6M-13-01X	11/11/2016	27	3.5	6.5	1.0 U	1.0 U	2.8	-	-	-	3.5	1.2	29						5.63	1.11	83.3	0.638	22.1	12.35
Area 5	G6M-13-04X	1/30/2014	41	51	68	2.7	0.90 J	150	-	-	-	-	-	-	-	-	-	-	-	6.57	0.98	-36.4	1.414	4.6	12.6
Area 5	G6M-13-04X	6/10/2014	25	31	29	2.7	0.66	130	2.7J	12J	3,600J	360	49J	5,900	2.5J	280J	0.13U	9.3 B	0.030U	6.42	0.58	-49.4	1.212	12.9	-
Area 5	G6M-13-04X	10/29/2014	1.7	17	69	1.6	0.56	72	4.7	41	32,000	321	5.45J	6,170J	13	310	0.13U	3.5J	0.03U	6.65	0.42	-95.2	1.081	5.55	12.07
Area 5	G6M-13-04X	6/22/2015	0.50 U	1.80	2.20	0.50 U	0.50 U	1.40	5.0 U	5.0 U	719	360	29	3,840 J	3.20	129	0.11 U	30.5 J	1.0 U	6.95	0.7	-156.6	0.800	0.8	17.28

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Well ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	°C
Area 5	G6M-13-04X	10/15/2015	19	19	52	0.76 J	1.0 U	32.7	10 U	18.6	9,470	388	33	7,930	2.8	269	0.16	5.8 J	2.0 U	6.6	0.29	-69.4	1.595	7.5	12.33
Area 5	G6M-13-04X	2/11/2016	0.70 J	5.9	15	1.5	1.0 U	50.9	10 U	18.9	5,690	392	33.9	7,390	3.2	261	0.099 J	6.1 J	2.0 U	6.66	1.23	-2.9	1.086	9.5	8.53
Area 5	G6M-13-04X	6/15/2016	12	18	19	1.2	0.73 J	55.0	2.80	20 J	9,300	340	27	6,800	1.7	280	0.05 U	3.6	1.0 U	6.69	0.59	-54.2	1.669	11.54	14.90
Area 5	G6M-13-04X	11/11/2016	4.9	17	17	0.86 J	0.62 J	36	2.2	12	7,000	340	28	7,600	1.6	250	0.05 U	4.0	1.0 U	7.21	0.88	-80.4	1.175	24.1	12.73
Area 5	G6M-97-05B	10/3/2011	5.7	0.58	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	6.21	3.91	166.4	0.357	1.48	12.4
Area 5	G6M-97-05B	10/12/2012	13	0.73	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	0.0194 J	25U	-	-	-	-	-	6.19	4.13	132	0.649	0.41	14.61
Area 5	G6M-97-05B	10/16/2013	26	0.70	0.63	0.5U	0.5U	0.5U	-	-	-	5U	0.1U	25U	-	-	-	-	-	6.15	3.88	123.8	0.513	3.86	13.76
Area 5	G6M-97-05B	10/28/2014	83	1.8	1.7	0.5U	0.5U	0.5U	-	-	-	2.5U	0.0293U	25UJ	-	-	-	-	-	6.21	3.38	112.1	0.499	2.78	11.07
Area 5	G6M-97-05B	6/19/2015	89	4.8	2.3	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	5.0 U	3.1 J	0.05 U	7.5 U	-	27.0	1.00	7.8 J	1.0 U	6.26	2.73	106.3	0.63	1.72	17.20
Area 5	G6M-97-05B	10/15/2015	117	6.90	3.40	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.0615 J	19	-	-	-	-	-	5.43	3.41	86.9	0.687	1.05	18.92
Area 5	G6M-97-05B	2/11/2016	97	11	3.8	1.0 U	1.0 U	1.0 U	10 U	10 U	10 U	4.0 U	0.10 U	15 U	1.0 U	29.3	1.0	7.8 J	2.0 U	6.33	4.72	131.7	0.43	16.7	7.32
Area 5	G6M-97-05B	6/15/2016	87	13	4.2	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.05 U	3.0 U	-	-	-	-	-	6.26	2.75	81.7	669	1.15	15.93
Area 5	G6M-97-05B	11/15/2016	140	13	4.2	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.021 J	2.4 J	-	-	-	-	-	6.39	3.37	129.4	0.469	0.87	11.73
Area 5	MW-3	10/17/2001	4,300	1,500	540	20U	10U	20U	-	-	-	-	-	-	-	-	-	-	-	5.70	0.9	-127	1.4	3.1	13.73
Area 5	MW-3	12/19/2001	26	4,000	2,200	20U	6.5J	20U	-	-	-	-	-	-	92	-	-	0.43J	-	6.28	0.43	-46	0.912	7.28	12.98
Area 5	MW-3	1/3/2002	-	-	-	-	-	-	0.063	0.21	18	180	30	-	44	-	-	-	-	4.77	1.33	-48	2.795	4.4	11.19
Area 5	MW-3	1/31/2002	-	-	-	-	-	-	-	-	-	-	-	-	38	-	-	-	-	6.64	0	-293	0.999	-	12.17
Area 5	MW-3	2/13/2002	4,400	1,700	1,600	1.6J	3.7	2U	0.079	0.29	53	190	20	8,300	15	-	0.10U	14	1.0J	6.65	0.75	-71	0.893	1.3	13.54
Area 5	MW-3	3/13/2002	5,200	640	1,400	1.4J	2.8	2U	0.093	0.37	66	180	16	8,400	7.3	-	0.10U	15	2.0U	6.72	0.25	-75	0.795	1.04	12.21
Area 5	MW-3	4/2/2002	3,100	1,000	1,700	2.2	4	2U	-	-	-	-	-	-	3.3J	-	-	-	-	6.74	4.28	-120	0.634	2.08	13.17
Area 5	MW-3	4/17/2002	1,200	1,300	1,600	1.2J	3.4	2U	0.025	0.087	54	240	37	17,000	6.1	-	3	7.9J	1.6J	6.60	4.39	-102	0.771	0.81	12.69
Area 5	MW-3	5/15/2002	31	23	2,600	3.5	6.7	2U	0.052	0.24	560	260	42	19,000	96	-	0.10U	3.9	1.6J	6.66	0.31	-124	1.46	1.68	14.23
Area 5	MW-3	6/27/2002	200U	200UJ	1,800	200UJ	100UJ	200UJ	0.021	0.082	3,900	490J	140	37,000J	270	-	14	4.4J	2.0U	6.70	1.64	-107	3.804	2.9	13.8
Area 5	MW-3	7/31/2002	-	-	-	-	-	-	-	-	-	-	-	-	31	-	-	-	-	6.76	0.15	-225	1.606	-	13.9
Area 5	MW-3	8/26/2002	990	640	580	2.1	4.4	2U	0.053	0.16	14,000	270	-	-	30	320	-	-	-	6.83	0.15	-138	1.285	6.5	18.8
Area 5	MW-3	10/28/2002	1,900	820	1,700	3.9	4.2	2U	0.3	0.23	6,300	330	39	9,700	6.3	190	0.10U	10	2.0U	6.70	0.4	-129	1.129	5.01	15.7
Area 5	MW-3	2/3/2003	3.0	2U	2,900	2U	7.1	2U	0.005U	0.26	28,000	330	120	-	180	580	-	1.0U		6.84	0.3	-159	1.322	6.7	18.2
Area 5	MW-3	7/16/2003	2.4	2U	2,700	2U	7.5	2.5	0.005U	0.1	23,000	520	170	-	17	450	-	4.0UB	2.0U	7.02	1.09	-138	1.464	39.2	16.1
Area 5	MW-3	9/24/2003	670	1,100	1,900	2.4	6.9	2U	0.005U	0.012	22,000	460	89	7,900	5.9	-	-	-	-	6.10	9.17	-138	1.222	18.9	15.3
Area 5	MW-3	1/9/2004	9.7	64	2,000	2U	5.6	2U	0.005U	0.005U	45,000	530	200J	15,000	130	500J	-	1.0U	2.0U	6.73	0.4	-195	1.347	14.6	-
Area 5	MW-3	3/11/2004	680	620	4,700	2U	7.6	2U	0.005U	0.005U	27,000	420	11	8,400	6.1	200	-	4.4	2U	6.58	0.62	-161	0.972	4.3	13.9
Area 5	MW-3	6/2/2004	2U	2U	1,800	2U	4.5	2U	0.005U	0.014	31,000	670MSA	150	23,000	290	810	-	0.98J	2U	6.95	0.1	-149	1.905	38.7	15.7
Area 5	MW-3	9/21/2004	210	250	1,900	2U	5.2	3.5	0.086	0.005U	28,000	660	200J	7,200	17	310	1J	4.3J	2U	6.66	0.95	-153.6	0.725	2.27	11.1
Area 5	MW-3	12/13/2004	2U	2U	750	2U	1U	610	0.092	3.5	17,000	510	160	5,400	8	210	1.1	1.4M	2U	6.62	1.6	-103.3	1.009	15.1	13.9
Area 5	MW-3	3/28/2005	23J	16J	1,000	50U	50U	280	0.005U	5.1	25,000	670	150	7,300	21	405	0.2U	1U	7.5J	6.49	0.34	-134.9	1.26	2.37	14.44
Area 5	MW-3	8/10/2005	440	80	120	2U	5.1	760	0.061J	13	22,000	680	180	4,400	43	338	0.05U	2U	8	11.13	0.71	-118.5	1.401	28.9	15.67
Area 5	MW-3	9/27/2005	1,100	240	180	1.8	9.1	360	0.020J	40	22,000	480	71J	2,500	5.6	96.8	0.05U	9.9J	3.4	6.36	0.21	-91.2	0.66	2.8	14.5
Area 5	MW-3	12/12/2005	37	67	52	20U	10U	480	0.055	100	26,000	566	100	-	18	180	0.083J	2U	5.6	6.66	0.11	-152.7	1.087	8	15.7
Area 5	MW-3	3/20/2006	620	350	120	3.1	3.9	220	0.025U	130	25,000	440	85	3,600	13	110	0.2U	6.31	1U	6.95	0.77	-106.2	0.871	3.71	14.88
Area 5	MW-3	6/22/2006	2U	2U	4	7.6	1U	6.1	0.023J	180	20,000	520	87	3,300	4J	98	0.2U	1U	1U	6.40	0.22	-127	1.012	4.18	12.97
Area 5	MW-3	9/20/2006	360	420	130	12	5.6	200	0.015J	95	17,000	580	70	3,300	9.6	70	0.2U	7.88	1.4	6.52	0.28	-108.5	0.729	3.56	13.28
Area 5	MW-3	12/12/2006	2U	3.1	3.1	16	1U	7.1	0.032	170	24,000	490	92	3,700	7.8	-	-	1U	1U	6.60	0.17	-116	0.99	4.36	12.34
Area 5	MW-3	3/27/2007	2U	31	19	12	1U	27	0.025U	130	18,000	560	110	3,300J	5.2	-	-	3.18	1U	6.28	0.19	21	0.944	2.64	13.6
Area 5	MW-3	6/11/2007	2U	5	5.4	15	1U	8	0.038	150	32,000	570	190	5,000	67	-	-	12.1	2.2	6.56	0.58	-124.7	1.405	17.3	12.26
Area 5	MW-3	9/11/2007	610	470	100	6.4	2.6	97	-	-	-	530	100	3,600	-	150	0.2U	400	1U	6.76	0.23	-130	1.016	6.8	13.48
Area 5	MW-3	10/12/2007	-	-	-	-	-	-	0.025U	120	34,000	-	-	-	3.8J	-	-	-	-	-	-	-	-	-	12.51
Area 5	MW-3	12/13/2007	250	180	59	8.8	2.4	78	0.016J	130	30,000	420	91	4,400	4.1J	-	-	10	1U	6.6	0.27	-159.8	1.04	15.7	19.2
Area 5	MW-3	3/10/2008	2U	2U	2U	8.3	1U	2U	18	35	29,000	530	140	3,300	16	-	-	5U	2.4	6.46	0.12	-113	1.402	5.5	14.26
Area 5	MW-3	10/6/2008	5U	5U	5U	11	5U	5U	1.3U	72	28,000	482	112	3,720	10U	210	0.13U	7.0U	0.03UJ	6.49	0.24	-158.6	1.070	9.3	21.5
Area 5	MW-3	1/21/2009	1.4U	2.3U	1.6J	9.2	1.2U	1.9	3.2	58	40,000	556	114J	3,350	10UJ	160	0.13U	7.0U	0.03U	6.69	0.5	-79.9	1.044	4.01	15.5
Area 5	MW-3	5/7/2009	2.0U	59	48	17	2.0U	66	1.3	70	47,000	519	115	3,630	7.0J	360J	0.13U	22	0.03U	6.26	1.03	-89.9	1.205	4.54	18.86

Table J-1
Historical Groundwater Analytical Results Through 2016
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 5	MW-3	10/19/2009	2U	35	25	9.4	2U	40	1.2U	36	25,000	551	120	5,330	6.7J	490	0.13U	28	0.03UJ	6.24	0.6	-62.6	1.494	25.6	15.54
Area 5	MW-3	4/20/2010	0.5UJ	0.48J	0.47J	4.7J	0.5UJ	2.5J	10	19	47,000	526	136J	3,200	9.0J	440	0.13U	3.4J	0.03U	6.33	0.16	5.4	1.445	0.09	11.12
Area 5	MW-3	10/5/2010	0.5U	4.8	3.4	7.5	0.5U	20	1.2U	69	32,000	444	76	3,560	10U	750	0.13U	4.5J	0.03U	6.20	0.20	-85.9	1.799	0.58	11.94
Area 5	MW-3	6/8/2011	0.5U	0.66	0.93	4.4	0.5U	17	4.5	18	100,000	374	53.6	2,570	12	690	0.13U	1.7J	0.03U	6.34	0.30	-91.1	1.232	3.56	11.96
Area 5	MW-3	10/3/2011	0.5U	0.5U	0.52	1.7	0.5U	1.0	1.2U	1.5U	40,000	385	45.8	2,760	10	730	0.13U	0.74J	0.03U	6.47	0.13	-88.1	1.544	0.9	12.14
Area 5	MW-3	5/8/2012	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	51	110	66,000	276	27	3,140	7.5J	600	0.13U	0.82J	0.03U	6.77	0.08	-107.2	1.856	4.6	12.24
Area 5	MW-3	10/10/2012	0.5U	0.5U	0.5U	0.54	0.5U	1.2	61	100	36,000	267	25.7	4,810	5.6J	520	0.13U	1.4J	0.03U	6.45	0.51	-87.6	1.738	0.92	12.1
Area 5	MW-3	5/21/2013	0.5U	0.5U	0.30J	0.39J	0.5U	0.75	1.2U	1.5U	10,000	281	24.7	6,460	4.3J	530J	0.13UJ	0.64J	0.03UJ	6.76	0.12	-105.2	1.277	2.75	11.48
Area 5	MW-3	10/16/2013	0.5U	0.21J	0.36J	0.32J	0.5U	0.94	12	11	38,000	298	26.6	7,970	5.2J	510	0.13U	1.9J	0.03U	6.75	0.40	-87.4	1.437	0	11.96
Area 5	MW-3	6/11/2014	0.5U	0.5U	0.5U	0.37J	0.5U	0.83	2.9J	1.6UJ	5,100J	354	34.3J	11,100	8.3J	330J	0.13U	1.2U	0.03U	6.70	0.51	-67.6	1.062	6.18	11.84
Area 5	MW-3	10/29/2014	0.5U	0.27J	0.68	0.38J	0.5U	0.53	3.8	1.5U	13,000	334	30.1J	10,500J	5.2J	370	0.13U	2.4J	0.03U	6.8	0.34	-110.1	0.756	3.79	11.95
Area 5	MW-3	6/23/2015	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	5.0 U	4,830	409	37.1	11,000	5.00	366	0.11 U	5.1 J	1.0 U	6.34	1.07	-89.4	1.262	5.85	14.23
Area 5	MW-3	10/15/2015	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.54 J	10 U	10 U	4,570	420	41.9	12,600	4.9	349	0.071	10 U	2.0 U	6.97	0.48	-112.1	1.215	1.38	13.86
Area 5	MW-3	2/10/2016	1.0 U	1.0 U	1.0	1.0 U	1.0 U	0.88 J	10 U	10 U	7,260	423	49	12,000	5.4	341	0.094 J	10 U	2.0 U	6.72	1.12	-109.7	0.851	10.5	9.14
Area 5	MW-3	6/16/2016	1.0 U	1.0 U	1.5	1.0 U	1.0 U	0.89 J	3.0	1.0 U	20,000	410	45	9,800	6.1	350	0.05 UJ	1.3	1.0 U	6.81	0.66	-77.4	1.36	4.93	14.27
Area 5	MW-3	11/11/2016	1.0 U	0.96 J	1.7	1.0 U	1.0 U	1.6	2.9	1.0 U	7,000	410	47	9,500	6.4	370	0.05 U	1.4	1.0 U	7.22	0.83	-97.8	0.871	7.77	12.73
Area 5	MW-7	2/14/2002	5,900	4.5	2U	2U	1U	2U	0.12	0.08	8.4	5U	1U	170J	-	-	-	20	0.6J	6.12	1.58	104	0.787	90	18.84
Area 5	MW-7	3/14/2002	5,700	4.2	2U	2U	1U	2U	0.094	0.18	5.9J	5U	1U	1,000U	2.0J	-	4.1	22J	2.0U	6.12	2.29	203	0.808	8.85	12.76
Area 5	MW-7	4/17/2002	4,200	2.9	2U	2U	1U	2U	0.072	0.2	6	2.3J	1U	1,000U	5U	-	4.2	18J	1.6J	6.11	0.5	145	0.656	19.5	-
Area 5	MW-7	5/16/2002	5,700	4.3	2U	2U	1U	2U	0.097	0.2	9	5U	1U	1,000U	5U	-	4.3	18J	2.0UJ	6.05	0.21	185	0.759	23.9	10.92
Area 5	MW-7	6/27/2002	5,300	3.8J	2UH	2UH	10H	2UH	-	-	-	5U	1U	170UJ	5U	-	4.2	19J	2.0U	6.13	0.73	163	1.198	100	11.12
Area 5	MW-7	8/27/2002	4,700	3.5	2U	2U	1U	2U	-	-	-	5U	-	-	5U	29	-	-	-	6.13	0.29	136	0.632	1.86	12.02
Area 5	MW-7	10/30/2002	5,400	2.7	2U	2U	1U	2U	0.047	0.18	20	5U	1U	200J	5U	23	4.9	16	2.0U	6.05	0.37	66	0.779	3.63	11.85
Area 5	MW-7	12/14/2002	-	-	-	-	-	-	-	-	-	-	-	-	5U	-	-	-	-	-	-	-	-	-	12.04
Area 5	MW-7	1/30/2003	4,700	3.1	2U	2U	1U	2U	0.044	0.075	23	5U	1U	-	5U	19	-	16	-	5.80	2.2	171	0.773	1.08	13.43
Area 5	MW-7	9/24/2003	4,200	3.3	2U	2U	1U	2U	0.015	0.027	58	5U	1U	140	5U	-	-	-	-	3.40	1.43	522	0.691	0.3	-
Area 5	MW-7	1/8/2004	4,300	2.8	2U	2U	1U	2U	0.011	0.026	25	5U	1U	130	5U	27	-	14J	2.0U	6.02	0	198	0.481	15	11.59
Area 5	MW-7	3/12/2004	3,100	2.7	2U	2U	1U	2U	0.02	0.28	6.3	5U	1U	120	1U	24	-	15M	2U	6.04	0.47	162	0.556	1.0	13.99
Area 5	MW-7	6/3/2004	2,900	2.6	2U	2U	1U	2U	0.012	0.034	34	5U	1U	110	1.5J	24	-	15M	2U	5.96	0.31	205.2	0.58	1.92	
Area 5	MW-7	9/21/2004	2,900	3.4	3.1	2U	1U	2U	-	-	-	5U	1U	110	-	-	-	-	-	5.98	0.21	240.4	0.58	0	11.09
Area 5	MW-7	9/27/2005	1,600	3.7	5.8	2.5U	2.5U	2.5U	-	-	-	5U	0.2J	110	-	-	-	-	-	4.49	0.93	304.1	0.593	3.39	11.86
Area 5	MW-7	9/22/2006	4,400	9.8	7.7	2U	1U	2U	-	-	-	5U	0.10U	100	-	-	-	-	-	5.99	1.19	140.9	0.503	3.01	12.70
Area 5	MW-7	9/11/2007	1,200	11	22	2U	1U	2U	-	-	-	6U	0.1U	110	-	-	-	-	-	5.98	0.32	139.9	0.691	5.9	-
Area 5	MW-7	10/20/2008	600	40	150	20U	20U	20U	-	-	-	8U	0.2U	166	-	-	-	-	-	5.97	1.39	71.9	0.804	2.0	14.72
Area 5	MW-7	10/19/2009	97	33	270	10U	10U	10U	-	-	-	4.2J	1.7	2,170	-	-	-	-	-	6.03	0.47	76.7	1.686	1.91	14.58
Area 5	MW-7	10/6/2010	45	9.5	120	2.5U	2.5U	3.1	-	-	-	5.7	1.46	2,090	-	-	-	-	-	6.53	0.21	-21.6	2.072	4.81	11.46
Area 5	MW-7	10/6/2011	1.6	3.7	20	0.5U	0.5U	6.8	-	-	-	52.9	5.44	5,070	-	-	-	-	-	6.6	0.49	-48.8	1.717	3.0	-
Area 5	MW-7	10/12/2012	2.3	2.3	9.9	0.70	0.5U	11	-	-	-	140	20.5	9,900	-	-	-	-	-	6.38	0.65	-65	1.253	0	-
Area 5	MW-7	10/17/2013	1.5	6.9	13	0.24J	0.5U	2.2	-	-	-	156	20.9	9,360	-	-	-	-	-	6.72	0.58	-68.2	1.152	0	10.50
Area 5	MW-7	11/3/2014	1.7	8.4	13	0.27J	0.5U	1.5	-	-	-	205	29.9	15,300	-	-	-	-	-	6.62	0.41	-74.2	0.878	1.94	10.28
Area 5	MW-7	10/15/2015	1.0 U	1.70	12.4	1.0 U	1.0 U	1.10	-	-	-	198	30.2	15,100	-	-	-	-	-	6.83	0.84	-68.2	0.926	1.50	11.26
Area 5	MW-7	11/14/2016	1.0 U	1.4	22	1.0 U	1.0 U	37	-	-	-	110	19	13,000	-	-	-	-	-	6.01	1.24	-63.5	0.77	7.42	13.2
Area 5	XSA-12-95X	10/12/2012	290	36	66	5.0U	5.0U	10	-	-	-	4.6J	9.53	11,800	-	-	-	-	-	6.53	2.04	-63.9	1.247	45	12.77
Area 5	XSA-12-95X	10/15/2013	160	51	100	4.7J	5.0U	6.5	-	-	-	12.8	5.17	9,890	-	-	-	-	-	6.59	0.3	-254.4	1.411	24.4	13.11
Area 5	XSA-12-95X	10/28/2014	110	39	94	5.0	0.47J	9.0	-	-	-	8.3	4.47J	9,310J	-	-	-	-	-	6.9	0.18	-315.7	0.906	20.2	14.23
Area 5	XSA-12-95X	10/19/2015	27	20	1.0 U	1.0 U	6.70	7.20	-	-	-	4.0 U	4.77	10,600	-	-	-	-	-	7.97	1.77	-103.6	1.385	15.3	-
Area 5	XSA-12-95X	11/14/2016	23	9.8	78	4.3	1.0 U	7.4	-	-	-	3.0 U	1.9	8,400	-	-	-	-	-	6.58	1.21	-59.7	1.048	28.1	12.69
Area 5	XSA-12-96X	10/10/2012	120	4.4	14	2.0U	2.0U	2.0U	-	-	-	5U	3.13	96.8	-	-	-	-	-	6.52	0.72	-87.1	0.782	3.9	12.33
Area 5	XSA-12-96X	10/15/2013	100	11	17	2.5U	2.5U	3.7	-	-	-	3.7J	0.94	2,840	-	-	-	-	-	6.46	0.27	-271.6	0.824	0.90	15.90
Area 5	XSA-12-96X	10/28/2014	84	14	22	2.3	0.36J	6.0	-	-	-	3.2J	0.925J	5,720J	-	-	-	-	-	6.73	0.14	-300.6	0.625	4.83	12.11
Area 5	XSA-12-96X	10/26/2015	30	14	1.0 U	1.0 U	3.40	10.2	-	-	-	4.0 U	2.19	7,340	-	-	-	-	-	6.34	0.66	-77.9	0.787	9.41	12.98

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AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
Area	Well ID	Date	PCE (µg/L)	TCE (µg/L)	*cis* -1,2-DCE (µg/L)	*trans* -1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Ethane (µg/L)	Ethene (µg/L)	Methane (µg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate/ Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS/cm)	Turbidity (NTUs)	Temp °C
Area 5	XSA-12-96X	11/14/2016	29	19	20	4.9	0.59 J	11	-	-	-	3.0 U	1.2	6,300	-	-	-	-	-	5.63	0.66	-25.5	0.733	9.26	11.67
Area 5	XSA-12-97X	10/9/2012	2.1	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	1.430 J	44.4	-	-	-	-	-	6.66	1.3	-11.9	0.673	33.8	11.73
Area 5	XSA-12-97X	10/16/2013	2.9	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	5U	2.25	29.3	-	-	-	-	-	6.74	1.74	-21.9	0.721	19.6	12.06
Area 5	XSA-12-97X	10/30/2014	5.6	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.435	9.1J	-	-	-	-	-	6.51	1.52	51.8	0.522	17.5	17.21
Area 5	XSA-12-97X	10/19/2015	7.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.771	15	-	-	-	-	-	6.62	1.39	31.9	0.614	13.9	10.02
Area 5	XSA-12-97X	11/14/2016	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.77	12	-	-	-	-	-	7.62	1.68	-57.9	0.526	18.4	11.61
Area 5	XSA-12-98X	10/11/2012	10	0.59	0.50	0.5U	0.5U	0.5U	-	-	-	5U	1.420	18.4 J	-	-	-	-	-	7.75	0.76	-60.1	0.308	8.89	13.14
Area 5	XSA-12-98X	10/16/2013	5.2	0.34J	0.47J	0.5U	0.5U	0.5U	-	-	-	3.1J	0.1U	6.6J	-	-	-	-	-	7.89	0.51	-39.8	0.413	51	10.53
Area 5	XSA-12-98X	10/29/2014	5.5	0.37J	0.76	0.5U	0.5U	0.5U	-	-	-	2.5U	0.313	5.6J	-	-	-	-	-	8	0.46	-293.1	0.258	44.8	10.63
Area 5	XSA-12-98X	10/19/2015	6.3	0.66 J	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	4.0 U	0.174	15 U	-	-	-	-	-	8.04	0.42	-194.4	0.31	3.62	10.70
Area 5	XSA-12-98X	11/11/2016	5.6	0.69 J	0.81 J	1.0 U	1.0 U	1.0 U	-	-	-	3.0 U	0.095	3.1 J	-	-	-	-	-	7.98	0.52	-140.7	0.233	16.1	9.67
Nashua River	G6M-04-14X	11/16/2004	12	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.3
Nashua River	G6M-04-14X	9/27/2005	6.9	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.88	1.6	333	0.263	18	13.22
Nashua River	G6M-04-14X	9/21/2006	9.4	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.98	3	26.1	0.211	15.7	11.11
Nashua River	G6M-04-14X	10/1/2007	7.1	2U	2U	2U	1U	2U	-	-	-	-	-	-	-	-	-	-	-	7.69	2.56	80.4	0.363	13.9	10.71
Nashua River	G6M-04-14X	10/21/2008	7.1J	0.21J	0.5UJ	0.5UJ	0.5UJ	0.5UJ	-	-	-	-	-	-	-	-	-	-	-	7.78	2.51	138.8	0.237	45	12.98
Nashua River	G6M-04-14X	10/15/2009	4.5J	250	10U	10U	10U	10U	-	-	-	-	-	-	-	-	-	-	-	7.56	3.6	-69.7	0.25	4.58	11.54
Nashua River	G6M-04-14X	1/15/2010	4.5	0.22J	0.5U	0.75U	0.75U	1.0U	-	-	-	-	-	-	-	-	-	-	-	7.73	25.3	166.2	0.293	12.5	11.64
Nashua River	G6M-04-14X	10/8/2010	2.4	0.25J	0.5U	0.5U	0.5U	0.5U	-	-	-	-	-	-	-	-	-	-	-	7.55	1.92	72.7	0.307	100.4	12.54
Nashua River	G6M-04-14X	10/5/2011	2.2	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	6.8	0.1U	25U	-	-	-	-	-	7.68	2.62	99.9	0.172	20.4	11.07
Nashua River	G6M-04-14X	10/15/2012	3.3	0.5U	0.5U	0.5U	0.5U	0.5U	-	-	-	9.6	0.194	7.7J	-	-	-	-	-	7.71	2.58	-10.9	0.297	21.7	16.33
Nashua River	G6M-04-14X	10/18/2013	1.7	0.34J	0.5U	0.5U	0.5U	0.5U	-	-	-	8.2	0.1U	7.5U	-	-	-	-	-	7.89	1.25	94	0.479	27.1	15.03
Nashua River	G6M-04-14X	10/31/2014	1.8	0.40J	0.5U	0.5U	0.5U	0.5U	-	-	-	2.5U	0.0507U	7.5U	-	-	-	-	-	7.93	0.4	54.4	0.423	8.26	15.56
Nashua River	G6M-04-14X	10/26/2015	1.7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	9.8	0.0731 J	15 U	-	-	-	-	-	7.89	1.44	79.2	0.482	18.9	13.11
Nashua River	G6M-04-14X	11/11/2016	2.5	1.4	1.2	1.0 U	1.0 U	1.0 U	-	-	-	8.3	0.05 U	2.1 J						7.48	0.84	-106.7	0.35	10.14	10.53
Area 5	IW-39	1/30/2014	180	4.4	15	4U	4U	4U	-	-	-	-	-	-	-	-	-	-	-	6.56	0.91	44.9	0.78	3.68	12.31

µg/L = micrograms per liter
mg/L = milligrams per liter

U/UJ = not detected
J = estimated
FDSA = Former Drum Storage Area

Table J-2
Groundwater Analytical Results Spring 2017
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Sample ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	(°C)
Area 1	G6M-02-08X-SPR17	5/18/2017	20 U	20 U	51	20 U	20 U	20 U	1.1 U	1.0 U	15,000	410	770	4300	740	930	0.10 U	1.0 U	1.0 U	12.31R	0.01	-111.3	2.650	30.4	13.09
Area 1	G6M-03-01X-SPR17	5/18/2017	61	77	210	2.3	0.70 J	73	1.1 U	120	7,900	75	120	70000	26	310	0.08 J	8.6	1.0 U	12.52R	0.12	-93.1	2.275	8.51	13.56
Area 1	G6M-04-09X-SPR17	5/18/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	14,000	430	180.0	3200	11	190	0.15	5.4	1.0 U	6.58	0.45	-116.7	1.813	17.0	10.40
Area 1	G6M-13-05X-SPR17	5/18/2017	1300	20 U	64 J	20 U	20 U	20 U	1.1 U	1.0 U	0.58 U	3.0 U	0.28	350	1.0 U	32 J	1.5	1.0 U	1.0 U	11.40R	3.97	25.1	0.550	7.65	12.67
Area 1	G6M-DUP01 (G6M-13-05X)	5/18/2017	1200	20 U	46 J	20 U	20 U	20 U	1.1 U	1.0 U	0.49 J	3.0 U	0.30	380	1.0 U	22 J	1.5	1.0 U	1.0 U	--	--	--	--	--	--
Area 1	G6M-13-06X-SPR17	5/19/2017	1.0 U	1.0 U	2.2	0.45 J	1.0 U	2.6	14	16	17,000	500	250	7000	70 J	470	0.14 J	3.0	1.0 U	5.96	1.01	-64.8	1.450	7.43	10.87
Area 1	IW-17D-SPR17	5/19/2017	4.1	6.1	16	5.0 U	5.0 U	5.0 U	1.1 U	1.0 U	24,000	110	130	14000	680	110	0.11	1.0 U	1.0 U	11.10R	0.45	40.9	1.781	21.28	11.27
Area 1	IW-18D-SPR17	5/19/2017	5.1	5.0 U	660	5.0 U	5.0 U	5.0 U	1.1 U	15	21,000	150	140	8900	680	110	0.21	1.0 U	1.0 UJ	11.00R	0.46	44.3	1.265	85	12.65
Area 1/FDSA	G6M-04-10A-SPR17	5/18/2017	1.0 U	0.52 J	1.4	1.0 U	1.0 U	0.85 J	1.1 U	1.0 U	5,500	170	74	4800	5.7	38	0.12	15	1.0 U	6.59	0.33	-98.6	1.780	19.2	10.93
Area 1/FDSA	G6M-04-10X-SPR17	5/18/2017	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	180	3.0 U	0.020 J	1,100	1.0 U	12	0.42	32	1.0 U	5.51	0.63	162.1	1.523	11.3	10.93
Area 1/FDSA	G6M-04-13X-SPR17	5/16/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	12	10	21	3.0 U	0.05 U	3.6 J	1.0 U	9.5	0.62	4.8	1.0 U	6.47	9.01	210.7	0.034	2.36	9.67
Area 1/FDSA	G6M-07-02X-SPR17	5/16/2017	1800	20 U	20 U	20 U	20 U	20 U	1.1 U	1.0 U	1.8	3.0 U	0.05 U	17	1.0 U	14	0.32	6.2	1.0 U	5.70	3.69	213.3	0.042	2.73	9.73
Area 2	G6M-02-01X-SPR17	5/19/2017	1.0 U	1.0 U	0.52 J	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	24,000	500	110	2600	4.9	220	0.09 J	0.51 J	1.0 U	6.85	0.42	-132.4	1.590	7.23	14.39
Area 3	G6M-03-07X-SPR17	5/16/2017	1.0 U	1.0 U	0.51 J	0.76 J	1.0 U	1.0 U	1.2	7.2	14,000	370	84	1600	19	200	0.14	1.0 U	1.0 U	6.59	0.35	-91.3	0.589	11.0	17.46
Area 3	G6M-04-02X-SPR17	5/16/2017	280	120	22 J	0.39 J	1.0 U	2.3 J	1.1 U	2.2	4,800	42	15	11000	2.5 J	130	0.065 J	10	1.0 U	6.00	2.09	29.5	0.956	3.90	13.17
Area 3	G6M-DUP-2-SPR17 (G6M-04-02X)	5/16/2017	290	130	33 J	5.0 U	5.0 U	5.1 J	1.1 U	2.2	5,000	40	14	11000	4.5 J	110	0.044 J	10	1.0 U	--	--	--	--	--	--
Area 4	G6M-13-02X-SPR17	5/16/2017	79	25	30	0.39 J	1.0 U	0.90 J	0.64 J	1.0 U	4,300	3.0 U	0.05 U	16	1.0 U	54	0.34	12	1.0 U	6.07	0.47	89.7	0.841	5.79	12.93
Area 5	G6M-13-01X-SPR17	5/18/2017	13	0.85 J	3.4	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	830	3.0 U	0.039 J	19	1.0 U	36	0.14	14	1.0 U	6.02	0.37	127.6	0.631	5.47	14.52
Area 5	G6M-13-04X-SPR17	5/18/2017	1.0 U	1.8	9.0	0.91 J	1.0 U	7.1	5.7	6.2	7,600	400	47.0	9000	2.4	250	0.04 J	5.0 U	1.0 U	6.75	0.43	-100.9	1.279	21.0	13.59
Area 5	G6M-97-05B-SPR17	5/17/2017	190	15	8.6	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.84	3.0 U	0.05 U	3.0 U	1.0 U	31	0.94	7.0	1.0 U	6.20	2.00	120.8	0.547	9.59	15.17
Area 5	MW-3-SPR17	5/17/2017	1.0 U	1.0 U	0.75 J	1.0 U	1.0 U	1.0 U	1.8	1.0 U	10,000	500	56	9400	5.2	310	0.073 J	2.2	1.0 U	6.78	0.63	-112.4	0.909	6.29	12.70

Notes
PCE = Tetrachloroethene
TCE = Trichloroethene
cis-1,2-DCE = cis-1,2-Dichloroethene
trans-1,2-DCE = trans-1,2-Dichloroethene
1,1-DCE = 1,1-Dichloroethene
VC = Vinyl chloride
TOC = Total Organic Carbon

µg/L = microgram per liter
mg/L = milligram per liter
U = Non-detect
UJ = Estimated non-detect
J = Estimated result
MCL = maximum contaminant limit
FDSA = Former Drum Storage Area

Cleanup Goals
PCE = 5 µg/L, MCL
TCE = 5 µg/L, MCL
cis-1,2-DCE = 70 µg/L, MCL
1,1-DCE = 7 µg/L, MCL
VC = 2 µg/L, MCL
Arsenic = 10 µg/L, MCL
Iron = 3,129 µg/L, risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).
Manganese = 1,460 µg/L, risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).

trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

pH/SU = standard units
DO = Dissolved Oxygen
ORP/mV = Oxidation-Reduction Potential/millivolt
SpC = Specific Conductance
mS/cm = millisiemens per centimeter
NTU = Nephelometric Turbidity Unit
Temp/°C = Temperature/degrees Celsius
R = pH value rejected and not usable due to field instrument error

Analytical Parameters
0.33 = Detection
0.33 = Above cleanup goal

Table J-3
Groundwater Analytical Results Fall 2017
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis*-1,2-DCE	*trans*-1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	Sample ID	Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(SU)	(mg/L)	(mV)	(mS/cm)	(NTUs)	(°C)
Area 1	G6M-02-08X-Fall17	10/18/2017	20 U	20 U	20 U	20 U	20 U	20 U	1.1 U	1.0 U	16,000	370	640	3,300	250	680	0.26	2.0 U	1.6	6.66	0.44	-144.8	1.97	38.1	12.23
Area 1	G6M-03-01X-Fall17	10/12/2017	2.0 UJ	9.7 J	240 J	2.0 UJ	2.0 UJ	160 J	1.1 U	1.0 U	8,000	130	210	65,000	72	390	0.12	0.50 J	1.0 U	6.42	2.23	-69.7	2.02	7.96	12.49
Area 1	G6M-03-02X-Fall17	10/12/2017	1.0 U	1.0 U	3.5	1.0 U	1.0 U	4.0	1.1 U	13	16,000	250	150	2,000	21	140	0.15	1.0 U	1.0 U	6.29	1.29	-44.1	1.14	13.9	11.17
Area 1	G6M-04-09X-Fall17	10/23/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.74 J	--	--	--	370	110	2,400	7.8	--	--	--	--	6.72	0.13	-106.4	1.86	30.7	10.44
Area 1	G6M-04-15X-Fall17	10/9/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	70	15	19,000	--	--	--	--	--	6.13	0.59	0.59	4.28	8.9	14.50
Area 1	G6M-04-22X-Fall17	10/18/2017	--	--	--	--	--	--	--	--	--	970	--	--	--	--	--	--	--	6.32	0.48	-66.9	1.27	120	11.74
Area 1	G6M-04-31X-Fall17	10/9/2017	--	--	--	--	--	--	--	--	--	410	--	--	--	--	--	--	--	6.52	0.58	-83.5	2.84	8.7	14.26
Area 1	G6M-13-05X-Fall17	10/5/2017	280	69	750	10 U	10 U	10 U	1.1 U	1.0 U	32	35	12	1,700	28	49	0.04 J	1.0 U	1.0 U	5.95	0.51	19.7	0.63	27.4	12.80
Area 1	G6M-13-06X-Fall17	10/5/2017	1.0 U	1.0 U	2.3 J	1.0 U	1.0 U	1.1	6.0	6.3	6,000	490	220	7,500	72	440	0.17 J	1.0 UJ	1.0 U	6.20	0.31	-88.6	1.46	15.2	10.97
Area 1	Dup-1-Fall17 (G6M-13-06X FD)	10/5/2017	1.0 U	1.0 U	1.2 J	1.0 U	1.0 U	0.98 J	6.9	6.9	6,500	480	230	7,700	70	500	0.16	1.0 U	1.0 U	--	--	--	--	--	--
Area 1	G6M-95-19X-Fall17	10/5/2017	1.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	3.0 U	0.05 U	1,400	--	--	--	--	--	5.60	1.22	171.7	3.53	3.41	13.04
Area 1	G6M-95-20X-Fall17	10/5/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	18	6.3	410	--	--	--	--	--	5.80	0.35	27.8	0.60	11.0	14.46
Area 1/FDSA	G6M-04-10A-Fall17	10/12/2017	1.0 U	1.0 U	1.2	1.0 U	1.0 U	0.81 J	1.1 U	3.6	9,200	290	100	4,600	8.4	78	0.12	8.4	1.2	6.62	0.97	-94.7	1.87	16.0	10.01
Area 1/FDSA	G6M-04-10X-Fall17	10/12/2017	1.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	760	3.0 U	0.075 U	1,200	1.0 U	13	0.46	34	1.0 U	5.56	1.11	195.3	2.02	4.17	10.29
Area 1/FDSA	G6M-04-13X-Fall17	10/6/2017	1.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.33 J	3.0 U	0.05 U	3.0 U	0.45 J	8.7 U	0.84	4.6	1.0 U	5.86	3.64	223.4	0.06	2.6	10.42
Area 1/FDSA	Dup-02-Fall17 (G6M-04-13X FD)	10/6/2017	1.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.43 J	3.0 U	0.05 U	1.0 J	0.49 J	8.9 U	0.89	4.4	1.0 U	--	--	--	--	--	--
Area 1/FDSA	G6M-07-02X-Fall17	10/10/2017	910 J	20 U	20 U	20 U	20 U	20 U	24 J	4.3 J	1,200	37 J	220 J	14,000 J	3,400	520	2.0	20	1.0 U	6.21	0.51	-161.2	2.08	overrange	11.07
Area 1/FDSA	DUP-3-Fall17 (G6M-07-02X FD)	10/10/2017	440 J	20 U	20 U	20 U	20 U	20 U	14 J	3.0 J	1,100	200 J	1,200 J	75,000 J	3,000	530	1.9	17	1.0 U	--	--	--	--	--	--
Area 2	G6M-02-01X-Fall17	10/13/2017	1.0 U	1.0 U	0.77 J	1.0 U	1.0 U	0.52 J	1.1 U	3.8	12,000	400	76	1,300	3.3	64	0.10	0.57 J	1.0 U	6.66	0.46	-107.4	0.96	7.14	12.14
Area 2	DUP-05-Fall17 (G6M-02-01X FD)	10/13/2017	1.0 U	1.0 U	0.83 J	1.0 U	1.0 U	1.0 U	1.1 U	4.4	13,000	400	76	1,300	3.3	71	0.11	0.61 J	1.0 U	--	--	--	--	--	--
Area 2	G6M-04-01X-Fall17	10/13/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	450	81	18,000	--	--	--	--	--	6.66	0.87	-99.2	3.54	11.5	13.49
Area 2	G6M-04-03X-Fall17	10/20/2017	1.0 U	1.0 U	2.2	1.0 U	1.0 U	1.6	1.1 U	1.0 U	9,100	260	85	20,000	5.1	160	0.06 J	19	1.0 U	6.45	0.38	-55.0	2.75	5.87	12.73
Area 3	G6M-03-07X-Fall17	10/23/2017	1.0 U	1.0 U	0.55 J	0.97 J	1.0 U	0.72 J	2.7	14	21,000	450	94	1,800	24	170	0.13	1.0 U	1.0 U	6.32	0.07	-75.1	0.66	5.78	13.52
Area 3	G6M-04-02X-Fall17	10/20/2017	97	26	13	2.0 U	2.0 U	1.8 J	1.1 U	1.0 U	16,000	260	66	10,000	3.3	160	0.08 J	6.2	1.0 U	6.36	0.28	-66.9	0.91	4.26	12.51
Area 3	G6M-04-04X-Fall17	10/20/2017	1.0 U	1.0 U	0.51 J	1.4	1.0 U	1.0 U	3.8	39	19,000	600	170	17,000	11	250	0.11	0.72 J	1.0 U	6.64	0.24	-111.1	1.94	4.39	12.69
Area 3	G6M-13-03X-Fall17	10/18/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	3.0 U	0.075 U	550	--	--	--	--	--	5.61	0.58	170.1	2.25	4.69	11.89
Area 4	G6M-02-04X	10/16/2017	1.0 U	1.0	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	440	22	1,300	--	--	--	--	--	7.07	0.42	-119.3	0.63	4.31	12.63
Area 4	G6M-02-13X-Fall17	10/19/2017	3.3	21	57	0.47 J	1.0 U	17	0.73 J	5.9	1,500	120	6.4	8,500	1.8	180	0.05 U	3.0	1.0 U	6.75	0.22	-58.1	0.50	5.52	12.40
Area 4	G6M-13-02X-Fall17	10/19/2017	65	15	13	0.50 J	1.0 U	0.99 J	1.1 U	1.0 U	4,100	1.5 J	0.23	50	2.2	75	0.47	12	1.0 U	6.33	0.22	51.1	1.00	8.18	13.41
Area 5	G6M-02-06X-Fall17	10/19/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	3.0 U	0.075 U	5.0 U	--	--	--	--	--	7.02	5.72	40.2	0.13	4.41	11.94
Area 5	G6M-02-07X-Fall17	10/23/2017	4.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	1.9 J	0.11	12	--	--	--	--	--	7.57	0.29	-39.4	0.34	9.82	11.93
Area 5	G6M-02-11X-Fall17	10/19/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.2	1.0 U	6,500	530	33	7,300	3.9	190	0.03 J	1.0 U	1.0 U	6.91	0.22	-115.9	0.82	12.1	12.07
Area 5	G6M-02-12X-Fall17	10/23/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0	1.0 U	8,000	670	41	8,100	4.3	200	0.055 J	1.0 U	1.0 U	6.90	0.29	-117.9	0.68	7.49	12.24
Area 5	G6M-03-08X-Fall17	10/4/2017	1.0 UJ	1.0 UJ	0.50 J	1.0 UJ	1.0 UJ	1.0 UJ	1.1 U	0.90 J	91	6.6	0.23	6,900	0.84 J	110	0.05 U	9.5	1.0 U	6.70	0.65	-29.9	0.37	5.94	13.29
Area 5	G6M-03-09X	10/17/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.48 J	3.0 U	0.075 U	180	1.0 U	24	1.7	11	1.0 U	6.10	2.03	143.1	0.16	3.92	10.69
Area 5	G6M-03-10X-Fall17	10/23/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	6,500	420	62	2,100	1.4	62	0.07 J	5.5	1.0 U	6.88	0.22	-115	1.19	3.99	12.17
Area 5	G6M-04-05X	10/17/2017	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	260	3.0 U	0.075 U	15	1.0 U	31	0.17	16	1.0 U	5.66	0.19	185.7	0.17	3.27	11.24
Area 5	G6M-04-06X	10/17/2017	1.8	1.0 U	0.60 J	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	1.6	3.0 U	0.03 J	98	1.0 U	58	0.07 J	16	1.0 U	6.42	0.28	81.7	0.27	5.72	10.97
Area 5	G6M-04-07X	10/17/2017	38	20	56	0.39 J	1.0 U	3.1	1.1 U	1.0 U	760	18	1.7	5,200	1.1	170	0.05 U	7.6	1.0 U	6.47	0.38	37.8	0.41	9.59	10.78
Area 5	G6M-13-01X	10/16/2017	10	0.79 J	0.65 J	1.0 U	1.0 U	1.0 U	--	--	--	3.6	0.83	34	--	--	--	--	--	6.09	0.40	49.7	0.81	38.9	12.11
Area 5	G6M-13-04X	10/16/2017	40	40	25	0.81 J	0.71 J	33	1.5	7.6	2,500	340 J	27	7,100	1.8	190	0.05 UJ	4.1	1.0 U	6.76	0.65	-79.1	1.41	4.96	12.07
Area 5	G6M-97-05B-Fall17	10/11/2017	140	16	4.4	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.58 U	3.0 U	0.1 U	3.3 J	1.0 U	32	0.89	7.4	1.0 U	6.20	1.65	100.1	0.71	5.27	13.95
Area 5	DUP-4-Fall17 (G6M-97-05B FD)	10/11/2017	140	17	4.7	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	0.58 U	3.0 U	0.19 U	8.1 J	1.0 U	32	0.88	7.4	1.0 U	--	--	--	--	--	--
Area 5	MW-3-Fall17	10/11/2017	1.0 U	1.0 U	1.0	1.0 U	1.0 U	0.60 J	1.9	1.0 U	5,500	440	56	9,200	5.0	280	0.06 J	0.62 J	1.0 U	6.60	0.69	-102.3	1.20	4.33	13.43
Area 5	MW-7-Fall17	10/11/2017	1.0 U	0.53 J	1.4	1.0 U	1.0 U	15	--	--	--	160	20	19,000	--	--	--	--	--	6.37	0.67	-30.1	0.73	2.75	12.73
Area 5	XSA-12-95X-Fall17	10/10/2017	36	11	26	3.1	1.0 U	5.6	--	--	--	3.2	7.8	9,700	--	--	--	--	--	6.65	0.35	-85.3	1.41	19.5	14.73
Area 5	XSA-12-96X-Fall17	10/10/2017	26	20	20	5.0	0.64 J	16	--	--	--	3.0 U	8.2	6,200	--	--	--	--	--	6.48	0.69	-38.6	1.12	9.27	14.23
Area 5	XSA-12-97X-Fall17	10/10/2017	8.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	3.0 U	1.5	78	--	--	--	--	--	7.88	0.28	-130.3	0.81	9.83	16.81
Area 5	XSA-12-98X-Fall17	10/23/2017	5.0	0.60 J	0.70 J	1.0 U	1.0 U	1.0 U	--	--	--	3 U	0.088 J	2.8 J	--	--	--	--	--	7.35	0.26	-55.5	0.39	5.42	11.48
Nashua River	G6M-04-14X-Fall17	10/6/2017	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	7.1	0.017 J	3.2 J	--	--	--	--	--	7.50	0.46	69.9	1.00	5.26	12.91

Notes:
PCE = Tetrachloroethene
TCE = Trichloroethene
cis-1,2-DCE = cis-1,2-Dichloroethene
trans-1,2-DCE = trans-1,2-Dichloroethene
1,1-DCE = 1,1-Dichloroethene
VC = Vinyl chloride
TOC = Total Organic Carbon

µg/L = microgram per liter
mg/L = milligram per liter
U = Non-detect
UJ = Estimated non-detect
J = Estimated result
MCL = maximum contaminant limit
FDSA = Former Drum Storage Area

Cleanup Goals
PCE = 5 µg/L, MCL
TCE = 5 µg/L, MCL
cis-1,2-DCE = 70 µg/L, MCL
1,1-DCE = 7 µg/L, MCL
VC = 2 µg/L, MCL
Arsenic = 10 µg/L, MCL
Iron = 3,129 µg/L, risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).
Manganese = 1,460 µg/L, risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).

trans-1,2-DCE does not have a cleanup goal but the MCL is 1,000 µg/L.

pH/SU = standard units
DO = Dissolved Oxygen
ORP/mV = Oxidation-Reduction Potential/millivolt
SpC = Specific Conductance
mS/cm = millisiemens per centimeter
NTU = Nephelometric Turbidity Unit
Temp/°C = Temperature/degrees Celsius

Analytical Parameters

0.33	= Detection
0.330	= Above cleanup goal

Table J-4
Groundwater Analytical Results, Spring 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Laboratory Parameters																	Field Parameters					
			PCE	TCE	*cis* -1,2-DCE	*trans* -1,2-DCE	1,1-DCE	VC	Ethane	Ethene	Methane	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	TOC	Alkalinity	Nitrate/ Nitrite	Sulfate	Sulfide	pH	DO	ORP	SpC	Turbidity	Temp
Area	**Sample ID**	**Date**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(µg/L)**	**(mg/L)**	**(µg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(SU)**	**(mg/L)**	**(mV)**	**(µS/cm)**	**(NTUs)**	**(°C)**
Area 1	G6M-13-05X-SPR18	4/5/2018	**59**	**81**	**410**	10 U	10 U	**5.6 J**	**0.75 J**	**1.1**	**6,800**	**85**	**32**	**3,900**	**85**	**77**	**0.10**	**0.95 J**	1.0 U	6.31	0.89	-20.9	641	5.92	10.27
Area 1/FDSA	G6M-04-10A-SPR18	4/4/2018	1.0 U	1.0 U	**0.89 J**	1.0 U	1.0 U	**0.60 J**	1.1 U	**3.6**	**25,000**	**250**	**98**	**2,600**	**19**	**190**	**0.17**	**11**	1.0 U	6.61	1.04	-90.7	1279	9.76	9.57
Area 1/FDSA	G6M-07-02X-SPR18	4/4/2018	**350**	5.0 U	**33**	5.0 U	5.0 U	5.0 U	**10**	**17**	**25,000**	**89**	**85**	**2,800**	**580**	**150**	**0.13**	10 U	1.0 U	5.91	0.81	-69.7	652	1,700	8.99
Area 1/FDSA	G6M-DUP01-SPR18 (G6M-07-02X)	4/4/2018	**360**	**2.6**	**30**	2.0 U	2.0 U	**1.7 J**	**12**	**17**	**33,000**	**83**	**82**	**2,700**	**480**	**150**	**0.11**	10 U	1.0 U	--	--	--	--	--	--
Area 3	G6M-04-02X-SPR18	4/3/2018	**300**	**74**	**19**	2.0 U	2.0 U	**1.7 J**	1.1 U	**3.4**	**23,000**	**99**	**30**	**9,800**	**2.5**	**120**	**0.10**	**11**	1.0 U	6.34	0.96	-22.3	1139	1.90	10.93
Area 4	G6M-13-02X-SPR18	4/3/2018	**58**	**11**	**15**	**0.65 J**	1.0 U	**1.1**	1.1 U	1.0 U	**6,300**	3.0 U	**0.16**	**54**	**6.8**	**53**	**0.35**	**11**	1.0 U	6.51	0.81	-19.0	1063	4.17	11.25
Area 5	G6M-04-07X-SPR18	4/3/2018	**4.2**	**3.4**	**7.7**	1.0 U	1.0 U	1.0 U	NA	NA	NA	**7.2**	**0.05 U**	**2,100**	NA	NA	NA	NA	NA	7.16	1.14	39.4	508	2.90	10.53
Area 5	G6M-13-01X-SPR18	4/4/2018	**3.4**	**0.99 J**	**1.2**	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	**3,200**	**10**	**1.5**	**260**	**1.8**	**31**	0.05 U	**15**	1.0 U	6.15	0.71	41.9	907	3.35	11.09
Area 5	G6M-13-04X-SPR18	4/5/2018	1.0 U	**4.1**	**6.9**	**1.6**	1.0 U	**8.6**	**8.6**	**14**	**20,000**	**350**	**34**	**7,500**	**1.8**	**210**	**0.062 J**	**4.5**	1.0 U	6.65	0.9	-31.2	1579	1.28	10.59
Area 5	G6M-97-05B-SPR18	4/3/2018	**240**	**19**	**9.0**	1.0 U	1.0 U	1.0 U	1.1 U	1.0 U	**34**	3.0 U	0.05 U	**1.4 J**	**1.5**	**33**	**0.79**	**7.4**	1.0 U	6.60	1.85	47.4	671	1.13	10.87
Area 5	XSA-12-96X-SPR18	4/3/2018	**27**	**22**	**23**	**5.7**	**0.69 J**	**16**	NA	NA	NA	3.0 U	**3.2**	**4,400**	NA	NA	NA	NA	NA	7.15	1.31	-187.3	988	14.20	9.07

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.
µg/L = microgram per liter.
µS/cm = microsiemens per centimeter.
mg/L = milligram per liter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.
ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.
TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Cleanup Goals:

PCE = 5 µg/L, MCL
TCE = 5 µg/L, MCL
cis-1,2-DCE = 70 µg/L, MCL
1,1-DCE = 7 µg/L, MCL
VC = 2 µg/L, MCL
Arsenic = 10 µg/L, MCL
Iron = 3,129 µg/L , risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).
Manganese = 1,460 µg/L, risk-based cleanup goal determined in the Record of Decision (ARCADIS, 2004).

Analytical Parameters

0.65	= Detection
240	= Above cleanup goal

Table J-5
Groundwater Analytical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Area 1								Area 1/FDSA	
Location ID:			G6M-04-09X	G6M-13-06X	G6M-13-05X	G6M-02-08X	G6M-04-11X	G6M-04-31X	G6M-04-31X	G6M-04-22X	G6M-07-02X	G6M-07-02X
Field Sample ID:			G6M-04-09X_FAL18	G6M-13-06X_FAL18	G6M-13-05X_FAL18	G6M-02-08X_FAL18	G6M-04-11X_FAL18	G6M-04-31X_FAL18	AOC50-DUP01 FAL18	G6M-04-22X_FAL18	G6M-07-02X_FAL18	AOC50-DUP03 FAL18
Lab Sample ID:			680-159494-5	680-159494-4	680-159359-6	680-159494-2	680-159735-16	680-159735-5	680-159735-7	680-159735-4	680-159359-1	680-159359-2
Sample Date:			10/19/2018	10/19/2018	10/16/2018	10/19/2018	10/22/2018	10/22/2018	10/22/2018	10/22/2018	10/17/2018	10/17/2018
Sample Type:			N	N	N	N	N	N	FD	N	N	FD
	Units	**ROD Cleanup Goals**										
Field Parameters												
pH	SU		6.42	6.25	4.99	6.37	6.23	6.59	NA	6.18	5.48	NA
DO	mg/L		0.81	1.5	0.45	0.35	6.24	0.2	NA	0.24	0.15	NA
ORP	mV		14.3	-61.9	87.2	111.3	206	111.5	NA	49.6	44.9	NA
SpC	mS/cm		1.315	2.131	0.973	1.439	0.254	2.999	NA	1.371	1.315	NA
Turbidity	NTU		16.8	13.2	4.83	41.6	2.65	4.49	NA	35.9	>1000	NA
Temp	°C		10.31	10.53	11.21	11.2	10.4	10.6	NA	12	10.65	NA
Anions												
Sulfate	mg/L		NA	2.00 U	5.00 U	2.00 U	NA	NA	NA	NA	**6.60 J**	10.0 U
Dissolved Gases												
Ethane	µg/L		NA	**12.0**	**4.10**	1.10 U	NA	NA	NA	NA	**14.0**	**12.0**
Ethene	µg/L		NA	**18.0**	**39.0**	1.00 U	NA	NA	NA	NA	**43.0**	**39.0**
Methane	µg/L		NA	**17000**	**16000**	**38000**	NA	NA	NA	NA	**25000**	**20000**
General Chemistry												
Alkalinity, Total (as CaCO3)	mg/L		NA	**480**	**170**	**190**	NA	NA	NA	NA	**400**	**400**
Nitrate-Nitrite (as N)	mg/L	10,000	NA	**0.180**	0.0500 U	**0.230**	NA	NA	NA	NA	**0.430 J**	**0.850 J**
Sulfide	mg/L		NA	1.00 U	1.00 U	1.00 U	NA	NA	NA	NA	1.00 U	1.00 U
Total Organic Carbon	mg/L		NA	**120**	**210**	**110**	NA	NA	NA	NA	**1300**	**1300**
Metals												
Arsenic (Dissolved)	µg/L	10	**330**	**400**	**95.0**	**300**	3.00 U	**370**	**360**	**820**	**69.0**	**71.0**
Iron (Dissolved)	µg/L	3,129	**140000**	**220000**	**66000**	**240000**	50.0 U	**60000**	**59000**	**140000**	**370000**	**390000**
Manganese (Dissolved)	µg/L	1,460	**2600**	**5300**	**15000**	**1400**	3.00 U	**6800**	**6700**	**760**	**6100**	**6400**
VOCs												
1,1-Dichloroethene	µg/L	7	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 UJ	5.00 U	5.00 U
1,2-Dichloroethane	µg/L	5	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 UJ	5.00 U	5.00 U
1,2-Dichloropropane	µg/L	5	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 UJ	5.00 U	5.00 U
Benzene	µg/L	5	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	**1.50 J**	1.00 UJ	5.00 U	5.00 U
cis-1,2-Dichloroethene	µg/L	70	1.00 U	**0.670 J**	**250**	**8.00 J**	1.00 U	1.00 U	**0.440 J**	**2.80 J**	**110**	**110**
Methylene chloride	µg/L	5	5.00 U	5.00 U	25.0 U	50.0 U	5.00 U	5.00 U	5.00 U	5.00 UJ	25.0 U	25.0 U
Tetrachloroethene (PCE)	µg/L	5	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 UJ	**370**	**430**
trans-1,2-Dichloroethene	µg/L	1,000*	1.00 U	1.00 U	5.00 U	10.0 U	1.00 U	1.00 U	1.00 U	1.00 UJ	5.00 U	5.00 U
Trichloroethene (TCE)	µg/L	5	1.00 U	1.00 U	**2.70 J**	10.0 U	1.00 U	**0.580 J**	**0.570 J**	1.00 UJ	**4.10 J**	**4.30 J**
Vinyl chloride	µg/L	2	1.00 U	**1.20**	**57**	10.0 U	1.00 U	1.00 U	1.00 U	**3.40 J**	**3.30 J**	**4.20 J**

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.

µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.

ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.

TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-5
Groundwater Analytical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Area 1/FDSA						Area 2			Area 3
Location ID:			G6M-04-10A	G6M-04-10X	G6M-04-13X	G6M-04-15X	G6M-95-19X	G6M-95-20X	G6M-02-01X	G6M-04-01X	G6M-04-03X	G6M-03-07X
Field Sample ID:			G6M-04-10A_FAL18	G6M-04-10X_FAL18	G6M-04-13X_FAL18	G6M-04-15X_FAL18	G6M-95-19X_FAL18	G6M-95-20X_FAL18	G6M-02-01X_Fal18	G6M-04-01X_Fal18	G6M-04-03X_Fal18	G6M-03-07X_Fal18
Lab Sample ID:			680-159359-3	680-159359-4	680-159494-1	680-159494-6	680-159359-7	680-159359-8	680-160018-1	680-160018-5	680-160018-6	680-160018-3
Sample Date:			10/16/2018	10/17/2018	10/19/2018	10/19/2018	10/17/2018	10/17/2018	10/29/2018	10/30/2018	10/29/2018	10/29/2018
Sample Type:			N	N	N	N	N	N	N	N	N	N
	Units	**ROD Cleanup Goals**										
Field Parameters												
pH	SU		5.51	5.2	5.02	6.21	5.43	5.84	7.48	6.48	6.78	6.54
DO	mg/L		0.72	0.26	10.4	0.12	2.08	0.13	0.17	0.55	0.57	0.27
ORP	mV		-47.2	181.2	77.8	116	246.1	154.3	-115.8	-73.1	-113	-78
SpC	mS/cm		1.243	1.534	0.162	3.171	4.601	0.426	3.07	5.152	2.944	0.795
Turbidity	NTU		346	4.23	3.31	7.49	1.99	24.9	18.2	3.01	6.82	3.12
Temp	°C		10.72	11.32	10.35	11.99	11.71	12.21	12.8	11.74	13.41	13.22
Anions												
Sulfate	mg/L		**6.50 J**	NA	NA	NA	NA	NA	NA	NA	NA	5.00 U
Dissolved Gases												
Ethane	µg/L		**0.990 J**	NA	NA	NA	NA	NA	NA	NA	NA	**2.80**
Ethene	µg/L		1.00 U	NA	NA	NA	NA	NA	NA	NA	NA	**19.0**
Methane	µg/L		**32000**	NA	NA	NA	NA	NA	NA	NA	NA	**37000**
General Chemistry												
Alkalinity, Total (as CaCO3)	mg/L		**210**	NA	NA	NA	NA	NA	NA	NA	NA	**170**
Nitrate-Nitrite (as N)	mg/L	10,000	0.0500 UJ	NA	NA	NA	NA	NA	NA	NA	NA	**0.200**
Sulfide	mg/L		1.00 U	NA	NA	NA	NA	NA	NA	NA	NA	1.00 U
Total Organic Carbon	mg/L		**240**	NA	NA	NA	NA	NA	NA	NA	NA	**18.0**
Metals												
Arsenic (Dissolved)	µg/L	10	**230**	NA	NA	**62.0**	NA	**18.0**	**51.0**	**470**	**310**	**420**
Iron (Dissolved)	µg/L	3,129	**140000**	NA	NA	**11000**	NA	**3500**	**3100**	**68000**	**74000**	**99000**
Manganese (Dissolved)	µg/L	1,460	**6100**	NA	NA	**5900**	NA	**170**	**2700**	**19000**	**10000**	**2100**
VOCs												
1,1-Dichloroethene	µg/L	7	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzene	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	**1.90**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**1.30**	1.00 U	**0.440 J**	**0.550 J**
Methylene chloride	µg/L	5	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	1.00 U	1.00 U	1.00 U	**1.50**	**1.60**	**1.10**	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene	µg/L	1,000*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**0.660 J**
Trichloroethene (TCE)	µg/L	5	1.00 U	1.00 U	1.00 U	**0.600 J**	1.00 U	**0.640 J**	**0.730 J**	1.00 U	**0.930 J**	1.00 U
Vinyl chloride	µg/L	2	**1.20**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**0.740 J**

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.

µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.

ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.

TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-5
Groundwater Analytical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Area 3				Area 4					Area 5
Location ID:			G6M-04-02X	G6M-04-02X	G6M-13-03X	G6M-04-04X	G6M-13-02X	G6M-02-13X	G6M-02-04X	G6M-02-03X	G6M-97-28X	MW-3
Field Sample ID:			G6M-04-02X_Fal18	AOC50-DUP02 Fal18	G6M-13-03X_Fal18	G6M-04-04X_FAL18	G6M-13-02X_FAL18	G6M-02-13X_FAL18	G6M-02-04X_FAL18	G6M-02-03X_FAL18	G6M-97-28X_FAL18	MW-3_Fal18
Lab Sample ID:			680-160018-14	680-160018-15	680-160018-16	680-159877-5	680-159735-1	680-159735-20	680-159877-4	680-159877-2	680-159877-3	680-160018-2
Sample Date:			10/30/2018	10/30/2018	10/30/2018	10/26/2018	10/24/2018	10/24/2018	10/26/2018	10/24/2018	10/26/2018	10/29/2018
Sample Type:			N	FD	N	N	N	N	N	N	N	N
	Units	**ROD Cleanup Goals**										
Field Parameters												
pH	SU		6.01	NA	5.01	6.44	5.79	6.53	7.12	5.72	6.33	6.8
DO	mg/L		0.9	NA	0.81	0.21	0.32	1.39	0.25	5.81	0.43	1.05
ORP	mV		-22.7	NA	-5.1	-91.7	-26.4	-40.1	-141.7	37.1	-37.8	-102
SpC	mS/cm		1.317	NA	2.618	2.529	1.217	1.26	0.741	1.931	0.817	1.211
Turbidity	NTU		0.58	NA	7.29	9.98	38.7	14.6	9.32	50.9	20.1	4.13
Temp	°C		12.12	NA	12.06	13	13.4	12.6	13.47	13.23	11.06	11.61
Anions												
Sulfate	mg/L		**9.10**	**9.00**	NA	NA	**10.0 J**	NA	NA	NA	NA	NA
Dissolved Gases												
Ethane	µg/L		1.10 U	1.10 U	NA	NA	**1.60**	**1.80**	**5.10**	1.10 U	1.10 U	NA
Ethene	µg/L		**4.10**	**3.90**	NA	NA	**1.30**	**2.80**	1.00 U	1.00 U	1.00 U	NA
Methane	µg/L		**14000**	**11000**	NA	NA	**6700**	**5900**	**6500**	**430**	**210**	NA
General Chemistry												
Alkalinity, Total (as CaCO3)	mg/L		**140**	**150**	NA	NA	**67.0**	NA	NA	NA	NA	NA
Nitrate-Nitrite (as N)	mg/L	10,000	**0.130**	**0.140**	NA	NA	**0.0950 J**	NA	NA	NA	NA	NA
Sulfide	mg/L		1.00 U	1.00 U	NA	NA	1.00 U	NA	NA	NA	NA	NA
Total Organic Carbon	mg/L		**8.40**	**8.50**	NA	NA	**29.0 J**	NA	0.500 U	0.500 U	0.500 U	NA
Metals												
Arsenic (Dissolved)	µg/L	10	**81.0**	**79.0**	NA	**460**	**3.60**	**150**	**470**	3.00 U	**92.0**	**470**
Iron (Dissolved)	µg/L	3,129	**45000**	**40000**	NA	**110000**	**1000**	**11000**	**22000**	**180**	**9500**	**51000**
Manganese (Dissolved)	µg/L	1,460	**14000**	**13000**	NA	**21000**	**160**	**18000**	**1400**	**320**	**9500**	**8300**
VOCs												
1,1-Dichloroethene	µg/L	7	2.00 U	2.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	2.00 U	2.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	2.00 U	2.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzene	µg/L	5	2.00 U	2.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	**27**	**27**	1.00 U	**0.830 J**	**24.0 J**	**1.80**	1.00 U	1.00 U	1.00 U	1.00 U
Methylene chloride	µg/L	5	10.0 U	10.0 U	5.00 U	5.00 U	5.00 UJ	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	**200**	**250**	1.00 U	1.00 U	**28.0 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene	µg/L	1,000*	2.00 U	2.00 U	1.00 U	**0.370 J**	**1.00 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene (TCE)	µg/L	5	**64**	**72**	1.00 U	1.00 U	**9.60 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl chloride	µg/L	2	**3**	**2.9**	1.00 U	**0.600 J**	**3.50 J**	**1.60**	1.00 U	1.00 U	1.00 U	1.00 U

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.

µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.

ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.

TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethe.ne
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-5
Groundwater Analytical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Area 5									
Location ID:			G6M-13-04X	G6M-02-12X	G6M-02-11X	G6M-03-10X	MW-7	G6M-02-06X	G6M-02-07X	G6M-04-14X	G6M-03-08X	G6M-04-05X
Field Sample ID:			G6M-13-04X_Fal18	G6M-02-12X_FAL18	G6M-02-11X_FAL18	G6M-03-10X_FAL18	MW-7_Fal18	G6M-02-06X_FAL18	G6M-02-07X_FAL18	G6M-04-14X_FAL18	G6M-03-08X_Fal18	G6M-04-05X_FAL18
Lab Sample ID:			680-160018-7	680-159735-13	680-159735-15	680-159735-11	680-160018-9	680-159735-19	680-159735-17	680-159877-1	680-160018-18	680-159735-12
Sample Date:			10/29/2018	10/23/2018	10/23/2018	10/23/2018	10/29/2018	10/22/2018	10/23/2018	10/25/2018	10/31/2018	10/23/2018
Sample Type:			N	N	N	N	N	N	N	N	N	N
	Units	**ROD Cleanup Goals**										
Field Parameters												
pH	SU		6.42	7.02	6.85	6.93	6.17	7.21	7.65	7.65	6.67	6.03
DO	mg/L		0.91	0.49	0.21	0.14	0.46	5.35	0.31	0.36	1.69	0.37
ORP	mV		-53.9	-16.1	4.2	-30.2	-56.8	168.4	81.7	102.7	30.9	18.9
SpC	mS/cm		1.619	0.731	1.013	1.576	1.018	0.152	0.575	0.767	0.478	0.187
Turbidity	NTU		9.47	18.9	11.2	3.98	19.6	11.8	8.66	1.56	25	2.1
Temp	°C		11.18	11.43	11.7	11.6	12.83	11.2	11.74	12.68	10.75	10.99
Anions												
Sulfate	mg/L		**6.90**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Gases												
Ethane	µg/L		**1.80**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	µg/L		**4.40**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	µg/L		**2700**	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry												
Alkalinity, Total (as CaCO3)	mg/L		**160**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate-Nitrite (as N)	mg/L	10,000	**0.0550 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	mg/L		1.00 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	mg/L		**1.50**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals												
Arsenic (Dissolved)	µg/L	10	**330**	**590**	**480**	**380**	**250**	3.00 U	3.00 U	**8.10**	**8.60**	NA
Iron (Dissolved)	µg/L	3,129	**23000**	**40000**	**38000**	**51000**	**20000**	50.0 U	50.0 U	50.0 U	**270**	NA
Manganese (Dissolved)	µg/L	1,460	**8700**	**7800**	**8800**	**1900**	**14000**	3.00 U	3.00 U	**1.70 J**	**7300**	NA
VOCs												
1,1-Dichloroethene	µg/L	7	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzene	µg/L	5	1.00 U	1.00 U	**0.450 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	**7.70**	1.00 U	1.00 U	1.00 U	**0.950 J**	1.00 U	1.00 U	1.00 U	**0.600 J**	1.00 U
Methylene chloride	µg/L	5	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**3.40**	**1.10**	1.00 U	**1.20**
trans-1,2-Dichloroethene	µg/L	1,000*	**0.670 J**	**0.390 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene (TCE)	µg/L	5	**6.90**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl chloride	µg/L	2	**6.10**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

Notes:
*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.
µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.
ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.
TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-5
Groundwater Analytical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Area 5								
Location ID:			G6M-04-07X	G6M-04-06X	XSA-12-95X	XSA-12-96X	XSA-12-97X	XSA-12-98X	G6M-97-05B	G6M-13-01X	G6M-13-01X
Field Sample ID:			G6M-04-07X_FAL18	G6M-04-06X_FAL18	XSA-12-95X_FAL18	XSA-12-96X_Fal18	XSA-12-97X_Fal18	XSA-12-98X_FAL18	G6M-97-05B_Fal18	G6M-13-01X_Fal18	AOC50-DUP05 Fal18
Lab Sample ID:			680-159735-8	680-159735-9	680-159735-10	680-160018-17	680-160018-4	680-159735-18	680-160018-13	680-160018-8	680-160018-10
Sample Date:			10/22/2018	10/22/2018	10/23/2018	10/31/2018	10/29/2018	10/23/2018	10/30/2018	10/29/2018	10/29/2018
Sample Type:			N	N	N	N	N	N	N	N	FD
	Units	**ROD Cleanup Goals**									
Field Parameters											
pH	SU		6.15	5.9	6.58	6.53	9.82	7.71	5.74	5.63	NA
DO	mg/L		0.28	0.53	0.21	0.38	0.34	0.25	1.29	0.46	NA
ORP	mV		33.7	51.1	-2.1	-54.7	-283	-141.6	105	-1.9	NA
SpC	mS/cm		0.538	0.246	1.198	1.221	0.682	0.948	0.758	0.975	NA
Turbidity	NTU		4.21	8.69	29.4	20.8	27.2	4.99	9.85	23.6	NA
Temp	°C		11.2	10.9	9.6	10.5	7.89	12	9.05	12.06	NA
Anions											
Sulfate	mg/L		NA	NA	NA	NA	NA	NA	**8.60**	**14.0**	**14.0**
Dissolved Gases											
Ethane	µg/L		NA	NA	NA	NA	NA	NA	1.10 U	1.10 U	1.10 U
Ethene	µg/L		NA	NA	NA	NA	NA	NA	1.00 U	1.00 U	1.00 U
Methane	µg/L		NA	NA	NA	NA	NA	NA	**530**	**2300**	**2300**
General Chemistry											
Alkalinity, Total (as CaCO3)	mg/L		NA	NA	NA	NA	NA	NA	**35.0**	**35.0**	**36.0**
Nitrate-Nitrite (as N)	mg/L	10,000	NA	NA	NA	NA	NA	NA	**0.590**	0.0500 U	0.0500 U
Sulfide	mg/L		NA	NA	NA	NA	NA	NA	1.00 U	1.00 U	1.00 U
Total Organic Carbon	mg/L		NA	NA	NA	NA	NA	NA	0.500 U	**6.70**	**4.70**
Metals											
Arsenic (Dissolved)	µg/L	10	**18.0**	3.00 U	**3.20**	**2.90 J**	3.00 U	3.00 U	3.00 U	**13.0**	**12.0**
Iron (Dissolved)	µg/L	3,129	**1500**	50.0 U	**3300**	**5100**	**2300**	50.0 U	50.0 U	**1500**	**1600**
Manganese (Dissolved)	µg/L	1,460	**4200**	**62.0**	**11000**	**10000**	**49.0**	3.00 U	**1.50 J**	**200**	**260**
VOCs											
1,1-Dichloroethene	µg/L	7	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U
Benzene	µg/L	5	2.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	**120**	1.00 U	**11.0**	**21.0**	1.00 U	1.00 U	**9.6**	**3.60**	**3.50**
Methylene chloride	µg/L	5	10.0 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	10.0 U	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	**15**	**1.40**	**13.0**	**24.0**	**6.10**	**2.80**	**190**	**0.850 J**	**0.84**
trans-1,2-Dichloroethene	µg/L	1,000*	2.00 U	1.00 U	**2.20**	**3.20**	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U
Trichloroethene (TCE)	µg/L	5	**47**	1.00 U	**5.00**	**9.10**	1.00 U	1.00 U	**16**	**1.30**	**1.40**
Vinyl chloride	µg/L	2	**4.4**	1.00 U	**1.9**	**4.70**	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.

µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.

ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.

TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-6
Vertical Profile Anayltical Results, Fall 2018
AOC 50, Former Fort Devens Army Installation, Massachusetts

Location ID:			G6M-18-01	G6M-18-01	G6M-18-01	G6M-18-01	G6M-18-02	G6M-18-02	G6M-18-02	G6M-18-02	G6M-18-02	G6M-18-02
Field Sample ID:			G6M-18-01-GW-90-94	G6M-18-01-GW-110-114	G6M-18-01-GW-FD-1	G6M-18-01-GW-100-104	G6M-18-02-GW-84-88	G6M-18-02-GW-94-98	G6M-18-02-GW-104-108	G6M-18-02-GW-114-118	G6M-18-02-GW-FD-2	G6M-18-02-GW-124-128
Lab Sample ID:			680-159877-8	680-159877-11	680-159877-10	680-159877-9	680-159889-1	680-159889-2	680-159889-3	680-159889-4	680-159889-5	680-159889-6
Sample Date:			10/24/2018	10/24/2018	10/24/2018	10/25/2018	10/22/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018	10/23/2018
Sample Type:			N	N	FD	N	N	N	N	N	FD	N
Field Parameters	**Units**	**ROD Cleanup Goals**										
pH	SU		6.11	6.99	NA	6.33	6.16	5.94	6.21	6.2	NA	6.42
DO	mg/L		5.27	6.77	NA	4.25	6.28	6.12	6.22	4.54	NA	5.2
ORP	mV		60	20.4	NA	32.6	107.6	71.7	64.7	30.9	NA	17.2
SpC	mS/cm		0.076	0.114	NA	0.157	0.308	0.39	0.687	0.838	NA	0.705
Turbidity	NTU		Overrange	687	NA	Overrange	1718	625	Overrange	3322	NA	3025
Temp	°C		12.19	10.98	NA	12.28	14.24	10.35	12.84	12.69	NA	12.91
VOCs												
1,1-Dichloroethene	µg/L	7	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzene	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Methylene chloride	µg/L	5	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
trans-1,2-Dichloroethene	µg/L	1000*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene (TCE)	µg/L	5	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl chloride	µg/L	2	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.
µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolts.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.
ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.
TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-7
Baseline Groundwater Analytical Results, Winter 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

Location ID:			G6M-18-01	G6M-18-02
Field Sample ID:			G6M-18-01-JAN19	G6M-18-02-JAN19
Lab Sample ID:			680-163405-1	680-163405-2
Sample Date:			1/14/2019	1/14/2019
Sample Type:			N	N
	Units	**ROD Cleanup Goals**		
Field Parameters				
pH	SU		8.58	6.22
DO	mg/L		7	3.85
ORP	mV		69	137.1
SpC	mS/cm		0.166	0.722
Turbidity	NTU		3.09	3.69
Temp	^{o}C		11.6	10.74
VOCs				
1,1-Dichloroethane	µg/L	7	1.00 U	1.00 U
1,2-Dichloroethane	µg/L	5	1.00 U	1.00 U
1,2-Dichloropropane	µg/L	5	1.00 U	1.00 U
Benzene	µg/L	5	1.00 U	1.00 U
cis-1,2-Dichloroethene	µg/L	70	1.00 U	1.00 U
Methylene chloride	µg/L	5	5.00 U	5.00 U
Tetrachloroethene (PCE)	µg/L	5	1.00 U	1.00 U
trans-1,2-Dichloroethene	µg/L	1000*	1.00 U	1.00 U
Trichloroethene (TCE)	µg/L	5	1.00 U	1.00 U
Vinyl chloride	µg/L	2	1.00 U	1.00 U

Notes:

*trans-1,2-DCE does not have a cleanup goal but the MCL is 1000 µg/L.

cis-1,2-DCE = cis-1,2-Dichloroethene.
1,1-DCE = 1,1-Dichloroethene.
DO = Dissolved Oxygen.
FDSA = Former Drum Storage Area.
J = Estimated result.
MCL = maximum contaminant level.
µg/L = microgram per liter.
mg/L = milligram per liter.
mS/cm = millisiemens per centimeter.
mV = millivolt.
NTU = Nephelometric Turbidity Unit.
NA = Not analyzed.
ORP = Oxidation-Reduction Potential.
PCE = Tetrachloroethene.
pH/SU = standard units.
ROD = Record of Decision, 2004.
SpC = Specific Conductance.
Temp/°C = Temperature/degrees Celsius.
TOC = Total Organic Carbon.
trans-1,2-DCE = trans-1,2-Dichloroethene.
TCE = Trichloroethene.
U = Non-detect.
UJ = Estimated non-detect.
VC = Vinyl chloride.

Analytical Parameters

1.3	= Detection
200	= Above cleanup goal

Table J-8
Groundwater Analytical Results, Spring 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-13-05X		G6M-04-10A		G6M-07-02X		G6M-07-02X		G6M-07-01X		G6M-04-02X		G6M-13-02X		G6M-04-07X		G6M-13-01X		G6M-13-04X		G6M-97-05B		XSA-12-96X	
			Sample ID	G6M-13-05X-SPR19		G6M-04-10A-SPR19		G6M-07-02X-SPR19		G6M-DUP01-SPR19		G6M-07-01X-SPR19		G6M-04-02X-SPR19		G6M-13-02X-SPR19		G6M-04-07X-SPR19		G6M-13-01X-SPR19		G6M-13-04X-SPR19		G6M-97-05B-SPR19		XSA-12-96X_SPR19	
			Sample Date	04/05/2019		4/4/2019		4/5/2019		4/5/2019		4/5/2019		4/3/2019		4/4/2019		4/4/2019		4/3/2019		4/4/2019		4/3/2019		4/19/2019	
			Sample Area	Area 1		Area 1/ FDSA		Area 1/ FDSA		Area 1/ FDSA		Area 2		Area 3		Area 4		Area 5		Area 5		Area 5		Area 5		Area 5	
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**																								
	4-Chlorotoluene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	4-Methyl-2-pentanone (MIBK)	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	5.0	UJ	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
	Acetone	**µg/L**		**37**		**11**		**34**		**27**		10	U	10	U	10	U	10	U	**13**		10	U	10	U	**83**	
	Benzene	**µg/L**	**5***	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromobenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromochloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromodichloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromoform	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromomethane	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	UJ
	Carbon disulfide	**µg/L**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
	Carbon tetrachloride	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Chlorobenzene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Chloroethane	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Chloroform	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Chloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	cis-1,2-Dichloroethene	**µg/L**	**70***	**120**		**29**		**110**		**100**		1.0	U	**29**		**11**		**78**		**3.1**		**13**		**9.8**		**9.9**	
	cis-1,3-Dichloropropene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Dibromochloromethane	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Dibromomethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
VOCs - Continued	**Dichlorodifluoromethane**	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	UJ
	Ethylbenzene	**µg/L**		0.50	U	0.50	U	**0.35**	**J**	**0.35**	**J**	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Hexachlorobutadiene	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Isopropylbenzene (Cumene)	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	m,p-Xylene	**µg/L**		1.0	U	1.0	U	**0.92**	**J**	**0.95**	**J**	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Methyl tert-butyl ether (MTBE)	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Methylene chloride	**µg/L**	**5***	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	n-Butylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	**0.49**	**J**	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	n-Propylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Naphthalene	**µg/L**		5.0	U	5.0	U	**2.8**	**J**	**3.1**	**J**	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	o-Xylene	**µg/L**		0.50	U	0.50	U	**0.65**	**J**	**0.56**	**J**	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	p-Cymene (p-Isopropyltoluene)	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	sec-Butylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Styrene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	tert-Butylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Tetrachloroethene (PCE)	**µg/L**	**5***	1.0	U	1.0	U	**71**	**J**	**52**	**J**	**35**	**J**	**160**		**22**		**25**		1.0	U	**1.0**	**J**	**180**		**10**	

Table J-8
Groundwater Analytical Results, Spring 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-13-05X	G6M-04-10A	G6M-07-02X		G6M-07-01X	G6M-04-02X	G6M-13-02X	G6M-04-07X	G6M-13-01X	G6M-13-04X	G6M-97-05B	XSA-12-96X
			Sample ID	G6M-13-05X-SPR19	G6M-04-10A-SPR19	G6M-07-02X-SPR19	G6M-DUP01-SPR19	G6M-07-01X-SPR19	G6M-04-02X-SPR19	G6M-13-02X-SPR19	G6M-04-07X-SPR19	G6M-13-01X-SPR19	G6M-13-04X-SPR19	G6M-97-05B-SPR19	XSA-12-96X_SPR19
			Sample Date	04/05/2019	4/4/2019	4/5/2019	4/5/2019	4/5/2019	4/3/2019	4/4/2019	4/4/2019	4/3/2019	4/4/2019	4/3/2019	4/19/2019
			Sample Area	Area 1	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 2	Area 3	Area 4	Area 5	Area 5	Area 5	Area 5	Area 5
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**												
	Toluene	**µg/L**		1.0 U	1.0 U	**0.60 J**	**0.59 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-Dichloroethene	**µg/L**		**1.2**	1.0 U	1.0 U	1.0 U	1.0 U	**0.61 J**	**0.42 J**	**0.52 J**	1.0 U	**0.52 J**	1.0 U	**2.9**
VOCs - Continued	**trans-1,3-Dichloropropene**	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Trichloroethene (TCE)	**µg/L**	**5***	**0.62 J**	**12**	**1.8**	**1.5**	**1.2**	**130**	**8.5**	**48**	1.0 U	**12**	**22**	**13**
	Trichlorofluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Vinyl acetate	**µg/L**		2.0 U	2.0 UJ	2.0 UJ	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Vinyl chloride	**µg/L**	**2***	**39**	**9.3**	**3.4**	**4.1**	1.0 U	**3.5**	**1.5**	**5.7**	1.0 U	**6.5**	1.0 U	**8.0**
	Xylenes, Total	**µg/L**		0.50 U	0.50 U	**1.6 J**	**1.5 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Field Parameters	**Dissolved Oxygen**	**mg/L**		0.74	1.7	0.37	0.37	1.4	1.1	0.92	0.89	1.4	1.4	1.5	1.2
	Oxidation Reduction Potential	**mv**		-13	-29	82	82	32	-76	-120	7.9	-140	-97	45	-100
	pH	**pH Units**		6.0	5.8	6.1	6.1	6.9	6.2	6.2	6.4	6.0	6.8	6.2	6.9
	Specific Conductivity	**µS/cm**		1,100	800	850	850	880	1,500	1,200	560	1,000	1,700	760	1,000
	Temperature	**°C**		8.6	9.5	8.4	8.4	12	11	13	11	12	10	13	17
	Turbidity	**NTU**		1.8	11	35	35	6.9	0.49	6.8	4.5	29	2.0	0.69	10

Notes:

*AOC 50 Cleanup Levels (AOC 50 Record of Decision, 2004)

FDSA:	Former Drum Storage Area
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
mv	Millivolts
pH Units	pH Units
µS/cm	Microsiemens per Centimeter
°C	Degrees Celsius
NTU	Nephelometric Turbidity Units

Qualifiers

U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the LOD.
J	The analtye was positively identified, the quantitation is an estimation.
UJ	The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.

Detection
Above Cleanup Level

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-04-10X	G6M-04-09X	G6M-04-15X	G6M-04-13X	G6M-95-19X	G6M-95-20X		G6M-13-05X	G6M-13-06X	G6M-02-08X	G6M-04-10A	G6M-07-02X	
			Sample ID	G6M-04-10X_FAL19	G6M-04-09X_FAL19	G6M-04-15X_FAL19	G6M-04-13X_FAL19	G6M-95-19X_FAL19	G6M-95-20X_FAL19	AOC50-DUP2_FAL19	G6M-13-05X_FAL19	G6M-13-06X_FAL19	G6M-02-08X_FAL19	G6M-04-10A_FAL19	G6M-07-02X_FAL19	AOC50_DUP1_FAL19
			Sample Date	10/9/2019	10/10/2019	10/9/2019	10/9/2019	10/9/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/16/2019	10/16/2019	10/9/2019	10/9/2019
			Sample Area	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**													
Anions	**Sulfate**	**mg/L**		---	---	---	---	---	---	---	1.0 U	1.0 UJ	1.0 U	**5.6**	1.0 U	1.0 U
Dissolved Gases	**Ethane**	**µg/L**		---	---	---	---	---	---	---	**3.3**	**11**	1.1 U	**4.0**	**5.0**	**4.2**
	Ethene	**µg/L**		---	---	---	---	---	---	---	**33**	**14**	**4.3**	**160**	**6.2**	**5.2**
	Methane	**µg/L**		---	---	---	---	---	---	---	**12,000**	**11,000**	**31,000**	**33,000**	**13,000**	**10,000**
GENCHEM	**Alkalinity, Total (as CaCO3)**	**mg/L**		---	---	---	---	---	---	---	**140**	**420**	**120**	**170**	**210**	**220**
	Nitrate-Nitrite (as N)		**10,000***	---	---	---	---	---	---	---	0.050 J	**0.29 J**	**0.054 J**	0.050 U	**0.39**	**0.24**
	Sulfide	**mg/L**		---	---	---	---	---	---	---	0.83 U	**1.2**	**1.8**	0.96 U	0.83 U	1.9
	Total Organic Carbon	**mg/L**		**1.3**	---	---	---	---	---	---	**37**	**110**	**89**	**65**	**260**	**270**
Metals	**Arsenic**	**µg/L**	**10***	---	**310**	**71**	---	---	**73**	**75**	**130**	**500**	**370**	**210**	**48**	**45**
	Iron	**µg/L**	**3,129***	---	**64,000**	**8,900**	---	---	**39,000**	**41,000**	**94,000**	**220,000**	**180,000**	**89,000**	**210,000**	**210,000**
	Manganese	**µg/L**	**1,460***	---	**1,600**	**2,500**	---	---	**1,500**	**1,600**	**19,000**	**2,900**	**1,100**	**2,300**	**5,500**	**5,500**
VOCs	**1,1,1,2-Tetrachloroethane**	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,1,1-Trichloroethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,1,2,2-Tetrachloroethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,1,2-Trichloroethane	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	1,1-Dichloroethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,1-Dichloroethene	**µg/L**	**7***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,1-Dichloropropene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,2,3-Trichlorobenzene	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	1,2,3-Trichloropropane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,2,4-Trichlorobenzene	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	1,2,4-Trimethylbenzene	**µg/L**		1.0 U	**1.7**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**1.1**	**9.0 J**	**2.7**	5.0 U	**1.4**
	1,2-Dibromo-3-chloropropane	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 UJ	2.0 U	10 U	2.0 U
	1,2-Dibromoethane (EDB)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,2-Dichlorobenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,2-Dichloroethane	**µg/L**	**5***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,2-Dichloroethene	**µg/L**		1.0 U	**24**	**1.0 J**	**2.4**	1.0 U	**1.5 J**	**1.3 J**	**34**	**1.0 J**	**5.9 J**	**150**	**140**	**140**
	1,2-Dichloropropane	**µg/L**	**5***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,3,5-Trimethylbenzene	**µg/L**		0.50 U	**0.83 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.33 J**	**2.5 J**	**1.6**	2.5 U	0.36 J
	1,3-Dichlorobenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,3-Dichloropropane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	1,4-Dichlorobenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	2,2-Dichloropropane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-04-10X	G6M-04-09X	G6M-04-15X	G6M-04-13X	G6M-95-19X	G6M-95-20X		G6M-13-05X	G6M-13-06X	G6M-02-08X	G6M-04-10A	G6M-07-02X	
			Sample ID	G6M-04-10X_FAL19	G6M-04-09X_FAL19	G6M-04-15X_FAL19	G6M-04-13X_FAL19	G6M-95-19X_FAL19	G6M-95-20X_FAL19	AOC50-DUP2_FAL19	G6M-13-05X_FAL19	G6M-13-06X_FAL19	G6M-02-08X_FAL19	G6M-04-10A_FAL19	G6M-07-02X_FAL19	AOC50_DUP1_FAL19
			Sample Date	10/9/2019	10/10/2019	10/9/2019	10/9/2019	10/9/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/16/2019	10/16/2019	10/9/2019	10/9/2019
			Sample Area	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**													
	2-Butanone (MEK)	**µg/L**		10 U	10 U	10 U	**3.4 J**	10 U	10 U	10 U	**96**	**320**	**37 J**	10 U	**110**	**110**
	2-Chlorotoluene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	2-Hexanone	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**3.9 J**	25 UJ	5.0 U	25 U	**16**
	4-Chlorotoluene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	4-Methyl-2-pentanone (MIBK)	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	Acetone	**µg/L**		10 U	10 U	10 U	10 U	10 U	10 U	10 U	**15**	**77**	50 UJ	**15**	50 U	**18**
	Benzene	**µg/L**	**5***	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Bromobenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Bromochloromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Bromodichloromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Bromoform	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Bromomethane	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	25 UJ	5.0 U	25 U	5.0 U
	Carbon disulfide	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.43 J**	**0.87 J**	10 UJ	2.0 U	10 U	2.0 U
	Carbon tetrachloride	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	Chlorobenzene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	Chloroethane	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	Chloroform	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Chloromethane	**µg/L**		1.0 U	1.0 U	1.0 U	**0.73 J**	1.0 U	1.0 U	**0.68 J**	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	cis-1,2-Dichloroethene	**µg/L**	**70***	1.0 U	**23**	**0.64 J**	**2.4**	1.0 U	**1.5**	**1.3**	**33**	**1.0**	**5.9 J**	**150**	**140**	**140**
VOCs - Continued	**cis-1,3-Dichloropropene**	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Dibromochloromethane	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	Dibromomethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Dichlorodifluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Ethylbenzene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.7**	2.5 UJ	0.50 U	2.5 U	**0.40 J**
	Hexachlorobutadiene	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	Isopropylbenzene (Cumene)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	**0.38 J**	5.0 U	1.0 U
	m,p-Xylene	**µg/L**		1.0 U	**0.39 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.50 J**	**0.77 J**	5.0 UJ	**1.4**	5.0 U	**1.0**
	Methyl tert-butyl ether (MTBE)	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.31 J**	2.5 UJ	0.50 U	2.5 U	0.50 U
	Methylene chloride	**µg/L**	**5***	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	5.0 U
	n-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	**0.60 J**
	n-Propylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Naphthalene	**µg/L**		5.0 UJ	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	25 UJ	5.0 U	25 U	**3.1 J**
	o-Xylene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.31 J**	**0.38 J**	2.5 UJ	0.50 U	2.5 U	**0.60 J**

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-04-10X	G6M-04-09X	G6M-04-15X	G6M-04-13X	G6M-95-19X	G6M-95-20X		G6M-13-05X	G6M-13-06X	G6M-02-08X	G6M-04-10A	G6M-07-02X	
			Sample ID	G6M-04-10X_FAL19	G6M-04-09X_FAL19	G6M-04-15X_FAL19	G6M-04-13X_FAL19	G6M-95-19X_FAL19	G6M-95-20X_FAL19	AOC50-DUP2_FAL19	G6M-13-05X_FAL19	G6M-13-06X_FAL19	G6M-02-08X_FAL19	G6M-04-10A_FAL19	G6M-07-02X_FAL19	AOC50_DUP1_FAL19
			Sample Date	10/9/2019	10/10/2019	10/9/2019	10/9/2019	10/9/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/16/2019	10/16/2019	10/9/2019	10/9/2019
			Sample Area	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA	Area 1/ FDSA
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**													
	p-Cymene (p-Isopropyltoluene)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	sec-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Styrene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 UJ	0.50 U	2.5 U	0.50 U
	tert-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Tetrachloroethene (PCE)	**µg/L**	**5***	**1.3**	**2.8**	**2.2**	1.0 U	**1.9**	1.0 U	1.0 U	**1.5 J**	1.0 U	5.0 UJ	**11**	**5.3**	**6.6**
	Toluene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**21**	**730 J**	1.0 U	5.0 U	**0.49 J**
	trans-1,2-Dichloroethene	**µg/L**		1.0 U	**1.4**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.93 J**	1.0 U	5.0 UJ	**1.2**	5.0 U	1.0 U
	trans-1,3-Dichloropropene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
VOCs - Continued	**Trichloroethene (TCE)**	**µg/L**	**5***	1.0 U	**11**	**1.1**	1.0 U	1.0 U	**0.55 J**	**0.54 J**	**1.8**	1.0 U	5.0 UJ	**34**	5.0 U	**1.7**
	Trichlorofluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 UJ	1.0 U	5.0 U	1.0 U
	Vinyl acetate	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 UJ	2.0 U	10 U	2.0 U
	Vinyl chloride	**µg/L**	**2***	1.0 U	**11**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**38**	**0.82 J**	5.0 UJ	**45**	**4.6 J**	**4.1**
	Xylenes, Total	**µg/L**		0.50 U	**0.39 J**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.81 J**	**1.2 J**	2.5 UJ	**1.4 J**	2.5 U	**1.6 J**
	Dissolved Oxygen	**mg/L**		0.3	0.28	0.19	1.56 J	2.75	0.15	0.15	0.14	0.11	1.82	1.12	0.21	0.21
	Oxidation Reduction Potential	**mv**		93.9	-117	-10	14.3	103	-39.8	-39.8	-65.6	-35	-115	-75.7	-55.3	-55.3
Field Parameters	**pH**	**pH Units**		7.21	6.48	6.45	7.41	5.58	6.92	6.92	7.80	6.99	6.43	6.37	7.34	7.34
	Specific Conductivity	**µS/cm**		2,300	440	2,500	100	4,800	310	310	950	1,500	1,400	700	730	730
	Temperature	**°C**		11	10	11	10.0	12	12	12	12	11	12	10	11	11
	Turbidity	**NTU**		2.1	44	5.5	3.1	0.77	9.7	9.7	7.0	18	44	21	12	12

Notes:

*AOC 50 Cleanup Levels (AOC 50 Record of Decision, 2004)

FDSA	Former Drum Storage Area
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
mv	Millivolts
pH Units	pH Units
µS/cm	Microsiemens per Centimeter
°C	Degrees Celsius
NTU	Nephelometric Turbidity Units

Detection
Above Cleanup Level

Qualifiers

U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the LOD.
J	The analtye was positively identified, the quantitation is an estimation.
UJ	The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-02-01X		G6M-04-01X	G6M-04-03X	G6M-04-02X		G6M-04-04X		G6M-03-07X		G6M-13-02X		G6M-02-13X	G6M-02-04X		G6M-97-28X
			Sample ID	G6M-02-01X_FAL19	AOC50-DUP03_FAL19	G6M-04-01X_FAL19	G6M-04-03X_FAL19	G6M-04-02X_FAL19		G6M-04-04X_FAL19		G6M-03-07X_FAL19		G6M-13-02X_FAL19	G6M-13-02X_FAL19R	G6M-02-13X_FAL19	G6M-02-04X_FAL19	G6M-02-04X_FAL19R	G6M-97-28X_FAL19
			Sample Date	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/18/2019		10/10/2019		10/18/2019		10/30/2019	12/26/2019	10/14/2019	10/28/2019	12/20/2019	10/28/2019
			Sample Area	Area 2	Area 2	Area 2	Area 2	Area 3		Area 3		Area 3		Area 4	Area 4	Area 4	Area 4	Area 4	Area 4
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**																
Anions	**Sulfate**	**mg/L**		---	---	---	---	1.0	U	---		1.0	U	**12**	---	---	---	---	---
Dissolved Gases	**Ethane**	**µg/L**		---	---	---	---	**2.9**		---		**3.0**		**1.2**	---	---	---	---	---
	Ethene	**µg/L**		---	---	---	---	**3.6**		---		**17**		1.0	U ---	---	---	---	---
	Methane	**µg/L**		---	---	---	---	**11,000**		---		**29,000**		**11,000**	---	---	---	---	---
GENCHEM	**Alkalinity, Total (as CaCO3)**	**mg/L**		---	---	---	---	**150**		---		**170**		**57**	---	---	---	---	---
	Nitrate-Nitrite (as N)		**10,000***	---	---	---	---	**0.040**	**J**	---		**0.075**	**J**	**0.048**	**J** ---	---	---	---	---
	Sulfide	**mg/L**		---	---	---	---	0.88	U	---		0.86	U	0.83	U ---	---	---	---	---
	Total Organic Carbon	**mg/L**		---	---	---	---	**170**		---		**15**		**0.86**	**J** ---	---	---	---	---
Metals	**Arsenic**	**µg/L**	**10***	**100**	**110**	**540**	**220**	**230**	**J**	3.0	U	**430**		**2.4**	**J** ---	**140**	**520**	---	**71**
	Iron	**µg/L**	**3,129***	**5,300**	**5,000**	**52,000**	**59,000**	**81,000**		50	U	**120,000**		**750**	---	**10,000**	**53,000**	---	**7,900**
	Manganese	**µg/L**	**1,460***	**2,700**	**2,800**	**13,000**	**7,100**	**13,000**		**61**		**3,100**		**130**	---	**20,000**	**2,600**	---	**10,000**
VOCs	**1,1,1,2-Tetrachloroethane**	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,1,1-Trichloroethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,1,2,2-Tetrachloroethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,1,2-Trichloroethane	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	1.0	U	0.50	U	0.50	U ---	0.50	U ---
	1,1-Dichloroethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,1-Dichloroethene	**µg/L**	**7***	1.0	U	1.0	U	1.0	U	1.0	U	**0.90**	**J**	1.0	U	1.0	U ---	1.0	U ---
	1,1-Dichloropropene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2,3-Trichlorobenzene	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U ---	5.0	U ---
	1,2,3-Trichloropropane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2,4-Trichlorobenzene	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	10	U	5.0	U	5.0	U ---	5.0	U ---
	1,2,4-Trimethylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2-Dibromo-3-chloropropane	**µg/L**		2.0	U	2.0	U	2.0	U	2.0	U	4.0	U	2.0	U	2.0	U ---	2.0	U ---
	1,2-Dibromoethane (EDB)	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2-Dichlorobenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2-Dichloroethane	**µg/L**	**5***	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,2-Dichloroethene	**µg/L**		**2.0**		**1.8**	**J**	1.0	U	**26**		**260**		**1.3**	**J**	**1.0**	**J** ---	**8.8**	**4.4** ---	**1.40**	**J** ---
	1,2-Dichloropropane	**µg/L**	**5***	1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,3,5-Trimethylbenzene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	1.0	U	0.50	U	0.50	U ---	0.50	U ---
	1,3-Dichlorobenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,3-Dichloropropane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	1,4-Dichlorobenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---
	2,2-Dichloropropane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	2.0	U	1.0	U	1.0	U ---	1.0	U ---

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-02-01X		G6M-04-01X	G6M-04-03X	G6M-04-02X	G6M-04-04X	G6M-03-07X	G6M-13-02X		G6M-02-13X	G6M-02-04X		G6M-97-28X
			Sample ID	G6M-02-01X_FAL19	AOC50-DUP03_FAL19	G6M-04-01X_FAL19	G6M-04-03X_FAL19	G6M-04-02X_FAL19	G6M-04-04X_FAL19	G6M-03-07X_FAL19	G6M-13-02X_FAL19	G6M-13-02X_FAL19R	G6M-02-13X_FAL19	G6M-02-04X_FAL19	G6M-02-04X_FAL19R	G6M-97-28X_FAL19
			Sample Date	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/18/2019	10/10/2019	10/18/2019	10/30/2019	12/26/2019	10/14/2019	10/28/2019	12/20/2019	10/28/2019
			Sample Area	Area 2	Area 2	Area 2	Area 2	Area 3	Area 3	Area 3	Area 4	Area 4	Area 4	Area 4	Area 4	Area 4
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**													
	2-Butanone (MEK)	**µg/L**		10 U	10 U	10 U	10 U	20 U	10 U	10 U	---	10 U	10 U	---	10 U	---
	2-Chlorotoluene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	2-Hexanone	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	4-Chlorotoluene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	4-Methyl-2-pentanone (MIBK)	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	Acetone	**µg/L**		10 UJ	10 UJ	10 UJ	10 UJ	20 U	10 U	10 U	---	10 U	10 U	---	10 U	---
	Benzene	**µg/L**	**5***	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Bromobenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Bromochloromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Bromodichloromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Bromoform	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Bromomethane	**µg/L**		5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	10 U	5.0 U	5.0 U	---	5.0 UJ	5.0 U	---	5.0 U	---
	Carbon disulfide	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	---	2.0 U	2.0 U	---	2.0 U	---
	Carbon tetrachloride	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	Chlorobenzene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	Chloroethane	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	Chloroform	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Chloromethane	**µg/L**		1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	cis-1,2-Dichloroethene	**µg/L**	**70***	**2.0**	**1.8**	**0.41 J**	**26**	**260**	**0.93 J**	**0.70 J**	---	**8.2**	**4.4**	---	**1.40**	---
VOCs - Continued	**cis-1,3-Dichloropropene**	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Dibromochloromethane	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	Dibromomethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Dichlorodifluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Ethylbenzene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	Hexachlorobutadiene	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	Isopropylbenzene (Cumene)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	m,p-Xylene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Methyl tert-butyl ether (MTBE)	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	Methylene chloride	**µg/L**	**5***	5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	n-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	n-Propylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Naphthalene	**µg/L**		5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	---	5.0 U	5.0 U	---	5.0 U	---
	o-Xylene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-02-01X		G6M-04-01X	G6M-04-03X	G6M-04-02X	G6M-04-04X	G6M-03-07X	G6M-13-02X		G6M-02-13X	G6M-02-04X		G6M-97-28X
			Sample ID	G6M-02-01X_FAL19	AOC50-DUP03_FAL19	G6M-04-01X_FAL19	G6M-04-03X_FAL19	G6M-04-02X_FAL19	G6M-04-04X_FAL19	G6M-03-07X_FAL19	G6M-13-02X_FAL19	G6M-13-02X_FAL19R	G6M-02-13X_FAL19	G6M-02-04X_FAL19	G6M-02-04X_FAL19R	G6M-97-28X_FAL19
			Sample Date	10/16/2019	10/16/2019	10/16/2019	10/16/2019	10/18/2019	10/10/2019	10/18/2019	10/30/2019	12/26/2019	10/14/2019	10/28/2019	12/20/2019	10/28/2019
			Sample Area	Area 2	Area 2	Area 2	Area 2	Area 3	Area 3	Area 3	Area 4	Area 4	Area 4	Area 4	Area 4	Area 4
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**													
	p-Cymene (p-Isopropyltoluene)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	sec-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Styrene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
	tert-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Tetrachloroethene (PCE)	**µg/L**	**5***	1.0 U	1.0 U	1.0 U	**9.0**	**5.4**	1.0 U	1.0 U	---	**16**	1.0 U	---	1.0 U	---
	Toluene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	**1.4**	---	1.0 U	1.0 U	---	1.0 U	---
	trans-1,2-Dichloroethene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	**0.53 J**	1.0 U	---	1.0 U	---
	trans-1,3-Dichloropropene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
VOCs - Continued	**Trichloroethene (TCE)**	**µg/L**	**5***	**4.1**	**3.3**	**0.48 J**	**12**	**7.0**	1.0 U	1.0 U	---	**8.6**	1.0 U	---	**0.9 J**	---
	Trichlorofluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	---	1.0 U	1.0 U	---	1.0 U	---
	Vinyl acetate	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	---	2.0 U	2.0 U	---	2.0 U	---
	Vinyl chloride	**µg/L**	**2***	**0.63 J**	1.0 U	1.0 U	**5.8**	**1.7 J**	**0.55 J**	**0.55 J**	---	1.0 U	**5.1**	---	1.0 U	---
	Xylenes, Total	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	---	0.50 U	0.50 U	---	0.50 U	---
Field Parameters	**Dissolved Oxygen**	**mg/L**		0.13	0.13	0.18	0.18	0.080	0.34	0.12	0.15	0.86	0.11	0.34	2.93	0.35
	Oxidation Reduction Potential	**mv**		-117	-117	-66.8	-45.5	-52	-88	-84	4.8	-22	-82	-130	-181	6.8
	pH	**pH Units**		6.56	6.56	6.18	5.81	5.4	6.4	6.3	6.0	6.2	6.7	7.0	7.21	6.1
	Specific Conductivity	**µS/cm**		2,700	2,700	4,400	1,600	1,600	3,000	930	1,200	1,200	1,300	890	391	1,100
	Temperature	**°C**		12	12	13	14	13	13	14	13	12	14	12	6.35	12
	Turbidity	**NTU**		16	16	3.7	1.8	1,000	2.3	3.7	7.0	1.8	4.7	4.6	2.8	1.8

Notes:

*AOC 50 Cleanup Levels (AOC 50 Record of Decision, 2004)

FDSA	Former Drum Storage Area
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
mv	Millivolts
pH Units	pH Units
µS/cm	Microsiemens per Centimeter
°C	Degrees Celsius
NTU	Nephelometric Turbidity Units

Detection
Above Cleanup Level

Qualifiers

U	The analyte was analyzed for, but not detected. The associated numerical val
J	The analtye was positively identified, the quantitation is an estimation.
UJ	The analyte was not detected and was reported as less than the LOD. Howeve

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-18-01	G6M-13-01X	G6M-13-04X	G6M-18-02	G6M-97-05B		G6M-04-07X	G6M-02-07X	G6M-02-11X	G6M-03-10X	G6M-04-06X	MW-3
			Sample ID	G6M-18-01_FAL19	G6M-13-01X_FAL19	G6M-13-04X_FAL19	G6M-18-02X_FAL19	G6M-97-05B_FAL19	AOC50-DUP04_FAL19	G6M-04-07X_FAL19	G6M-02-07X_FAL19	G6M-02-11X_FAL19	G6M-03-10X_FAL19	G6M-04-06X_FAL19	MW-3_FAL19
			Sample Date	10/14/2019	10/21/2019	10/23/2019	10/18/2019	10/21/2019	10/21/2019	10/10/2019	10/9/2019	10/15/2019	10/15/2019	10/10/2019	10/17/2019
			Sample Area	Area 4	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
Analytical Method	Analyte	Units	Cleanup Levels												
Anions	Sulfate	mg/L		7.1	12	4.1	11	2.0	2.1	---	---	---	---	---	---
Dissolved Gases	Ethane	µg/L		1.1 U	1.1 U	3.2	1.1 U	4.7	4.7	---	---	---	---	---	---
	Ethene	µg/L		1.0 U	2.2	16	1.0 U	1.4	1.4	---	---	---	---	---	---
	Methane	µg/L		0.33 J	6,200	13,000	2.6	820	810	---	---	---	---	---	---
GENCHEM	Alkalinity, Total (as CaCO3)	mg/L		26	34	310	18	110	140	---	---	---	---	---	---
	Nitrate-Nitrite (as N)		10,000*	0.50	0.21	0.042 J	1.9	0.050 U	0.050 U	---	---	---	---	---	---
	Sulfide	mg/L		0.93 U	0.85 U	0.86 U	0.88 U	0.83 U	0.83 U	---	---	---	---	---	---
	Total Organic Carbon	mg/L		0.57 J	14	55	1.0 U	270	270	1.2	---	---	---	---	---
Metals	Arsenic	µg/L	10*	3.0 U	6.2	440	3.0 U	56	55	9.3	3.0 U	500	360	550	510
	Iron	µg/L	3,129*	54	1,300	81,000	19 J	22,000	21,000	860	50 U	37,000	45,000	130,000	42,000
	Manganese	µg/L	1,460*	14	2,700	13,000	90	5,800	5,600	4,000	1.2 J	9,900	2,100	17,000	7,000
VOCs	1,1,1,2-Tetrachloroethane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,1-Trichloroethane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,2,2-Tetrachloroethane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,2-Trichloroethane	µg/L		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	1,1-Dichloroethane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1-Dichloroethene	µg/L	7*	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1-Dichloropropene	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2,3-Trichlorobenzene	µg/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	1,2,3-Trichloropropane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2,4-Trichlorobenzene	µg/L		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	1,2,4-Trimethylbenzene	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dibromo-3-chloropropane	µg/L		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	1,2-Dibromoethane (EDB)	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichlorobenzene	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichloroethane	µg/L	5*	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichloroethene	µg/L		1.0 U	30	8.8	1.0 U	17	18	110	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichloropropane	µg/L	5*	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,3,5-Trimethylbenzene	µg/L		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	1,3-Dichlorobenzene	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,3-Dichloropropane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,4-Dichlorobenzene	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2,2-Dichloropropane	µg/L		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-18-01		G6M-13-01X		G6M-13-04X		G6M-18-02		G6M-97-05B				G6M-04-07X		G6M-02-07X		G6M-02-11X		G6M-03-10X		G6M-04-06X		MW-3	
			Sample ID	G6M-18-01_FAL19		G6M-13-01X_FAL19		G6M-13-04X_FAL19		G6M-18-02X_FAL19		G6M-97-05B_FAL19		AOC50-DUP04_FAL19		G6M-04-07X_FAL19		G6M-02-07X_FAL19		G6M-02-11X_FAL19		G6M-03-10X_FAL19		G6M-04-06X_FAL19		MW-3_FAL19	
			Sample Date	10/14/2019		10/21/2019		10/23/2019		10/18/2019		10/21/2019		10/21/2019		10/10/2019		10/9/2019		10/15/2019		10/15/2019		10/10/2019		10/17/2019	
			Sample Area	Area 4		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5		Area 5	
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**																								
	2-Butanone (MEK)	**µg/L**		10	U	10	U	10	U	10	U	**110**	**J**	**100**	**J**	10	U	10	U	10	U	10	U	10	U	10	U
	2-Chlorotoluene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	2-Hexanone	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	4-Chlorotoluene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	4-Methyl-2-pentanone (MIBK)	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Acetone	**µg/L**		10	U	10	U	10	U	10	U	**9.6**	**J**	**16**		10	U	10	U	10	UJ	10	UJ	10	U	10	U
	Benzene	**µg/L**	**5***	1.0	U	1.0	U	1.0	U	1.0	U	**0.61**	**J**	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromobenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromochloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromodichloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromoform	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Bromomethane	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	UJ	5.0	U	5.0	U
	Carbon disulfide	**µg/L**		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
	Carbon tetrachloride	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Chlorobenzene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Chloroethane	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Chloroform	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Chloromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	**0.48**	**J**	1.0	UJ	1.0	UJ	1.0	U	1.0	U
	cis-1,2-Dichloroethene	**µg/L**	**70***	1.0	U	**30**		**8.5**		1.0	U	**17**		**18**		**110**		1.0	U	**0.46**	**J**	1.0	U	**0.54**	**J**	**0.71**	**J**
VOCs - Continued	**cis-1,3-Dichloropropene**	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Dibromochloromethane	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Dibromomethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Dichlorodifluoromethane	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Ethylbenzene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Hexachlorobutadiene	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	Isopropylbenzene (Cumene)	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	m,p-Xylene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Methyl tert-butyl ether (MTBE)	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
	Methylene chloride	**µg/L**	**5***	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
	n-Butylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	n-Propylbenzene	**µg/L**		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
	Naphthalene	**µg/L**		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
	o-Xylene	**µg/L**		0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	G6M-18-01	G6M-13-01X	G6M-13-04X	G6M-18-02	G6M-97-05B		G6M-04-07X	G6M-02-07X	G6M-02-11X	G6M-03-10X	G6M-04-06X	MW-3
			Sample ID	G6M-18-01_FAL19	G6M-13-01X_FAL19	G6M-13-04X_FAL19	G6M-18-02X_FAL19	G6M-97-05B_FAL19	AOC50-DUP04_FAL19	G6M-04-07X_FAL19	G6M-02-07X_FAL19	G6M-02-11X_FAL19	G6M-03-10X_FAL19	G6M-04-06X_FAL19	MW-3_FAL19
			Sample Date	10/14/2019	10/21/2019	10/23/2019	10/18/2019	10/21/2019	10/21/2019	10/10/2019	10/9/2019	10/15/2019	10/15/2019	10/10/2019	10/17/2019
			Sample Area	Area 4	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**												
	p-Cymene (p-Isopropyltoluene)	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	sec-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Styrene	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	tert-Butylbenzene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Tetrachloroethene (PCE)	**µg/L**	**5***	1.0 U	**1.8**	1.0 U	**0.80 J**	**26**	**28**	**36**	**4.7**	1.0 U	1.0 U	**1.1**	1.0 U
	Toluene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-Dichloroethene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.77 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,3-Dichloropropene	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VOCs - Continued	**Trichloroethene (TCE)**	**µg/L**	**5***	1.0 U	**7.1**	**0.61 J**	1.0 U	**7.8**	**8.4**	**53**	**0.52 J**	1.0 U	1.0 U	1.0 U	1.0 U
	Trichlorofluoromethane	**µg/L**		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Vinyl acetate	**µg/L**		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Vinyl chloride	**µg/L**	**2***	1.0 U	**4.0**	**4.5**	1.0 U	1.0 U	1.0 U	**8.5**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Xylenes, Total	**µg/L**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Field Parameters	**Dissolved Oxygen**	**mg/L**		6.8	0.15	1.8	2.5	0.11	0.11	0.42	0.48	0.34	0.31	0.20	1.1
	Oxidation Reduction Potential	**mv**		130	33	-95	210	5.8	5.8	51	47	-120	-140	100	-100
	pH	**pH Units**		6.0	5.7	6.6	5.8	6.0	6.0	6.2	7.6	6.8	6.8	6.1	6.7
	Specific Conductivity	**µS/cm**		140	790	2,000	840	980	980	610	320	1,400	1,500	190	1,100
	Temperature	**°C**		13	12	12	12	12	12	11	11	12	12	11	12
	Turbidity	**NTU**		5.5	190	11	1.3	140	140	8.4	1.2	12	1.2	2.4	7.6

Notes:

*AOC 50 Cleanup Levels (AOC 50 Record of Decision, 2004)

FDSA	Former Drum Storage Area
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
mv	Millivolts
pH Units	pH Units
µS/cm	Microsiemens per Centimeter
°C	Degrees Celsius
NTU	Nephelometric Turbidity Units

Detection
Above Cleanup Level

Qualifiers

U	The analyte was analyzed for, but not detected. The associated numerical valu
J	The analtye was positively identified, the quantitation is an estimation.
UJ	The analyte was not detected and was reported as less than the LOD. Howeve

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	MW-7		XSA-12-95X		XSA-12-96X	XSA-12-97X	XSA-12-98X	G6M-02-06X	G6M-04-14X
			Sample ID	MW-7_FAL19	MW-7_FAL19R	XSA-12-95X_FAL19	XSA-12-95X_FAL19R	XSA-12-96X_FAL19	XSA-12-97X_FAL19	XSA-12-98X_FAL19	G6M-02-06X_FAL19	G6M-04-14X_FAL19
			Sample Date	10/30/2019	12/20/2019	10/30/2019	12/26/2019	11/6/2019	10/15/2019	10/9/2019	10/15/2019	10/15/2019
			Sample Area	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Nashua River	Nashua River
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**									
Anions	**Sulfate**	**mg/L**		---	---	---	---	---	---	---	---	---
Dissolved Gases	**Ethane**	**µg/L**		---	---	---	---	---	---	---	---	---
	Ethene	**µg/L**		---	---	---	---	---	---	---	---	---
	Methane	**µg/L**		---	---	---	---	---	---	---	---	---
GENCHEM	**Alkalinity, Total (as CaCO3)**	**mg/L**		---	---	---	---	---	---	---	---	---
	Nitrate-Nitrite (as N)		**10,000***	---	---	---	---	---	---	---	---	---
	Sulfide	**mg/L**		---	---	---	---	---	---	---	---	---
	Total Organic Carbon	**mg/L**		---	---	---	---	---	---	---	---	---
Metals	**Arsenic**	**µg/L**	**10***	**400**	---	**5.5**	---	3.0 U	**2.2 J**	3.0 U	**1.7 J**	**8.4**
	Iron	**µg/L**	**3,129***	**23,000**	---	**3,500**	---	**2,200**	**2,400**	**88**	50 U	**21 J**
	Manganese	**µg/L**	**1,460***	**12,000**	---	**9,900**	---	**5,300**	**200**	**1.7 J**	3.0 U	**7.1 J**
VOCs	**1,1,1,2-Tetrachloroethane**	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,1-Trichloroethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,2,2-Tetrachloroethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1,2-Trichloroethane	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	1,1-Dichloroethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,1-Dichloroethene	**µg/L**	**7***	---	1.0 U	---	1.0 U	**0.90 J**	1.0 U	1.0 U	1.0 U	1.0 U
	1,1-Dichloropropene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2,3-Trichlorobenzene	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	1,2,3-Trichloropropane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2,4-Trichlorobenzene	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	1,2,4-Trimethylbenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dibromo-3-chloropropane	**µg/L**		---	2.0 U	---	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	1,2-Dibromoethane (EDB)	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichlorobenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichloroethane	**µg/L**	**5***	---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,2-Dichloroethene	**µg/L**		---	**1.3 J**	---	**14**	**26**	**2.9**	1.0 U	1.0 U	1.0 U
	1,2-Dichloropropane	**µg/L**	**5***	---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,3,5-Trimethylbenzene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	1,3-Dichlorobenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,3-Dichloropropane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	1,4-Dichlorobenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	2,2-Dichloropropane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	MW-7		XSA-12-95X		XSA-12-96X	XSA-12-97X	XSA-12-98X	G6M-02-06X	G6M-04-14X
			Sample ID	MW-7_FAL19	MW-7_FAL19R	XSA-12-95X_FAL19	XSA-12-95X_FAL19R	XSA-12-96X_FAL19	XSA-12-97X_FAL19	XSA-12-98X_FAL19	G6M-02-06X_FAL19	G6M-04-14X_FAL19
			Sample Date	10/30/2019	12/20/2019	10/30/2019	12/26/2019	11/6/2019	10/15/2019	10/9/2019	10/15/2019	10/15/2019
			Sample Area	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Nashua River	Nashua River
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**									
	2-Butanone (MEK)	**µg/L**		---	10 U	---	10 U	10 U	10 U	10 U	10 U	10 U
	2-Chlorotoluene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	2-Hexanone	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	4-Chlorotoluene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	4-Methyl-2-pentanone (MIBK)	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	Acetone	**µg/L**		---	10 U	---	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
	Benzene	**µg/L**	**5***	---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Bromobenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Bromochloromethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Bromodichloromethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Bromoform	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Bromomethane	**µg/L**		---	5.0 U	---	5.0 UJ	5.0 U	5.0 UJ	5.0 U	5.0 UJ	5.0 UJ
	Carbon disulfide	**µg/L**		---	2.0 U	---	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Carbon tetrachloride	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Chlorobenzene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Chloroethane	**µg/L**		---	5.0 U	---	5.0 U	**3.9 J**	5.0 U	5.0 U	5.0 U	5.0 U
	Chloroform	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Chloromethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 UJ	**0.67 J**	1.0 UJ	1.0 UJ
	cis-1,2-Dichloroethene	**µg/L**	**70***	---	**1.3**	---	**11**	**20**	**2.9**	**0.47 J**	1.0 U	1.0 U
VOCs - Continued	**cis-1,3-Dichloropropene**	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Dibromochloromethane	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dibromomethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Dichlorodifluoromethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Ethylbenzene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Hexachlorobutadiene	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	Isopropylbenzene (Cumene)	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	m,p-Xylene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Methyl tert-butyl ether (MTBE)	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Methylene chloride	**µg/L**	**5***	---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	n-Butylbenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	n-Propylbenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Naphthalene	**µg/L**		---	5.0 U	---	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U
	o-Xylene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

Table J-9
Groundwater Analytical Results, Fall 2019
AOC 50, Former Fort Devens Army Installation, Massachusetts

			Location	MW-7		XSA-12-95X		XSA-12-96X	XSA-12-97X	XSA-12-98X	G6M-02-06X	G6M-04-14X
			Sample ID	MW-7_FAL19	MW-7_FAL19R	XSA-12-95X_FAL19	XSA-12-95X_FAL19R	XSA-12-96X_FAL19	XSA-12-97X_FAL19	XSA-12-98X_FAL19	G6M-02-06X_FAL19	G6M-04-14X_FAL19
			Sample Date	10/30/2019	12/20/2019	10/30/2019	12/26/2019	11/6/2019	10/15/2019	10/9/2019	10/15/2019	10/15/2019
			Sample Area	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Area 5	Nashua River	Nashua River
Analytical Method	**Analyte**	**Units**	**Cleanup Levels**									
	p-Cymene (p-Isopropyltoluene)	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	sec-Butylbenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Styrene	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	tert-Butylbenzene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Tetrachloroethene (PCE)	**µg/L**	**5***	---	1.0 U	---	**11**	**13 J**	**9.2**	**5.5**	1.0 U	1.0 U
	Toluene	**µg/L**		---	1.0 U	---	**0.52 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-Dichloroethene	**µg/L**		---	1.0 U	---	**2.7**	**6.7**	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,3-Dichloropropene	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VOCs - Continued	**Trichloroethene (TCE)**	**µg/L**	**5***	---	**0.79 J**	---	**4.9**	**24**	**0.98 J**	**0.52 J**	1.0 U	1.0 U
	Trichlorofluoromethane	**µg/L**		---	1.0 U	---	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Vinyl acetate	**µg/L**		---	2.0 U	---	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Vinyl chloride	**µg/L**	**2***	---	1.0 U	---	**1.8**	**23**	1.0 U	1.0 U	1.0 U	1.0 U
	Xylenes, Total	**µg/L**		---	0.50 U	---	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dissolved Oxygen	**mg/L**		0.41	2.4	0.43	0.86	1.15	0.72	0.62	8.4	0.74
	Oxidation Reduction Potential	**mv**		-52	-110	-56	-56	-100.9	-47	-65	63	-59
Field Parameters	**pH**	**pH Units**		6.4	6.8	6.7	6.6	6.9	6.9	7.7	7.3	7.7
	Specific Conductivity	**µS/cm**		980	630	1,500	1,300	1032	980	380	150	600
	Temperature	**°C**		13	9.9	12	9.2	17.09	12	11	11	12
	Turbidity	**NTU**		96	15	11	3.8	10.1	19	3.5	3.5	13

Notes:

*AOC 50 Cleanup Levels (AOC 50 Record of Decision, 2004)

FDSA	Former Drum Storage Area
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
mv	Millivolts
pH Units	pH Units
µS/cm	Microsiemens per Centimeter
°C	Degrees Celsius
NTU	Nephelometric Turbidity Units

Detection
Above Cleanup Level

Qualifiers

U	The analyte was analyzed for, but not detected. The associated numerical val
J	The analtye was positively identified, the quantitation is an estimation.
UJ	The analyte was not detected and was reported as less than the LOD. Howeve

J.4 Former

Moore Army

Airfield

Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: ADC 50	**Date of inspection:** 02/12/20
Location and Region: Devens MA	**EPA ID:** MA 7210025154
Agency, office, or company leading the five-year review: Koman Government Solutions	**Weather/temperature:** 36°F partial clouds, cold

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: enhanced reductive dechlorination

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) NA

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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 NA for Site Inspection

1 **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2 **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____
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

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

D. General

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

2. **Land use changes on site** ☒ N/A
Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 _____

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~~ Stripping 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 Stripping system is shut down. In 2017 Inspection showed corrosion of pumps & blowers. Pumps would be needed to make operational. Should the system be deemed necessary for use.
2.	**~~Extraction~~ Stripping System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☒ Needs Maintenance Remarks Stripping system is shutdown
3	**Spare Parts and Equipment** ☒ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided Remarks Should the system should to be needed again. Shut down & not used
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

Not Active

C. Treatment System ☐ Applicable ☒ N/A IWS System shut down since 2013

1 **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ 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
Remarks _____

D. Monitoring Data

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

2 Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

i. **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.

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.).

ERD- Enhanced Reductive Dechlorination is proving effective.

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.

satisfactory.

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. [illegible]

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. [redacted] [illegible]

View of Area 1 source area

View of stick up wells observed within Area 1, southeast of building

View of a stick up well observed within Area 1, southwest of building

View of a stickup wells observed within Area 1, east of building

View of the stick up well observed near Area 5

View of grassy area located west of Area 5

View of Area 5

View of southern perimeter access road near Area 5

View of access gate to wooded area south of Area 5

View of IWS System Enclosure southwest of Area 5

View of wooded area southwest of Area 5

View of AOC 50 of paved area within Area 4

View of road box well observed within Area 4

View of a typical stick up well observed near Area 4

View of grassy area observed northeast of Area 4

View of paved area near Area 3 with a road box well

View of grassy area northwest of Area 3and south of Building 3813

Additional view of southwestern portion of Building 3813 near Area 3

View of the paved area located east of Building 3813 and southwest of Area 2

View of Area 2

View of a road box well observed southwest of Area 2

Additional view of the paved area located east of Building 3813

J.5 Former

Moore Army

Airfield

ARARs

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal					
Chemical	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, Maximum Contaminant Levels [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Relevant and Appropriate	The National Primary Drinking Water Regulations (NPDWR) establish maximum contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking-water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable health-based goals that are always set equal to or lower than MCLs.	The MCLs for the chemicals of concern (COCs) will be met through active remediation of groundwater in selected areas of the plumes.
Chemical	Surface Water	Clean Water Act, Ambient Water Quality Criteria, 33 USC 1314, 40 CFR 131.36(b)(1), 63 Fed. Reg. 68359	To be considered	National recommended criteria for surface water quality establishes numerous criteria for constituents	Ambient water quality criteria were evaluated during the assessment of potential ecological risks and the development of preliminary remediation goals for AOC 50

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State					
Chemical	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected and set forth water-quality criteria necessary to maintain the designated uses. Groundwater at Devens RFTA is classified GW-1. Groundwaters assigned to this class are fresh groundwaters designated as a source of potable water supply.	314 CMR 6.00 will be met by achieving MMCLs for COCs. The MMCLs for COCs will be met through active remediation of groundwater plume. Groundwater monitoring will be performed to measure changes in COC. State groundwater quality standards that are more stringent that Federal MCLs will be used as remediation goals.
Chemical	Groundwater	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.00]	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list Massachusetts Maximum Contaminant Level (MMCLs), which apply to water delivered to any user of a public water-supply system as defined in 310 CMR 22.00.	Devens groundwater is classified GW-1 and is designated as a source of potable water supply. State MCLs that are more stringent than Federal MCLs will be used as remediation goals.
State					
Chemical	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Relevant and Appropriate	The Massachusetts Surface Water Quality Standards list Massachusetts surface water standards, which apply to discharge to the waters of the Commonwealth from any source. These standards: designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained and protected; prescribe the minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality.	Massachusetts Surface Water Quality Standards were considered during the assessment of acceptable risk levels and the development of preliminary remediation goals for AOC 50.

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal					
Location	Groundwater	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Applicable, if remedial actions are performed within floodplain	Requires federal agencies to evaluate potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/ construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Monitoring wells may be constructed in the floodplain. All construction in the floodplain will be conducted in a manner that minimizes harm and preserves and restores the natural and beneficial values of the floodplain. Appropriate federal agencies will be contacted and allowed to review the proposed work plan for the remedial action prior to implementation of the action.
Federal					
Location	Wetlands	Protection of Wetland Executive Order 11990 [40 CFR 6, Appendix A]	Applicable, if remedial actions are performed within wetlands	Requires federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance natural and beneficial values of wetlands. If remediation is required within the wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	Monitoring wells may be constructed in the wetlands. Construction will be performed in a manner that minimizes adverse effects on wetlands, to the extent practicable.
Location	Wetlands	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CRF Part 230; 40 CRF Part 230]	Applicable if remedial actions are performed in U.S. water or within a floodplain	Section 404 of the CWA regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a discharge of fill materials.	Any construction will be performed to minimize adverse effects on aquatic ecosystem.

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal (cont.)					
Location	Surface water, Endangered species, Migratory species	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Applicable	Requires that the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service be consulted in the alteration of a body of water, such as if installation of monitoring wells in a wetland and/or discharge of pollutants into a wetland will occur as a result of off-site remedial activities. Requires consultation with state agencies to devise measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	Construction will be performed in a manner that minimizes adverse effects on wildlife resources and habitat. Measures will be developed to prevent or mitigate project-related impacts to habitat and wildlife. The USFWS, acting as a review agency for the USEPA, will be kept informed of proposed remedial actions.
State					
Location	Groundwater	Massachusetts Wetland Protection Act [310 CMR 10.00]	Relevant and Appropriate	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as area within the riverfront area or the 100-year floodplain). A Notice of Intent (NOI) must be filed with the municipal conservation commission and a Final Order of Conditions obtained before proceeding with the activity. A Determination of Applicability or NOI must be filed for activities such as excavation within a 100-foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet or bordering vegetated wetlands. Loss may be permitted with replication of any lost area within two growing seasons.	Any proposed remedial actions within riverfront area (defined as the river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away), wetlands, or the 100-foot buffer will be developed and evaluated to minimize adverse effects on wetlands and to attain compliance with the substantive requirements of these regulations.

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal					
Action	Groundwater Injection	Safe Drinking Water Act (SDWA) Regulations, Underground Injection Control Program (40 CFR Parts 144, 146, 147, and 1000)	Relevant and Appropriate	These regulations outline minimum program and performance standards for underground injection programs.	The regulation applies and would be complied with because the alternative includes injection into the aquifer.
Action	Investigation derived waste	USEPA OSWER Publication 9345.303FS, January 1992	To be considered	Management of IDW must ensure protection of human health and the environment.	IDW produced from remedial activities will be managed in compliance with this guidance.
Federal					
Action	Hazardous Waste	RCRA Regulations. Identification and Listing of Hazardous Waste (40 CFR Part 261)	Applicable	Defines listed and characteristic hazardous wastes subject to RCRA. These regulations would apply when determining whether or not waste on site is hazardous either by being listed or exhibiting a hazardous characteristic as described in the regulations.	Groundwater treatment residues will be evaluated against the criteria and definitions of hazardous waste. The criteria and definition of hazardous waste refers to those wastes subject to regulations as hazardous wastes under 40 CFR parts 124 and 264. IDW produced during remedial activities will be managed in accordance with these regulations.
Action	Hazardous Waste	Standards Applicable to Generators of Hazardous Waste (RCRA 40 CFR 262)	Applicable	These regulations establish standards for generators of hazardous waste. RCRA Subtitle C established standards applicable to treatment, storage, and disposal of hazardous waste and closure of hazardous waste facilities.	Treatment residues will be tested to determine whether they contain characteristic hazardous waste. If so, management of the hazardous waste would comply with substantive requirements of these regulations.

TABLE 6
Synopsis of Federal and State ARARs for Remedial Alternative 6
AOC 50, Devens, Massachusetts

ARAR TYPE	MEDIUM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State					
Action	Hazardous Waste	Massachusetts Hazardous Waste Management Rules; 310 CMR 30.000	Relevant and Appropriate	This requirement sets standards for generators of hazardous waste that address (1) accumulating waste, (2) preparing hazardous waste for shipment, and (3) preparing the uniform hazardous waste manifest. Massachusetts specifies requirements for very small quantity generators, as well as small and large quantity generators.	If RCRA-characteristic hazardous wastes are generated, the material will be managed in accordance with these requirements.

Notes:
ARARs = Applicable, Relevant and Appropriate Regulations
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
COC= Chemical of Concern
CWA = Clean Water Act
IDW = Investigation derived waste
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MMCL = Massachusetts Maximum Contaminant Level
NOI = Notice of Intent
NPDWR = National Primary Drinking Water Regulations
NSDWR = National Secondary Drinking Water Regulations
OSWER = Office of Solid Waste and Emergency Response
RCRA = Resource Conservation and Recovery Act
RFTA=Reserves Forces Training Area
SDWA = Safe Drinking Water Act
SMCL = Secondary Maximum Contaminant Level
USEPA = U.S. Environmental Protection Agency

APPENDIX K – Building 3713 Fuel Oil Spill Site

K.1 Building 3713

Fuel Oil Spill Site

Additional

Background

Information

Chronology of Events – AOC 57, Area 1

Event	Date
Initial discovery of problem and contamination	February 13, 1977
SI, Preliminary Risk Evaluation (PRE)	1992
Area Requiring Environmental Evaluation (AREE)	1994
Soil Removal Action	1997
RI completed	2000
ROD signed	September 28, 2001
No Further Action following removal of contaminated soil	2001
First Five-Year Review	September 2005
Second Five-Year Review	September 2010
Third Five-Year Review	September 2015
Fourth Five-Year Review	September 2020

Chronology of Events – AOC 57, Area 2

Event	Date
Final NPL Listing	November 1989
Drainage ditch investigated as part of SI for Group 2 and 7 historic gas stations	1992
Soil removal action in response to new MCP standards	1994
Soil removal action discontinued due to contamination extending beyond original estimates (1,300 cy soil removed)	1994
RIs conducted, identified most significant soil contaminants to be PAHs, PCBs and lead	1995-1998
USACE conducted additional soil/groundwater investigations	2000
FS completed	2000
ROD signed for AOC Areas 1, 2, and 3	September 28, 2001
USACE completed additional soil removal actions	January-February 2003
Remedial Action Work Plan (RAWP) started	January-February 2003
Additional Remediation and Work Plan Amendment	2003
Site Restoration completed	October 2003
Transportation and Disposal/Stockpiles	December 2003
Remedial Action Report Completed	September 2004
ESD issued for additional soil removal volume and additional soil and groundwater COCs for Area 2	March 10, 2004
LTMP	2003/2004
First Five-Year Review	September 2005
Draft Operating Properly and Successfully Demonstration for Area of Contamination 57	December 2005
Revised LTMMP completed	November 2008
Final Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Plan, Area of Contamination 57 Areas 2 and 3	January 2007
2004 to 2006 Final Annual Reports, Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Program, Area of Contamination 57 Areas 2 and 3	January 2007
2007 & 2008 Final Annual Reports, Operation & Maintenance Phase, Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Program, DCL Areas of Contamination 9, 11, 40, 41 & Study Areas 12 and 13, and Area of	May 2008 & June 2009
Annual LTM	2005-2009
Final Operating Properly and Successfully Demonstration for Area of Contamination 57	February 2010
Second Five Year Review	September 2010

Event	Date
Annual LTM	2010-2014
Third Five Year Review	2015
Annual LTM	2015-2019
Supplemental Groundwater Sampling	January – February 2020
Fourth Five Year Review	September 2020

Chronology of Events – AOC 57, Area 3

Event	Date
Final NPL Listing	November 1989
Four test-pits excavated east of Area 2, results indicated PAH and chlorinated VOCs, area designated Area 3	1995
RIs conducted, identified most significant soil contaminants to be PAHs, PCBs, some SVOCs and arsenic, lower concentrations of VOCs	1996-1998
USACE conducted soil removal action 1,860 cy of TPH and PCB contaminated soil removed	1999
USACE performed additional soil sampling	2000
FS completed	2000
Groundwater monitoring points installed	2000
USEPA and MADEP collected groundwater samples	April 3, 2001
ROD signed	September 28, 2001
Soil Removal Action completed	2002
Remedial Action Report/remedial work completed	2002-2003
LTMP	2003/2004
First Five-Year Review	September 2005
Draft Operating Properly and Successfully Demonstration for Area of Contamination 57	December 2005
Revised LTMMP completed	November 2008
Final Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Plan, Area of Contamination 57 Areas 2 and 3	January 2007
2004 to 2006 Final Annual Reports, Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Program, Area of Contamination 57 Areas 2 and 3	January 2007
2007 & 2008 Final Annual Report , Operation & Maintenance Phase, Wetland & Upland Habitat and Long Term Adaptive Monitoring and Maintenance Program, DCL Areas of Contamination 9, 11, 40, 41 & Study Areas 12 and 13, and Area of Contamination 57 Areas 2 and 3	May 2008 & June 2009
Final Operating Properly and Successfully Demonstration for Area of Contamination 57	February 2010
Annual LTM	2005-2009
Second Five Year Review	September 2010
Annual LTM	2010-2014
Third Five-Year Review	September 2015
Annual LTM	2015-2019
Supplemental Groundwater Sampling	January – February 2020
Fourth Five-Year Review	September 20 2020

Physical Characteristics

AOC 57 is part of the Bowers-Nonacoicus Brook Sub-basin, Nashua River Watershed, located south of former Building 3713, between Barnum Road and Cold Spring Road on the northeastern side of the former Main Post of Fort Devens in the Town of Harvard, Massachusetts.

Areas 1, 2, and 3 include upland areas [elevations between 228-ft and 240-ft mean sea level (msl)]

that slope downward to a delineated wetland (elevations lower than 228-ft msl), which is part of the wetland system and feeder stream known as Lower Cold Spring Brook. The ROD identified the 228-foot elevation line as the border between the upland and the 100-year flood plain for Cold Spring Brook. The floodplain boundary is located approximately 260 feet from Cold Spring Brook in Area 2 and approximately 400 feet from Cold Spring Brook in Area 3. The upland area is forested with trees and scrub bush. The wetland area is densely vegetated with brush and contains small areas of standing water. A portion of Area 1 is located outside the lease parcel A6a and outside of the 100-year floodplain, (i.e., at an elevation > 228-ft msl).

Land and Resource Use

A solar panel manufacturing facility was constructed between Areas 2 and 3 of AOC 57 and Barnum Road between 2008 and 2009. The solar panel manufacturing facility has since been closed but has been taken over by another company, Saint Gobain, Crystals division. A company called Nypro has taken over the property in 2014. The same building footprint and infrastructure remain in place. Construction activities complicated site access but otherwise had minimal impact to AOC 57.

Areas 2 and 3 are located within Lease Parcel A6. Public access to Area 2 and 3 is not restricted, but the presence of floodplains/wetlands and existing zoning currently prevents residential use/exposure.

Initial Response

Area 1

Approximately 3,000 gallons of mixed oil and water were recovered through the use of contaminant dikes and absorbent booms in 1977, and approximately 25 cy of petroleum contaminated soil was removed in 1997.

Area 1 was recommended for No Further Action (NFA) following the removal of this contaminated soil. The approved 2001 AOC 57 ROD indicated that Area 1 was closed with NFA.

Area 2

Area 2 is located approximately 700 feet north of Area 1 and adjacent to a former vehicle storage yard associated with the motor repair shops located in former Buildings 3757 and 3758. Area 2 grades down towards the wetlands associated with Cold Spring Brook and formerly consisted of an eroded drainage ditch created by rainfall runoff from vehicle storage yard associated with former Buildings 3757 and 3758. Initially, it was believed that contamination in Area 2 was the result of a No. 4 fuel release in Area 1. Subsequent investigations concluded that Area 2 was separate from Area 1. Following a soil removal action in 1994, Area 2 was re-graded and a permanent drainage swale was installed. Runoff drains into the swale and discharges east into Cold Spring Brook (**Figure K - 1**). Subsequent activities included subsurface investigations with soil sampling and monitoring well installation, removal of contaminated soil, construction of an interceptor trench, and operation of a petroleum product recovery system.

In 1992, the drainage ditch located at Area 2 was investigated as part of the SI (ABB, 1995) for Groups 2 and 7 Historic Gas Stations. Naphthalene and TPH were detected in soil samples. Fingerprint analysis of soil samples collected from the drainage ditch area indicated soil contamination was most likely derived from lubricating oil or vehicle crankcase oil, and not the 1977 release of No. 4 fuel oil.

During 1994, the Army performed a soil removal action at Area 2 in response to newly promulgated MCP standards. The 1994 soil removal action was discontinued due to soil contamination that extended below the water table and well beyond the area limits originally estimated. A total of 1,300 cy of contaminated soil was removed. The site was transferred to the RI/FS process.

During 1995 through 1998, the Army conducted a RI at AOC 57 Areas 2 and 3. The most significant soil

contaminants identified at Area 2 included PAHs, PCBs, and lead. The Army performed additional soil and groundwater investigations in 2000, and completed a FS for selection of final remedies at AOC 57 Areas 2 and 3. "Alternative II-3, Excavation (For Possible Future Use), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls" was the selected remedy for Area 2. The ROD was signed on September 28, 2001.

Soil excavation conducted (in Area 2) as a ROD remedy was initiated in January 2002 and was conducted in phases until February 2003, when excavation activities were discontinued due to contamination extending beyond the limits identified in the ROD. The Army conducted further sampling to delineate the extent of contamination and completed site restoration in October 2003. An Explanation of Significant Differences (ESD) dated March 2004 expanded the ROD recommendations to include EPH C11-C12 aromatics and PCBs as COCs for Area 2 groundwater, include EPH as a COC for Area 2 soil, monitor for the presence of petroleum waste at Area 2, and increase the soil volume and associated cost for Area 2 soil removal activities.

AOC 57 – Area 3

During investigation activities completed in 1995, four test-pits were excavated east of Area 2 where historical photos indicated soil staining. Sample analysis showed the presence of PAHs and chlorinated VOCs. The area was designated AOC 57 Area 3. Area 3 is located approximately 600 feet to the northeast of Area 2, south of former vehicle maintenance motor pools (**Figure K-3**).

During 1996 through 1998, RI field investigations were performed to assess the nature and extent of contamination at Area 3. The most significant soil contaminants identified at Area 3 included PAHs, PCBs, some SVOCs, and arsenic. Lower concentrations of VOCs were detected at some locations.

Following investigations conducted in 1995, and 1996 through 1998, the Army conducted a soil removal action in 1999 that targeted soils with TPH and PCB concentrations exceeding soil standards published under the MCP. A total of 1,860 cy of materials was removed for off-site disposal.

During 2000, the Army performed additional soil and groundwater investigations, and completed a FS for selection of final remedy for Area 3. "Alternative III-2a, Excavation (To Accelerate Groundwater Cleanup), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls" was the selected remedy for Area 3. The ROD was signed on September 28, 2001.

Soil excavation was initiated in January 2002 and completed in February 2003. Area 3 was excavated to the target limits, and the planned volume of soil was removed within these limits to depths ranging between 2 and 4 feet. All confirmatory samples met the ROD cleanup criterion for EPH, and Area 3 was backfilled and the extent of removal was documented.

K.2 Building 3713

Fuel Oil Spill Site

Figures

Legend

- Irrigation Well (Approximate Location)
- Stream
- Topographic Contour (Ft AMSL)
- AOC 57 Sub Area
- Former Fort Devens Boundary

Note:
AOC 57 lies within the MassDEP Zone II Wellhead Protection Area.

Aerial Sources: UGSS, MassGIS Orthoimagery 2019

Site Layout
Area of Contamination 57 Area 1, 2, & 3
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 125 250
Feet

Date:
04/13/2020

Figure
K-1

File: MP_SuppSampling_F2-1_AOC57.mxd

Legend

- Monitoring Well Location
- Stream
- Topographic Contour (Ft AMSL)
- Final Excavation Limit (2003)
- Conti Excavation Limit (2002)
- Flagged Wetland Limits
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Containment Dam
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Site Layout
Area of Contamination 57 - Area 2
March 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date:
04/13/2020

Figure
K-2

File: MP_SuppSampling_F2-2_AOC57-2_SiteLayout.mxd

Legend

- Monitoring Well Location
- Stream
- Topographic Contour (Ft AMSL)
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Alternate III-2a Estimated Soil Excavation Area

Aerial Sources: UGSS, MassGIS Orthoimagery 2019

Site Layout
Area of Contamination 57 - Area 3
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date:
04/13/2020

Figure
K-3

File: MP_SuppSampling_F2-3_AOC57-3_SiteLayout.mxd

Legend

- Monitoring Well Location
- (219.52) Shallow Groundwater Elevation (Feet)
- Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Groundwater Flow Direction
- Stream
- Topographic Contour (Ft AMSL)
- Final Excavation Limit (2003)
- Conti Excavation Limit (2002)
- Flagged Wetland Limits
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Containment Dam
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Interpretive Shallow Water Table Elevation
Area of Contamination 57 - Area 2
March 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 04/13/2020

Figure K-4

File: MP_SuppSampling_F2-4_AOC57-2_Shallow_GWC0320.mxd

Legend

- Monitoring Well Location
- (232.84) Deep Groundwater Elevation (Feet)
- Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Inferred Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Groundwater Flow Direction
- Stream
- Topographic Contour (Ft AMSL)
- Final Excavation Limit (2003)
- Conti Excavation Limit (2002)
- Flagged Wetland Limits
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Containment Dam
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Interpretive Deep Water Table Elevation
Area of Contamination 57 - Area 2
March 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date:
04/13/2020

Figure
K-5

File: MP_SuppSampling_F2-5_AOC57-2_Deep_GWC0320.mxd

Legend

- Monitoring Well Location
- (219.52) Shallow Groundwater Elevation (Feet)
- Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Inferred Shallow Groundwater Contour (ft NAVD88) (Contour Interval = 1 ft)
- Groundwater Flow Direction
- Stream
- Topographic Contour (Ft AMSL)
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Alternate III-2a Estimated Soil Excavation Area

Aerial Sources: UGSS, MassGIS Orthoimagery 2019

Interpretive Shallow Water Table Elevation
Area of Contamination 57 - Area 3
March 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date:
04/13/2020

Figure
K-6

File: MP_SuppSampling_F2-6_AOC57-3_Shallow_GWC0320.mxd

Legend

- Monitoring Well Location
- (232.84) Deep Groundwater Elevation (Feet)
- Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Inferred Deep Groundwater Contour (ft NAVD88) (Contour Interval = 0.5 ft)
- Groundwater Flow Direction
- Stream
- Topographic Contour (Ft AMSL)
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2011 analytical data)
- Alternate III-2a Estimated Soil Excavation Area
- Former Fort Devens Boundary

Aerial Source: USGS, MassGIS Orthoimagery 2019

Interpretive Deep Water Table Elevation
Area of Contamination 57 - Area 3
March 2020
Devens Five Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

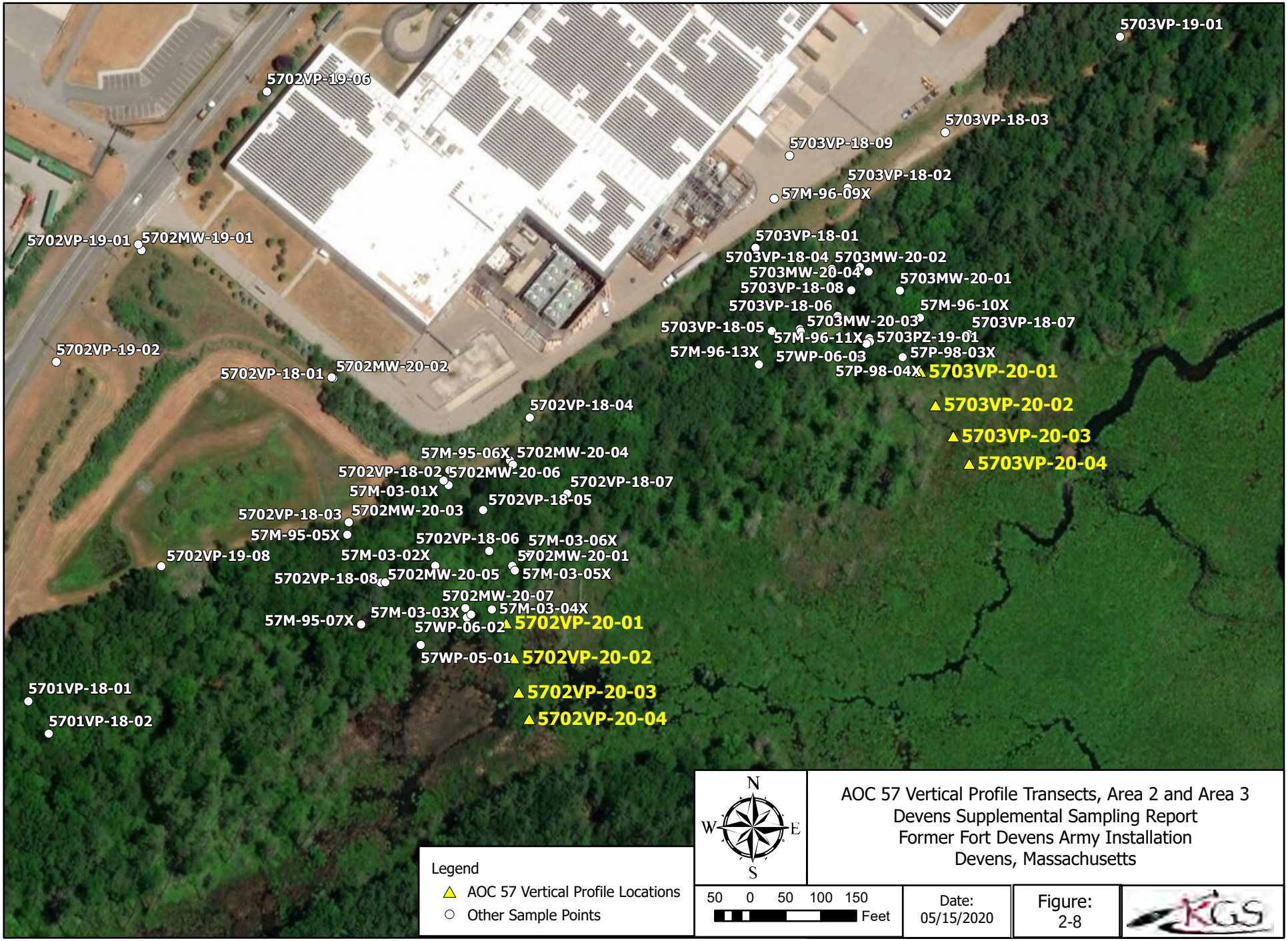
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 04/13/2020

Figure K-7

File: MP_SuppSampling_F2-7_AOC57-3_Deep_GWC0320.mxd


5703VP-19-01
5702VP-19-06
5703VP-18-03
5703VP-18-09
5703VP-18-02
57M-96-09X
5702VP-19-01
5702MW-19-01
5703VP-18-01
5703VP-18-04
5703MW-20-02
5703MW-20-04
5703MW-20-01
5703VP-18-08
5703VP-18-06
57M-96-10X
5703MW-20-03
5703VP-18-07
5703VP-18-05
57M-96-11X
5703PZ-19-01
57M-96-13X
57WP-06-03
57P-98-03X
57P-98-04X
5703VP-20-01
5703VP-20-02
5703VP-20-03
5703VP-20-04
5702VP-19-02
5702VP-18-01
5702MW-20-02
5702VP-18-04
57M-95-06X
5702MW-20-04
5702VP-18-02
5702MW-20-06
5702VP-18-07
57M-03-01X
5702VP-18-05
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57M-95-05X
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57M-03-06X
5702VP-19-08
57M-03-02X
5702MW-20-01
5702VP-18-08
5702MW-20-05
57M-03-05X
5702MW-20-07
57M-03-04X
57M-03-03X
57M-95-07X
57WP-06-02
5702VP-20-01
57WP-05-01
5702VP-20-02
5702VP-20-03
5702VP-20-04
5701VP-18-01
5701VP-18-02
N
W
E
S
Legend
AOC 57 Vertical Profile Locations
Other Sample Points
50 0 50 100 150
Feet
AOC 57 Vertical Profile Transects, Area 2 and Area 3
Devens Supplemental Sampling Report
Former Fort Devens Army Installation
Devens, Massachusetts
Date:
05/15/2020
Figure:
2-8
KGS

K.3 Building 3713

Fuel Oil Spill Site

Tables

Table K-1
Groundwater Analytical Results
Area of Contamination 57
June 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	Cleanup Goal[1]	GW-3 Groundwater Standard[3]	Background[2]	57M 95-03X	Q	57M 96-11X	Q
Metals (SW6010C)	Arsenic, Total	µg/L	10	900	10.5	**37.5**		**284**	
	Arsenic, Dissolved	µg/L	10	900		**22.0**		**137**	
	Iron, Total	µg/L	NS	NS	9,100	**6,350**		**35,400**	
	Iron, Dissolved	µg/L	NS	NS		**4,470**		**31,500**	
	Manganese, Total	µg/L	NS	NS	291	**191**		**3,190**	
	Manganese, Dissolved	µg/L	NS	NS		**202**		**3,150**	
Field Parameters	Temperature	°Celcius	NS	NS	NS	9.03		10.14	
	ORP	mV	NS	NS	NS	6.8		2.7	
	pH	Std Units	NS	NS	NS	5.74		6.16	
	Specific Conductance	µS/cm	NS	NS	NS	281		286.0	
	Dissolved Oxygen	mg/L	NS	NS	NS	0.37		0.19	
	Turbidity	NTU	NS	NS	NS	12.8		33.10	

Notes:

NS - No standard

NA Not analyzed

Q: Qualifier

0.333	= Cleanup goal exceedance
0.716	= Detected result above GW 3 Standard and/or Background

[1] From the MCP "GW 1" Standards (310 CMR 40 Subpart P) unless identified in the ROD.

[2] From the RI.

[3] The GW 3 standard was effective on April 2014

Table K-2
Surface Water Analytical Results
Area of Contamination 57
June 2015
Former Fort Devens Army Installation
Devens, MA

Method	Analyte	Units	USEPA Water Quality Criteria *	57 AREA3 SW1	Q
Metals (SW6010B)	Arsenic, Dissolved	µg/L	150	3.7	J
	Iron, Dissolved	µg/L	1,000	***1,290***	
	Manganese, Dissolved	µg/L	NS	789	
VOCs (SW8260B)	1,4 Dichlorobenzene	µg/L	NS	NC	
	cis 1,2 Dichloroethene	µg/L	NS	NC	
	Chlorobenzene	µg/L	NS	NC	
	Tetrachloroethene	µg/L	NS	NC	
	Trichloroethene	µg/L	NS	NC	
	Vinyl Chloride	µg/L	NS	NC	
EPH (EPH 04 1.1)	C11 C22 Aromatics (Unadjusted)	µg/L	NS	NC	
Field Parameters	Temperature, initial	°C	NS	NA	
	Temperature, final	°C	NS	NA	
	ORP	mV	NS	NA	
	pH	Std Units	NS	NA	
	Specific Conductance	µS/cm	NS	NA	
	Dissolved Oxygen	mg/L	NS	NA	
	Turbidity	NTU	NS	NA	

Notes:

NS - No standard J - Estimated concentration.

NA Not analyzed

NC = Not Collected

Q - Qualifier

0.716 Detected results above USEPA Water Quality Criteria

* Results for contaminants of concern that are not present in this table were non detect

All general terms, laboratory indicators and data qualifiers are defined on the Key for Tables found at the beginning of this section.

* = Criterion Continuous Concentration

Water Quality Criteria published by USEPA pursuant to Section 304(a) of the Clean Water Act and provide guidance for states and tribes to use in adopting water quality standards.

For Contaminants of Concern (COCs) without Water Quality Criteria a qualitative comparison will be made between the detected concentrations in groundwater and COC concentrations in surface water to determine if groundwater discharge is impacting surface water.

Table K-3
AOC 57 Area 3 Groundwater Analytical Results - June 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

			GW Cleanup Goal[1]	Background[2]	57M 95-03X_SPR16	Q	57M 96-11X_SPR16	Q	DUP-1 (57M-96-11X)	Q
Method	**Analyte**	**Units**			**06/09/2016**		**06/09/2016**		**06/09/2016**	
Metals	Arsenic, Total	µg/L	10	10.5	**31**		**290**		**290**	
	Arsenic, Dissolved	µg/L	10	10.5	**25**		**130**		**130**	
Metals	Iron, Total	µg/L	NS	9,100	**4,700**		***32,000***		***32,000***	
	Iron, Dissolved	µg/L	NS	9,100	**4,500**		***29,000***		***28,000***	
	Manganese, Total	µg/L	NS	291	**130**		***2,800***		***2,800***	
	Manganese,	µg/L	NS	291	**140**		***2,800***		***2,800***	
Field Parameters	Temperature	°C	NS	NS	10.59		11.21		--	
	ORP	mV	NS	NS	-33.6		-14.5		--	
	pH	Std	NS	NS	6.61		6.49		--	
	Specific	µS/cm	NS	NS	414		371		--	
	Dissolved Oxygen	mg/L	NS	NS	2.68		0.81		--	
	Turbidity	NTU	NS	NS	7.55		24.0		--	

Notes:

NS No standard

10.0 = Cleanup goal exceedance

5.0 = Detected result above background

[1] Cleanup Goal for arsenic is the MCL standard.

[2] From the RI.

Table K-4
AOC 57 Area 3 Surface Water Analytical Results - June 2016
Main Post - Former Fort Devens Army Installation - Devens, MA

			Surface Water Benchmark[1]	57-AREA3-SW1_SPR16	Q
Method	**Analyte**	**Units**		**06/09/2016**	
Metals	Arsenic, Total	µg/L	150	**23.0**	
	Arsenic, Dissolved	µg/L	150	**8.1**	
Metals	Iron, Total	µg/L	1,000	**19,000**	
	Iron, Dissolved	µg/L	1,000	**6,500**	
	Manganese, Total	µg/L	NS	**1,400**	
	Manganese, Dissolved	µg/L	NS	**1,300**	
Field Parameters	Temperature	°C		--	
	ORP	mV		--	
	pH	Std		--	
	Specific Conductance	µS/cm		--	
	Dissolved Oxygen	mg/L		--	
	Turbidity	NTU		--	

Notes:
NS No standard
10.0 = Benchmark exceedance
[1] Water Quality Criteria for Surface Water

Table K-5
AOC 57 Area 3 Groundwater Analytical Results, June 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Background[2]	57M-95-03X	Q	57M-96-11X	Q	DUP-1 57M-96-11X	Q
				6/26/2017		6/26/2017		6/26/2017	
Total and Disolved Metals									
Arsenic, Total	µg/L	10	10.5	**27**		**180**		**170**	
Arsenic, Dissolved	µg/L	10	10.5	**30**		**120**		**120**	
Iron, Total	µg/L	NS	9,100	**5,300**		***31,000***		***31,000***	
Iron, Dissolved	µg/L	NS	9,100	**5,600**	J	***29,000***		***30,000***	
Manganese, Total	µg/L	NS	291	**110**		***2,900***		***3,000***	
Manganese, Dissolved	µg/L	NS	291	**120**		***3,000***		***3,100***	
Field Parameters									
Temperature	°C	NS	NS	**9.09**		**10.13**		**10.13**	
ORP	mV	NS	NS	**26.7**		**-38.7**		**-38.7**	
pH	Std Units	NS	NS	**6.83**		**7.00**		**7.00**	
Specific Conductance	µS/cm	NS	NS	**132**		**352**		**352**	
Dissolved Oxygen	mg/L	NS	NS	**1.24**		**1.05**		**1.05**	
Turbidity	NTU	NS	NS	**4.84**		**9.66**		**9.66**	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)

Table K-6
AOC 57 Area 3 Surface Water Analytical Results, June 2017
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Surface Water Benchmark[1]	57M-SW-1	Q	57M-SWDUP	Q
			6/26/2017		6/26/2017	
Total and Dissolved Metals						
Arsenic, Total	µg/L	150	**31**		**27**	
Arsenic, Dissolved	µg/L	150	**17**		**18**	
Iron, Total	µg/L	1,000	***21,000***		***18,000***	
Iron, Dissolved	µg/L	1,000	***15,000***		***16,000***	
Manganese, Total	µg/L	NS	**1,200**		**1,200**	
Manganese, Dissolved	µg/L	NS	**1,300**		**1,300**	
Field Parameters						
ORP	mV	NS	--		--	
pH	Std Units	NS	--		--	
Specific Conductance	µS/cm	NS	--		--	
Dissolved Oxygen	mg/L	NS	--		--	
Temperature	°C	NS	--		--	
Turbidity	NTU	NS	--		--	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
-- Not recorded for surface water
[1] USEPA Aquatic Life Water Quality Criterion for Surface Water benchmarks for iron and arsenic (USEPA, 2018).

Table K-7
AOC 57 Area 3 Groundwater Analytical Results, May 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Background[2]	57M-95-03X	Q	57M-96-11X	Q	DUP-1 57M-96-11X	Q
				5/8/2018		5/8/2018		5/8/2018	
Dissolved Metals									
Arsenic, Dissolved	µg/L	10	10.5	**42**		**180**		**200**	
Iron, Dissolved	µg/L	NS	9,100	**8,400**		***37,000***		***36,000***	
Manganese, Dissolved	µg/L	NS	291	**110**		***2,700***		***2,500***	
Field Parameters									
Temperature	°C	NS	NS	**11.06**		**10.33**		--	
ORP	mV	NS	NS	**58.7**		**39.7**		--	
pH	Std Units	NS	NS	**5.31**		**5.18**		--	
Specific Conductance	µS/cm	NS	NS	**154**		**571**		--	
Dissolved Oxygen	mg/L	NS	NS	**1.94**		**0.59**		--	
Turbidity	NTU	NS	NS	**3.27**		**85.6**		--	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)
-- Not recorded for duplicate sample

Table K-8
AOC 57 Area 3 Surface Water Analytical Results, May 2018
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Surface Water Benchmark[1]	57M-SW-1	Q	57M-SWDUP	Q
			5/8/2018		5/8/2018	
Total Metals						
Arsenic, Total	µg/L	150	**5.2**		**4.9**	
Iron, Total	µg/L	1,000	***4,000***		***4,700***	
Manganese, Total	µg/L	NS	**800**		**910**	
Field Parameters						
ORP	mV	NS	--		--	
pH	Std Units	NS	--		--	
Specific Conductance	µS/cm	NS	--		--	
Dissolved Oxygen	mg/L	NS	--		--	
Temperature	°C	NS	--		--	
Turbidity	NTU	NS	--		--	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
-- Not recorded for surface water
[1] USEPA Aquatic Life Water Quality Criterion for Surface Water benchmarks for iron and arsenic (USEPA, 2018).

Table K-9
AOC 57 Area 3 Groundwater Analytical Results, Spring 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Background[2]	57M-95-03X		57M-96-11X		DUP-1 57M-96-11X	
				4/8/2019	Q	4/8/2019	Q	4/8/2019	Q
Total Metals									
Arsenic, Total	µg/L	10	10.5	**15**		**100**		**110**	
Iron, Total	µg/L	NS	9,100	**5,600**		***36,000***		***38,000***	
Manganese, Total	µg/L	NS	291	**160**		***3,000***		***3,100***	
Field Parameters									
Temperature	°C	NS	NS	**6.6**		**6.9**		**--**	
ORP	mV	NS	NS	**6.0**		**8.0**		**--**	
pH	Std Units	NS	NS	**6.2**		**6.1**		**--**	
Specific Conductance	µS/cm	NS	NS	**270**		**1,000**		**--**	
Dissolved Oxygen	mg/L	NS	NS	**0.60**		**0.85**		**--**	
Turbidity	NTU	NS	NS	**7.0**		**29**		**--**	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)
-- Not recorded for duplicate sample

Table K-10
AOC 57 Area 3 Surface Water Analytical Results, Spring 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Surface Water Benchmark[1]	57-SW1		DUP 57-SW1	
			4/5/2019	Q	4/5/2019	Q
Dissolved Metals						
Arsenic, Dissolved	µg/L	150	3.0	U	3.0	U
Iron, Dissolved	µg/L	1,000	**760**		**600**	
Manganese, Dissolved	µg/L	NS	**110**		**100**	
Field Parameters						
ORP	mV	NS	--		--	
pH	Std Units	NS	--		--	
Specific Conductance	µS/cm	NS	--		--	
Dissolved Oxygen	mg/L	NS	--		--	
Temperature	°C	NS	--		--	
Turbidity	NTU	NS	--		--	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard
Q = Qualifier
J = Estimated result
U = Non-detect
-- Not recorded for surface water
[1] USEPA Aquatic Life Water Quality Criterion for Surface Water benchmarks for iron and arsenic (USEPA, 2018).

Table K-11
AOC 57 Area 2 Groundwater Analytical Results, Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Background[2]	57M-03-01X		57M-03-02X		57M-03-03X		DUP01 57M-03-03X		57M-03-04X		57M-03-05X		57M-95-06X		57WP-06-02		5702MW-20-01A	
				1/28/2020	Q	2/5/2020	Q	1/28/2020	Q	1/28/2020	Q	1/27/2020	Q	2/5/2020	Q	2/5/2020	Q	2/6/2020	Q	2/7/2020	Q
Dissolved Metals																					
Arsenic, Dissolved	µg/L	10 (T)	10.5 (T)	3.0	U	**7.3**		3.0	U	3.0	U	**2.5**	**J**	**13**		3.0	U	**1.7**	**J**	**2.2**	**J**
Iron, Dissolved	µg/L	NS	9100 (T)	50	U	**4,500**		50	U	50	U	50	U	**640**		50	U	50	U	50	U
Manganese, Dissolved	µg/L	NS	291 (T)	**6.3**	**J**	**290**		**96**		**91**		**73**		***590***		**3.3**	**J**	**190**		**38**	
Field Parameters																					
Temperature	°C	NS	NS	11.25		5.20		9.77		--		8.70		4.02		10.56		8.35		9.77	
pH	Std Units	NS	NS	6.44		5.73		6.32		--		6.36		6.26		6.06		6.08		6.77	
Specific Conductance	µS/cm	NS	NS	2.675		187		1.013		--		0.506		361		472		411		379	
ORP	mV	NS	NS	231.4		56.1		235.6		--		188.8		67		146.2		-19.6		98.6	
Dissolved Oxygen	mg/L	NS	NS	9.69		9.7		1.42		--		1.29		0.31		1.5		0.07		7.35	
Turbidity	NTU	NS	NS	1.84		2.5		2.03		--		1.87		3.5		2.77		10.7		3.3	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard

Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)
(T) = Cleanup Goal or Background Level for Total Metals
-- Not recorded for duplicate sample

Table K-12
AOC 57 Area 2 Groundwater Analytical Results, Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Background[2]	5702MW-20-01B		5702MW-20-02A		DUP-01 5702MW-20-02A		5702MW-20-03A		5702MW-20-04A		5702MW-20-05A		5702MW-20-05B		5702MW-20-06A		5702MW-20-07A	
				2/7/2020	Q	2/10/2020	Q	2/10/2020	Q	2/24/2020	Q	2/10/2020	Q	2/24/2020	Q	2/28/2020	Q	2/10/2020	Q	03/06/2020	Q
Dissolved Metals																					
Arsenic, Dissolved	µg/L	10 (T)	10.5 (T)	***17***		3.0	U	3.0	U	**1.8**	**J**	**1.6**	**J**	3.0	U	**7.0**		**1.9**	**J**	**1.8**	**J**
Iron, Dissolved	µg/L	NS	9100 (T)	**48**	**J**	50	U	50	U	50	U	**530**		50	U	**37**	**J**	**86**		50	U
Manganese, Dissolved	µg/L	NS	291 (T)	**49**		**34**		**37**		***490***		***310***		***600***		**100**		***450***		**64**	
Field Parameters																					
Temperature	°C	NS	NS	6.29		9.43		--		9.92		11.48		11.31		11.08		10.14		9.06	
pH	Std Units	NS	NS	8.27		6.35		--		6.58		6.80		6.02		9.16		6.97		6.68	
Specific Conductance	µS/cm	NS	NS	303		852		--		0.485		238		1.642		0.239		498		640	
ORP	mV	NS	NS	-185		177.6		--		55.5		107.3		191.9		-98.4		162.4		-0.9	
Dissolved Oxygen	mg/L	NS	NS	0.46		10.29		--		5.02		2.82		6.62		0.1		4.88		1.72	
Turbidity	NTU	NS	NS	4.21		0.80		--		10.42		4.51		3.1		864		1.5		3.3	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteri
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard

Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)
(T) = Cleanup Goal or Background Level for Total Metals
-- Not recorded for duplicate sample

Table K-13
AOC 57 Area 3 Groundwater Analytical Results, Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

	Units	Cleanup Goal[1]	Back-ground[2]	57M-95-03X		DUP01 57M-95-03X		57M-96-11X		57M-96-12X		57P-98-03X		57P-98-04X		5703MW-20-01A		5703MW-20-01B		5703MW-20-02A		5703MW-20-03A		5703MW-20-04A		5703PZ-19-01	
				2/11/2020	Q	2/11/2020	Q	2/13/2020	Q	2/13/2020	Q	2/13/2020	Q	2/13/2020	Q	2/11/2020	Q	2/18/2020	Q	2/13/2020	Q	2/11/2020	Q	2/11/2020	Q	2/18/2020	Q
Dissolved Metals																											
Arsenic, Dissolved	µg/L	10 (T)	10.5 (T)	**30**		**29**		**67**		3.0	U	**3.3**		3.0	U	3.0	U	***11***		**2.2**	**J**	3.0	U	**7.6**		**64**	
Iron, Dissolved	µg/L	NS	9100 (T)	**3,900**		**3,800**		***31,000***		**41**	**J**	**1,400**		**270**		**450**		**83**		**740**		**91**		**2,300**		**28**	**J**
Manganese, Dissolved	µg/L	NS	291 (T)	**120**		**120**		***3,300***		**85.0**		***11,000***		***370***		**110**		***1,200***		***920***		**130**		**270**		**160**	
Field Parameters																											
Temperature	°C	NS	NS	6.53		--		6.13		5.35		5.88		4.00		5.95		8.72		7.98		9.95		8.49		9.12	
pH	Std Units	NS	NS	6.68		--		6.12		5.13		5.50		5.43		5.40		7.12		6.47		6.69		6.71		8.11	
Specific Conductance	µS/cm	NS	NS	712		--		1,062		0.59		0.766		928		426		0.169		3.363		0.248		447		0.182	
ORP	mV	NS	NS	-72.2		--		0.2		210		136.9		187.2		110.7		5.5		95.1		208.7		-97.7		-68.1	
Dissolved Oxygen	mg/L	NS	NS	1.27		--		1.12		0.21		8.7		2.6		1.21		0.58		0.78		0.12		0.46		0.45	
Turbidity	NTU	NS	NS	3.84		--		4.1		2.24		3.4		3.92		3.2		over range		2.63		2,263		10.9		27.8	

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

µg/L = microgram per liter
mg/L = milligram per liter
NS = No Standard

Q = Qualifier
J = Estimated result
U = Non-detect
[1] Cleanup Goal for arsenic is the MCL standard.
[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)
(T) = Cleanup Goal or Background Level for Total Metals
-- Not recorded for duplicate sample

Table K-14
Summary of Historical Groundwater and Surface Water Cleanup Goal Exceedances at AOC 57 Area 3 Between 2003 and 2019
Main Post, Former Fort Devens Army Installation, Massachusetts

Sample Location	Fall 2003	Spring 2004	Fall 2004	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Spring 2014	Spring 2015	Spring 2016	Spring 2017	Spring 2018	Spring 2019
Groundwater																					
Arsenic (Total) - 10 µg/L Cleanup Goal																					
57M-95-03X	**36**	**44**	**230**	**25**	**13.6**	**7.0**	**49.0**	**4.8**	**51.0**	**23.0**	**21.0**	**23.0**	**58.0**	**36.0**	**60.0**	**60.0**	**37.5**	**31.0**	**27**	**42**	**15**
57M-96-11X	**270**	**240**	**120**	**161**	**215**	**163**	**171**	**166**	**193**	**160**	**163**	**148**	**190**	**192**	**181**	**160**	**284**	**290**	**180**	**180**	**100**
1,4-Dichlorobenzene - 5 µg/L Cleanup Goal																					
57M-95-03X	**1.4**	**2.2**	**13**	**0.5**	**0.8**	**1.4**	**4.5**	**1.4**	**13**	**0.9**	**2.4 J**	**1.4 J**	**5.1**	**2.4 J**	**3.13**	**3.27**	NA	NA	NA	NA	NA
57M-96-11X	**3.4**	**3.8**	**2.4**	**3.3**	**1.4**	**3.7**	**2.4**	**4.4**	**1.6**	**5.1**	**7.5**	**2.1 J**	**2.3 J**	**0.92 J**	**1.05 J**	**1.22**	NA	NA	NA	NA	NA
Surface Water																					
Arsenic - 150 µg/L Water Quality Criterion																					
57-AREA 3-SW-1	**35**	**3.1 J**	**4.9J**	ND	**5.2**	**34 J**	**6**	**2.7 J**	**9**	**11**	ND	ND	**18**	**8.0**	**8.0**	ND	**9.9**	**23**	**31**	**5**	ND
Iron - 1,000 µg/L Water Quality Criterion																					
57-AREA 3-SW-1	NA	NA	NA	NA	NA	**600**	***4,500***	520	***7,100***	***6,800***	***2,500***	240	***20,000***	***8,300***	***10,000***	***10,000***	***4,140***	***19,000***	***21,000***	***4,000***	***760***
Lead - 2.5 µg/L Water Quality Criterion																					
57-AREA 3-SW-1	***34***	ND	**0.81**	***3.4***	ND	**2.3**	ND	**1.8**	***14***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result
NA = Not analyzed
ND = non-detect
µg/L = microgram per liter

Table K-15
Summary of Historical Groundwater Cleanup Goal Exceedances for Arsenic at AOC 57 Area 3 Since 2003
Main Post, Former Fort Devens Army Installation, Massachusetts

Sample Location	Fall 2003	Spring 2004	Fall 2004	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Spring 2009	Spring 2010	Spring 2011	Spring 2012	Spring 2013	Spring 2014	Spring 2015	Spring 2016	Spring 2017	Spring 2018	Spring 2019	Winter 2020
Groundwater																						
Arsenic (Total) - 10 µg/L Cleanup Goal																						
57M-95-03X	**36**	**44**	**230**	**25**	**14**	**7.0**	**49**	**4.8**	**51**	**23**	**21**	**23**	**58**	**36**	**60**	**60**	**38**	**31**	**27**	**42**	**15**	NA
57M-96-11X	**270**	**240**	**120**	**161**	**215**	**163**	**171**	**166**	**193**	**160**	**163**	**148**	**190**	**192**	**181**	**160**	**284**	**290**	**180**	**180**	**100**	NA
Arsenic (Dissolved) - 10 µg/L Cleanup Goal for Arsenic (Total)																						
57M-95-03X	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**30**
57M-96-11X	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**67**

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

J = Estimated result

NA = Not analyzed

ND = non-detect

µg/L = microgram per liter

Table K-16
Vertical Groundwater Gradients for AOC 57 Area 2 and Area 3, Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

Monitoring Well/ Piezometer/ Surface Water ID	Location	Screen Interval	Measuring Point Elevation	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
AOC 57 - Area 2											
AOC 57 - Area 2 - Well Triplet 1											
57M-03-05X	Shallow Well at Eastern Margin	2-12	221.88	207.58	217.58	212.58		219.26			
5702MW-20-01A	Mid-Depth Well	30-40	222.23	179.59	189.59	184.59		219.41			
5702MW-20-01B	Deep Well	70-80	222.27	139.69	149.69	144.69		220.45			
	57M-03-05X Shallow						67.89		1.19	--	0.0175
	5702MW-20-01B Deep										
	57M-03-05X Shallow						27.99		0.15	--	0.0054
	5702MW-20-01A Mid-Depth										
	5702MW-20-01A Mid-Depth						39.90		1.04	--	0.0261
	5702MW-20-01B Deep										
AOC 57 - Area 2 - Well Pair 1											
57M-03-01X	Shallow Well at Northern Margin	10-20	235.73	214.44	224.44	219.44	60.34	221.36	0.05	0.0008	--
5702MW-20-06A	Deep Well	70-80	236.52	154.10	164.10	159.10		221.31			
AOC 57 - Area 2 - Well Pair 2											
57M-95-06X	Shallow Well at Northeastern Margin	11.87-21.87	234.39	210.76	220.76	215.76	58.07	221.62	0.41	0.0071	--
5702MW-20-04A	Deep Well	70-80	235.62	152.69	162.69	157.69		221.21			
AOC 57 - Area 2 - Well Pair 3											
5702MW-20-05A	Mid-Depth at Western Margin	30-40	226.09	183.25	193.25	188.25	39.96	219.87	1.33	--	0.0333
5702MW-20-05B	Deep Well	70-80	226.07	143.29	153.29	148.29		221.20			
AOC 57 - Area 2 - Well Triplet 2											
57M-03-03X	Shallow Well at Southern Margin	2-12	220.00	206.98	216.98	211.98		219.12			
57WP-06-02	Mid-Depth Well	18.92-23.92	220.29	195.25	200.25	197.75		219.16			
5702MW-20-07A	Deep Well	30-40	221.71	179.42	189.42	184.42		219.23			
	57M-03-03X Shallow						27.56		0.11	--	0.0040
	5702MW-20-07A Deep										
	57M-03-03X Shallow						14.23		0.04	--	0.0028
	57WP-06-02 Mid-Depth										
	57WP-06-02 Mid-Depth						13.33		0.07	--	0.0053
	5702MW-20-07A Deep										

Table K-16
Vertical Groundwater Gradients for AOC 57 Area 2 and Area 3, Winter 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

Monitoring Well/ Piezometer/ Surface Water ID	Location	Screen Interval	Measuring Point Elevation	Bottom of Screen Interval	Top of Screen Interval	Mid-Point of Screen	Difference Between Mid-Screen	Groudwater Elevation	Difference GW Elevation	Downward Gradient	Upward Gradient
		(ft bgs)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft NAVD88)	(ft)	(ft NAVD88)	(ft)	(unitless)	(unitless)
AOC 57 - Area 3											
AOC 57 - Area 3 - Well Pair 1											
57M-96-12X	Shallow Well at Western Margin	2-12	225.80	210.78	220.75	215.78	47.83	221.00	0.28	0.0059	--
5703MW-20-03A	Deep Well	50-60	225.80	162.95	175.80	167.95		220.72			
AOC 57 - Area 3 - Well Triplet 1											
57M-96-11X	Shallow Well at Southern Margin	2-12	222.20	208.04	218.04	213.04		219.52			
57WP-06-03	Mid-Depth Well	13.85-18.85	220.51	200.46	205.46	202.96		219.75			
5703PZ-19-01	Deep Well	62.5-67.5	222.93	152.66	157.66	155.16		219.85			
	57M-96-11X Shallow						57.88		0.33	--	0.0057
	5703PZ-19-01 Deep										
	57M-96-11X Shallow						10.08		0.23	--	0.0228
	57WP-06-03 Mid-Depth										
	57WP-06-03 Mid-Depth						47.80		0.10	--	0.0021
	5703PZ-19-01 Deep										
AOC 57 - Area 3 - Well Pair 2											
5703MW-20-01A	Shallow Well at Eastern Margin	2-12	228.18	213.24	223.24	218.24	48.12	220.85	0.37	0.0077	--
5703MW-20-01B	Deep Well	50-60	228.10	165.12	175.12	170.12		220.48			

Table K-17
AOC 57 Vertical Profile Groundwater Analytical Results for Select Metals, April 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

							Dissolved Metals			Field Parameters					
						Analyte	Arsenic	Iron	Manganese	Dissolved Oxygen	ORP	pH	Specific Conductivity	Temperature	Turbidity
	Sample	Elevation (ft NAVD88)				Units	µg/L	µg/L	µg/L	mg/L	mv	pH Units	µS/cm	°C	NTU
	Interval	Ground	Sample	Sample		Cleanup Goal[1]	10 (T)	NS	NS	NS	NS	NS	NS	NS	NS
Location ID	(ft bgs)	Surface	Interval	Type	Sample Field ID	Monitoring Criteria[2]	10.5 (T)	9,100 (T)	291 (T)	NS	NS	NS	NS	NS	NS
Area of Concern 57, Area 2															
5702VP-20-01	5 - 9	220.44	211.44 - 215.44	Grab	5702VP-20-01-5-9	04/22/2020	**2.1 J**	**910**	***400***	3.46	61.5	7.60	623	9.09	18.1
				Dup	A1-VP-DUP-1-42220	04/22/2020	**2.0 J**	**900**	***400***	3.46	61.5	7.60	623	9.09	18.1
	10 - 14	220.44	206.44 - 210.44	Grab	5702VP-20-01-10-14	04/23/2020	3.0 U	**110**	**240 J**	3.18	42.6	7.40	603	9.31	9.70
	15 - 19	220.44	201.44 - 205.44	Grab	5702VP-20-01-15-19	04/23/2020	**3.4 J**	**2,200 J**	***680***	4.91	41.6	7.39	629	10.5	37.1
				Dup	A1-VP-DUP-1-42320	04/23/2020	**1.8 J**	**1,400 J**	***550***	4.91	41.6	7.39	629	10.5	37.1
	20 - 24	220.44	196.44 - 200.44	Grab	5702VP-20-01-20-24	04/23/2020	3.0 U	**600**	***300***	5.21	46.2	6.81	574	11.4	720
	25 - 29	220.44	191.44 - 195.44	Grab	5702VP-20-01-25-29	04/23/2020	3.0 U	**360**	**180**	4.01	47.9	6.67	547	11.3	703
	30 - 34	220.44	186.44 - 190.44	Grab	5702VP-20-01-30-34	04/23/2020	**1.6 J**	**140**	**81**	4.90	59.3	6.62	401	12.4	4,000 J(OR)
	35 - 39	220.44	181.44 - 185.44	Grab	5702VP-20-01-35-39	04/23/2020	**1.9 J**	**830**	***540***	4.92	61.7	6.59	398	12.5	17.6
	40 - 44	220.44	176.44 - 180.44	Grab	5702VP-20-01-40-44	04/24/2020	***13***	**110**	**130**	5.01	70.3	6.69	283	9.87	980
	50 - 54	220.44	166.44 - 170.44	Grab	5702VP-20-01-50-54	04/24/2020	**5.1**	**320**	***530***	3.29	61.1	6.73	271	9.99	4,000 J(OR)
5702VP-20-02	5 - 9	220.71	211.71 - 215.71	Grab	5702VP-20-02-5-9	04/21/2020	**3.3**	**1,400**	***320***	3.76	-74.3	6.66	600	10.2	11.2
				Dup	A1-VP-DUP-1-42120	04/21/2020	**4.2**	**1,500**	***360***	3.76	-74.3	6.66	600	10.2	11.2
	10 - 14	220.71	206.71 - 210.71	Grab	5702VP-20-02-10-14	04/21/2020	3.0 U	**260**	**290**	3.17	-21.6	6.69	503	10.3	108
	15 - 19	220.71	201.71 - 205.71	Grab	5702VP-20-02-15-19	04/21/2020	3.0 U	**700**	***340***	2.30	-17.1	6.47	429	10.2	1900
	20 - 24	220.71	196.71 - 200.71	Grab	5702VP-20-02-20-24	04/21/2020	3.0 U	**650**	**290**	2.80	-0.900	6.40	531	10.0	1300
	25 - 29	220.71	191.71 - 195.71	Grab	5702VP-20-02-25-29	04/22/2020	3.0 U	**320**	**210**	2.30	2.60	6.59	560	9.87	2730
	30 - 34	220.71	186.71 - 190.71	Grab	5702VP-20-02-30-34	04/22/2020	**4.4**	**190**	**170**	6.19	38.7	6.69	407	10.5	1300
	35 - 39	220.71	181.71 - 185.71	Grab	5702VP-20-02-35-39	04/22/2020	**8.0**	**760**	**120**	3.93	29.6	6.78	327	10.3	3350
	40 - 44	220.71	176.71 - 180.71	Grab	5702VP-20-02-40-44	04/22/2020	**2.9 J**	**780**	**190**	4.95	14.7	6.90	307	9.89	4,000 J(OR)
	50 - 54	220.71	166.71 - 170.71	Grab	5702VP-20-02-50-54	04/22/2020	3.0 U	**2,300**	**170**	4.30	11.1	6.77	281	10.0	3260
5702VP-20-03	5 - 9	220.15	213.15 - 215.15	Grab	5702VP-20-03-5-7	04/17/2020	3.0 U	**200**	**49**	6.84	81.1	7.16	778	9.59	3250
	10 - 14	220.15	206.15 - 210.15	Grab	5702VP-20-03-10-14	04/17/2020	3.0 U	**210**	**97**	8.77	42.8	6.76	804	9.97	2050
	15 - 19	220.15	201.15 - 205.15	Grab	5702VP-20-03-15-19	04/17/2020	3.0 U	**550**	**160**	4.97	33.5	6.84	9.37	11.3	497
				Dup	A1-VP-DUP-1-41720	04/17/2020	3.0 U	**670**	**190**	4.97	33.5	6.84	9.37	11.3	497
	20 - 24	220.15	196.15 - 200.15	Grab	5702VP-20-03-20-24	04/17/2020	**1.5 J**	**180**	**73**	(EF)	(EF)	(EF)	(EF)	(EF)	4,000 J(OR)
	25 - 29	220.15	191.15 - 195.15	Grab	5702VP-20-03-25-29	04/20/2020	**5.0 J**	**1,700 J**	***820 J***	2.57	6.30	7.80	268	11.7	36.2
				Dup	A1-VP-DUP-1-42020	04/20/2020	3.0 U	**340 J**	**190 J**	2.57	6.30	7.80	268	11.7	36.2
	30 - 34	220.15	186.15 - 190.15	Grab	5702VP-20-03-30-34	04/20/2020	**4.3**	**5,600**	***510***	2.99	29.7	7.30	386	11.5	432
	35 - 39	220.15	181.15 - 185.15	Grab	5702VP-20-03-35-39	04/20/2020	**5.9**	**4,100**	**190**	3.27	46.1	7.12	399	11.4	4,000 J(OR)
	40 - 44	220.15	176.15 - 180.15	Grab	5702VP-20-03-40-44	04/20/2020	3.0 U	**3,700**	**150**	3.09	50.7	7.06	421	11.7	80.3
	45 - 49	220.15	171.15 - 175.15	Grab	5702VP-20-03-45-49	04/20/2020	3.0 U	**1,200**	**170**	3.03	18.7	6.77	244	11.8	4,000 J(OR)
	50 - 54	220.15	166.15 - 170.15	Grab	5702VP-20-03-50-54	04/20/2020	**3.3**	**440**	**180**	2.97	29.9	6.69	307	11.6	731

Table K-17
AOC 57 Vertical Profile Groundwater Analytical Results for Select Metals, April 2020 Supplemental Sampling
Main Post, Former Fort Devens Army Installation, Massachusetts

							Dissolved Metals			Field Parameters					
						Analyte	Arsenic	Iron	Manganese	Dissolved Oxygen	ORP	pH	Specific Conductivity	Temperature	Turbidity
	Sample	Elevation (ft NAVD88)				Units	µg/L	µg/L	µg/L	mg/L	mv	pH Units	µS/cm	°C	NTU
	Interval	Ground	Sample	Sample		Cleanup Goal[1]	10 (T)	NS	NS	NS	NS	NS	NS	NS	NS
Location ID	(ft bgs)	Surface	Interval	Type	Sample Field ID	Monitoring Criteria[2]	10.5 (T)	9,100 (T)	291 (T)	NS	NS	NS	NS	NS	NS
5702VP-20-04	10 - 12	219.62	207.62 - 209.62	Grab	5702VP-20-04-10-12	04/16/2020	3.0 U	**190**	**170**	5.79	102	6.63	450	9.63	988
	15 - 17	219.62	202.62 - 204.62	Grab	5702VP-20-04-15-17	04/16/2020	**8.4 J**	**450 J**	**77**	6.44	48.0	7.10	261	10.4	60.7
				Dup	A1-VP-DUP-1-41620	04/16/2020	**5.2 J**	**97 J**	**74**	6.44	48.0	7.10	261	10.4	60.7
	20 - 22	219.62	197.62 - 199.62	Grab	5702VP-20-04-20-22	04/16/2020	**5.3**	**1,400**	**50**	5.80	37.6	7.02	229	10.5	68.7
	25 - 27	219.62	192.62 - 194.62	Grab	5702VP-20-04-25-27	04/16/2020	**8.1**	**4,700**	***710***	4.98	21.7	6.93	361	10.6	2590
	30 - 32	219.62	187.62 - 189.62	Grab	5702VP-20-04-30-32	04/16/2020	**2.8 J**	**250**	***300***	5.99	64.7	6.87	421	10.5	4,000 J(OR)
	35 - 37	219.62	182.62 - 184.62	Grab	5702VP-20-04-35-37	04/16/2020	**2.2 J**	**180**	**110**	4.20	87.6	6.73	518	10.2	4,000 J(OR)
Area of Concern 57, Area 3															
5703VP-20-01	5 - 7	218.74	211.74 - 213.74	Grab	5703VP-20-01-5-7	04/07/2020	3.0 U	**1,700**	***3,100***	6.74	113	6.23	734	11.1	6.23
	10 - 12	218.74	206.74 - 208.74	Grab	5703VP-20-01-10-12	04/07/2020	3.0 U	**790**	***3,500***	(EF)	(EF)	(EF)	(EF)	(EF)	1120
				Dup	A1-VP-DUP-1-4720	04/07/2020	3.0 U	**600**	***3,500***	(EF)	(EF)	(EF)	(EF)	(EF)	1120
	15 - 17	218.74	201.74 - 203.74	Grab	5703VP-20-01-15-17	04/07/2020	3.0 U	**260**	**34**	(EF)	(EF)	(EF)	(EF)	(EF)	769
	20 - 22	218.74	196.74 - 198.74	Grab	5703VP-20-01-20-22	04/07/2020	3.0 U	**130**	**63**	(EF)	(EF)	(EF)	(EF)	(EF)	2900
	25 - 27	218.74	191.74 - 193.74	Grab	5703VP-20-01-25-27	04/07/2020	**1.8 J**	**75**	3.0 U	(EF)	(EF)	(EF)	(EF)	(EF)	4,000 J(OR)
	30 - 32	218.74	186.74 - 188.74	Grab	5703VP-20-01-30-32	04/08/2020	**1.9 J**	**190**	**19**	(EF)	(EF)	(EF)	(EF)	(EF)	1290
5703VP-20-02	5 - 7	218.4	211.40 - 213.40	Grab	5703VP-20-02-5-7	04/08/2020	3.0 U	**1,000**	**28**	(EF)	(EF)	(EF)	(EF)	(EF)	38.9
	10 - 12	218.4	206.40 - 208.40	Grab	5703VP-20-02-10-12	04/08/2020	3.0 U	**460**	**41**	3.17	58.9	8.03	447	9.55	1970
	15 - 17	218.4	201.40 - 203.40	Grab	5703VP-20-02-15-17	04/08/2020	3.0 U	**130**	**41**	3.05	78.7	5.99	211	10.4	4,000 J(OR)
	20 - 22	218.4	196.40 - 198.40	Grab	5703VP-20-02-20-22	04/08/2020	3.0 U	**480**	**25**	3.68	69.2	6.37	210	10.6	66.0
	25 - 27	218.4	191.40 - 193.40	Grab	5703VP-20-02-25-27	04/09/2020	3.0 U	**150**	**37**	2.66	55.1	6.39	193	10.3	2470
	30 - 32	218.4	186.40 - 188.40	Grab	5703VP-20-02-30-32	04/09/2020	**3.5**	**37 J**	**19**	2.50	48.9	6.40	185	10.4	4,000 J(OR)
5703VP-20-03	5 - 7	218.33	211.33 - 213.33	Grab	5703VP-20-03-5-7	04/09/2020	**2.4 J**	**1,100**	**41**	(EF)	(EF)	(EF)	(EF)	(EF)	845
	10 - 12	218.33	206.33 - 208.33	Grab	5703VP-20-03-10-12	04/09/2020	3.0 U	**160**	**15**	5.05	62.0	6.64	268	9.18	2120
	15 - 17	218.33	201.33 - 203.33	Grab	5703VP-20-03-15-17	04/09/2020	3.0 U	50 U	**31**	3.97	69.7	6.73	318	9.24	1930
	20 - 22	218.33	196.33 - 198.33	Grab	5703VP-20-03-20-22	04/10/2020	3.0 U	**200**	**52**	4.02	117	6.11	163	11.3	2710
				Dup	A1-VP-DUP-41020	04/10/2020	3.0 U	**200**	**45**	4.02	117	6.11	163	11.3	2710
	25 - 27	218.33	191.33 - 193.33	Grab	5703VP-20-03-25-27	04/10/2020	3.0 U	**61**	**33**	2.68	66.7	6.53	172	10.9	4,000 J(OR)
	30 - 32	218.33	186.33 - 188.33	Grab	5703VP-20-03-30-32	04/10/2020	**3.9**	**250**	**50**	2.27	89.7	6.41	168	10.8	4,000 J(OR)
5703VP-20-04	5 - 7	218.42	211.42 - 213.42	Grab	5703VP-20-04-5-7	04/15/2020	3.0 U	**160**	**8.8 J**	8.47	92.3	6.72	73.0	9.26	109
	10 - 12	218.42	206.42 - 208.42	Grab	5703VP-20-04-10-12	04/15/2020	3.0 U	**89**	**9.7 J**	7.99	68.7	6.89	107	9.40	4,000 J(OR)
	15 - 17	218.42	201.42 - 203.42	Grab	5703VP-20-04-15-17	04/15/2020	3.0 U	**370**	**26**	6.20	107	6.97	156	9.87	2430
	20 - 22	218.42	196.42 - 198.42	Grab	5703VP-20-04-20-22	04/15/2020	3.0 U	**52**	**19**	5.16	70.9	6.66	131	11.7	2930

Notes:

0.333	= Detection
0.333	= Above background or monitoring criteria
0.333	= Above cleanup goal

NS = No Standard

[1] Cleanup Goal for arsenic is the MCL standard.

[2] From the RI. (Final Remediation Investigation Report, Area of Contamination (AOC) 57, Devens, Massachusetts, HLA, 2000b)

ORP = Oxidation Reduction Potential
ft bgs = feet below ground surface
ft NAVD = North American Vertical Datum (1988), in feet
(T) = Cleanup Goal or Background Level for Total Metals
µg/L = microgram per liter

mg/L = milligram per liter
mv = millivolts
pH Units = pH Standard Units
µS/cm = microSeimens per centimeter
°C = degrees Celsius
NTU = Nephalometric Turbidity Units

Results Qualifiers and Notes:
J = Estimated result
U = Non-detect
(OR) = Turbidity Over Range (4,000 NTU)
(EF) - Equipment failure

K.4 Building 3713

Fuel Oil Spill Site

Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: AOC57 Areas 1 2 & 3	**Date of inspection:** 02/05/20
Location and Region: Devens, MA	**EPA ID:**
Agency, office, or company leading the five-year review: Koman Government Solutions	**Weather/temperature:** 35° F cloudy/cold

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☑ Institutional controls LUCs
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☑ Other Long Term Monitoring
- ☑ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) N/A Building Site visit

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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 NA

1 **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2 **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____

Frequency _____

Responsible party/agency _____

Contact _____ _____ _____ _____

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

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

Remarks LUCs are adequate

D. General

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

Remarks _____

2 **Land use changes on site** ☒ N/A

Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ 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

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

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

D. Monitored Natural Attenuation

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy NA ~~[illegible]~~ during site visit

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.).

B. Adequacy of O&M NA During site visit

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.

C.	**Early Indicators of Potential Remedy Problems** NA
	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.

D.	**Opportunities for Optimization** NA
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy

View of paved areas north of AOC 57, behind the Nypo Building

View of grassy area/pathway north of AOC 57 Area 3

Additional view of paved areas north of AOC 57, behind the Nypo Building

View of wooded area in AOC 57 Area 3

View of typical monitoring wells observed in AOC 57 Area 3

Additional view of wooded area observed in AOC 57 Area 3

View of grassy area/pathway north of AOC 57 Area 2

Additional continuing view of grassy area/pathway north of AOC 57 Area 2

View of typical monitoring wells observed in AOC 57 Area 2

View of wooded area observed in AOC 57 Area 3

View of sumps observed in AOC 57 Area 3

Northern view of detention pond observed in AOC 57, north of Area 1

Southern view of detention pond observed in AOC 57, north of Area 1

View of wooded area observed in AOC 57 Area 1

K.5 Building 3713

Fuel Oil Spill Site

ARARs

TABLE 14
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Floodplains	Floodplain Management Executive Order 11988 [40 CFR Part 6, Appendix A]	Applicable	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Contaminated soil removal will be designed to minimize alternation/destruction of the floodplain area. If this alternative is chosen, floodplains affected by Remedial Investigation will be restored to original elevations.
	Wetlands	Protection of Wetlands Executive Order 11990 [40 CFR Part 6, Appendix A]	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	Contaminated soil removal will be designed to minimize alternative/destruction of the wetlands. If this alternative is chosen, the wetlands will be restored.
	Wetlands, Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [40 CFR Part 230]	Relevant and Appropriate	Section 404 of the CWA regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a	The removal of soil will be designed for eventual restoration. A Massachusetts PGP (granted by USACE) is typically required prior to excavating/restoring

TABLE 14 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				discharge of fill materials. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under CWA Section 404(b)(1), maintain that no discharge of dredged or fill material will be permitted if there is a practical alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be taken to restore, or create alternative wetlands.	any sediment. The substantive portions of the permit would potentially be required.
	Surface Waters, Endangered Species, Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.]	Relevant and Appropriate	Actions that affect species/habitat require consultation with USDOI, USFWS, NMFS, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these	To the extent necessary, actions will be taken to develop measures to prevent, mitigate, or compensate for project related impacts to habitat and wildlife. The USFWS, will be kept informed of proposed Remedial Investigations.

TABLE 14 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				requirements apply to all response activities under the NCP.	
	Endangered Species	Endangered Species Act [50 CFR Parts 17.11-17.12]	Relevant and Appropriate	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	According to the RI report, no endangered federally-listed species have been identified within one mile of the AOC 57. However, protection of endangered species and their habitat will be considered as part of the design and excavation activities.
	Atlantic Flyway, Wetlands, Surface Waters	Migratory Bird Treaty Act [16 USC 703 et seq.]	Relevant and Appropriate	The Migratory Bird Treaty Act protects migratory birds, their nests, and eggs. A depredation permit is required to take, possess, or transport migratory birds or disturb their nests, eggs, or young.	Remedial Investigations will be performed to protect migratory birds, their nests, and eggs.
State	Floodplains, Wetlands, Surface Waters	Massachusetts Wetland Protection Regulations [310 CMR 10.00]	Applicable	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as areas within the 100-year floodplain). A NOI must be filed with the municipal conservation commission and a Final Order of Conditions obtained before proceeding with the activity. A Determination of Applicability or NOI must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.

TABLE 14 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	
	Endangered Species	Massachusetts Endangered Species Regulations [321 CMR 8.00]	Applicable	Actions must be conducted in a manner that minimizes the impact to Massachusetts-listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Hearing Program.	The RI report identified several state-listed rare, threatened, or endangered species occurring within one mile of AOC 57. The protection of state listed endangered species will be considered during the design and implementation of this alternative.

Notes:

AOC = Area of contamination
ARAR = Area of Contamination
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
USDOI = U.S. Department of the Interior
USFWS = U.S. Fish and Wildlife Service
NCP = National Contingency Plan
NMFS = National Maine Fisheries Service
NOI = Notice of Intent
PGP = Programatic General Permit
RI = Remedial Investigation
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency
USC = United Sees Code

TABLE 15
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs and MCLGs [40 CFR Parts 141.60 - 141.63 and 141.50 - 141.52]	Relevant and Appropriate	The National Primary Drinking Water Regulations establish MCLs and MCLGs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable health based goals set equal to or lower than MCLs.	The MCLs for arsenic and PCE will likely be met through natural attenuation processes. Monitoring would be performed to measure changes in contaminant concentrations or migration; therefore attainment of groundwater ARARs would eventually be confirmed at the two locations (57M-95-04A and 57P-98-02X), where MCL exceedances were detected.
State	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Relevant and Appropriate	These standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I, fresh groundwaters designated as a source of potable water supply.	314 CMR 6.00 would be met by achieving MMCLs for arsenic and PCE. The MMCLs for arsenic and PCE will likely be met through natural attenuation processes. Monitoring would be performed to measure changes in contaminant concentrations or migration; therefore attainment of groundwater MMCLs would eventually be confirmed at the two locations (57M-95-04A and 57P-98-02X).
	Groundwater	Massachusetts Drinking	Relevant and	These regulations list MMCLs which	As previously stated, Devens

TABLE 15 (continued)
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
		Water Regulations [310 CMR 22.00]	Appropriate	apply to drinking water distributed through a public water system.	Groundwater is classified as Class I, and designated as a source of potable water supply. AOC 57 is currently not within a Zone I or II/Interim Wellhead Protection Area. An AUL would be established at Area 2 until the environmental monitoring program indicates that MMCLs have been achieved for at least three years.

Notes:

AOC = Area of contamination
ARARs = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MMCL = Massachusetts Maximum Contaminant Level
PCE = Tetrachloroethylene

TABLE 16
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff, Direct discharge to surface water	Clean Water Act NPDES Permit Program [40 CFR 122, 125]	Relevant and Appropriate	The NPDES permit program specifies the permissible concentration or level of contaminants in the discharge from any point source, including surface runoff, to water of the United States.	Construction activities will be controlled to meet USEPA discharge requirements. Water collected from dewatering and stockpile activities will be collected and treated offsite or discharged to the Devens WWTP. Any on-site runoff discharges (though none expected) will meet the substantive requirements of these regulations.
	Discharge to Devens Treatment Plant	CWA, General Pretreatment Program (40 CFR Part 403)	Applicable	Discharge of nondomestic wastewater to WWTP must comply with the general prohibitions of this regulation, as well as categorical standards, and local pretreatment standards.	Discharge to Devens WWTP would be sampled to evaluate compliance with pre-treatment standards.
	Groundwater	USEPA OWSER Publication 9345.3-03FS, January 1992	To Be Considered	Management of IDW must ensure protection of human health and the environment.	IDW produced from well sampling will comply with ARARs.
	RCRA-Identification and Listing of Hazardous Wastes	Toxicity Characteristics (40 CFR 261.24)	Applicable	Defines those wastes that are subject to regulations as hazardous wastes under 40 CFR Parts 124 and 264.	Soil/sediment analytical results will be evaluated against the criteria and definitions of hazardous waste. The criteria and definition of hazardous waste will be referred to and utilized in development of the Remedial

TABLE 16 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
					Investigation.
	Disposal of soil that contains hazardous waste	RCRA, Land Disposal Restrictions (40 CFR 268)	Applicable	Land disposal of RCRA hazardous wastes without specified treatment is restricted. LDRs require that such wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	Waste materials from Area 2 will be evaluated to determine whether the waste is subject to LDRs. If so, the materials will be treated in accordance with LDRs prior to disposal at an off-base facility.
	Management of PCB-contaminated soil	TSCA (40 CFR Part 761 Subpart G) PCB Spill Cleanup Policy	To be considered	This policy governs the cleanup of PCB spills occurring after May 4, 1987. Because this policy is not a regulation and only applies to recent spills (reported within 24 hours of occurrence), these requirements are not applicable, but will be considered.	This policy would only be considered during the development of Remedial Investigation for areas with expected detected PCBs at concentrations greater than or equal to 50 ppm. The highest concentration of PCBs in soil was detected during the RI at 12 ppm.
	Management of PCB-contaminated soil	TSCA (40 CFR Part 761 Subpart D) Storage and Disposal	Relevant and Appropriate	This regulation governs the storage and final disposal of PCBs. The regulation also specifies procedures to be followed in decontaminating containers and moveable equipment used in storage areas. Section 761.61 pertains to PCB remediation wastes and provides self-implementing on-site cleanup and disposal requirements. Per Section 761.61, the self-implementing cleanup provisions are not binding for cleanups	Section 761.61 cleanup levels for low and high occupancy areas are # 1 ppm, respectively. RI calculated RBCs for Aroclor – 1260 are more conservative and will be used as PRGs at AOC 57. Off-site storage, disposal and decontamination requirements specified in this regulation will be applied for soil or sediment containing PCBs.

TABLE 16 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				conducted under CERCLA.	
State	Hazardous Waste	Hazardous Waste Management Systems; (RCRA 40 CFR 260)	Relevant and Appropriate	USEPA procedures for making information available to the public; rules for claims of business confidentially.	Does not address cleanup requirements. However, these procedures will be followed when dealing with hazardous waste.
	Hazardous Waste	Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (RCRA 40 CFR 264)	Relevant and Appropriate	Define requirements for RCRA facility operations and management including impoundments, waste piles, land treatment, landfills, incinerators, storage, closure and post closure.	Operations, management and safety requirements in effect for all portions of remedial process, if hazardous waste is being handled.
	Hazardous Waste	RCRA 40 CFR Part 262, Standards Applicable to Generators of Hazardous Waste	Relevant and Appropriate	These regulations establish standards for generators of hazardous waste. RCRA Subtitle C established standards applicable to treatment, storage, and disposal of hazardous waste and closure of hazardous waste facilities.	Sediments will be tested to determine whether they contain characteristic hazardous waste. If so, management of the hazardous waste would comply with substantive requirements of these regulations.
	Hazardous Waste	Massachusetts Hazardous Waste Management Rules; 310 CMR 30.000	Relevant and Appropriate	These rules set forth Massachusetts definitions and criteria for establishing whether waste materials are hazardous and subject to associated hazardous waste regulations.	These regulations supplement RCRA requirements. Those criteria and definitions more stringent than RCRA take precedence over federal requirements.
	Activities that potentially affect surface water quality	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]	Relevant and Appropriate	A Massachusetts Division of Water Pollution Control Water Quality Certification is required pursuant to 314 CMR 9.00 for dredging-related	Excavation and filling activities will meet the substantive criteria and standards of these regulations. Remedial activities will be designed to

TABLE 16 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE II-3

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				activities in waters (including wetlands) within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification.	attain and maintain Massachusetts Water Quality Standards in affected waters.
	Activities that affect ambient air quality	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable	These regulations pertain to the prevention of emissions in excess of Massachusetts ambient air quality standards.	Remedial activities will be conducted to meet the standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).

Notes:

ARARs = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
IDW = Investigation derived waste
LDR = Land Disposal Restrictions
NPDES = National Pollutant Discharge Elimination System
RCBs = Risk-based concentrations
RCRA = Resource Conservation and Recovery Act
RI = Remedial Investigation
TSCA = Toxic Substances Control Act
PCB = Polychlorinated biphenyls
PRGs = preliminary remediation goals
USEPA = U.S. Environmental Protection Agency
WWTP = Wastewater Treatment Plant

TABLE 17
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Floodplains	Floodplain Management Executive Order 11988 [40 CFR Part 6, Appendix A]	Applicable	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Contaminated soil removal will be designed to minimize alteration/destruction of the floodplain area. If this alternative is chosen, floodplains affected by Remedial Investigation will be restored to original elevations.
	Wetlands	Protection of Wetlands Executive Order 11990 [40 CFR Part 6, Appendix A]	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	Contaminated soil removal will be designed to minimize alteration/destruction of the wetlands. If this alternative is chosen, the wetlands will be restored.
	Wetlands, Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404	Relevant and Appropriate	Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill materials to U.S.	The removal of soil will be designed for eventual restoration. A Massachusetts PGP (granted by USACE) is typically

TABLE 17 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
		[40 CFR Part 230]		waters, including wetlands. Filling wetlands would be considered a discharge of fill materials. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under CWA Section 404(b)(1), maintain that no discharge of dredged or fill material will be permitted if there is a practical alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be taken to restore, or create alternative wetlands.	required prior to excavating/ restoring any sediment. The substantive portions of the permit would potentially be required.
	Surface Waters, Endangered Species, Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.]	Relevant and Appropriate	Actions that affect species/habitat require consultation with USDOI, USFWS, NMFS, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources.	To the extent necessary, actions will be taken to develop measures to prevent, mitigate, or compensate for project related impacts to habitat and wildlife. The USFWS, acting as a review agency for the USEPA, will be kept informed of proposed Remedial Investigations.

TABLE 17 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the NCP.	
	Endangered Species	Endangered Species Act [50 CFR Parts 17.11-17.12]	Relevant and Appropriate	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	According to the RI report, no endangered federally-listed species have been identified within one mile of the AOC 57. However, protection of endangered species and their habitat will be considered as part of the design and excavation activities.
	Atlantic Flyway, Wetlands, Surface Waters	Migratory Bird Treaty Act [16 USC 703 et seq.]	Relevant and Appropriate	The Migratory Bird Treaty Act protects migratory birds, their nests, and eggs. A depredation permit is required to take, possess, or transport migratory birds or disturb their nests, eggs, or young.	Remedial Investigations will be performed to protect migratory birds, their nests, and eggs.
State	Floodplains, Wetlands, Surface Waters	Massachusetts Wetland Protection Regulations [310 CMR 10.00]	Applicable	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as areas within the 100-year flood plain). A NOI must be filed with the municipal conservation commission and a Final Order of	All work to be performed within wetlands and the 100-foot buffer zone will be in accordance with the substantive requirements of these regulations.

TABLE 17 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				Conditions obtained before proceeding with the activity. A Determination of Applicability or NOI must be filed for activities such as excavation within a 100-foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	
	Endangered Species	Massachusetts Endangered Species Regulations [321 CMR 8.00]	Applicable	Actions must be conducted in a manner that minimizes the impact to Massachusetts-listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	The RI report identified several state-listed rare, threatened, or endangered species occurring within one mile of AOC 57. The protection of state listed endangered species will be considered during the design and implementation of this alternative.

Notes:

AOC = Area of contamination
ARAR = Area of Contamination
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
USDOI = U.S. Department of the Interior
USFWS = U.S. Fish and Wildlife Service
NCP = National Contingency Plan
NMFS = National Maine Fisheries Service

TABLE 17 (continued)
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

NOI	=	Notice of Intent
PGP	=	Programatic General Permit
RI	=	Remedial Investigation
USACE	=	U.S. Army Corps of Engineers
USEPA	=	U.S. Environmental Protection Agency
USC	=	United States Code

TABLE 18
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs and MCLGs [40 CFR Parts 141.60 - 141.63 and 141.50 - 141.52]	Relevant and Appropriate	The National Primary Drinking Water Regulations establish Maximum Containment Levels (MCLs) and Maximum Containment Level Goals (MCLGs) for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable health based goals set equal to or lower than MCLs.	The MCLs for arsenic, cadmium, tetrachloroethene (PCE), and 1,4-dichlorobenzene will likely be met through natural attenuation processes. Monitoring would be performed to measure changes in contaminant concentrations or migration; therefore attainment of groundwater ARARs would eventually be confirmed at the two locations (57M-95-03X and 57M-96-11X), where MCL exceedances were detected.
State	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Relevant and Appropriate	These standards designate and assign uses for which groundwaters of the commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated users. Groundwater at Fort Devens is classified as Class I, fresh groundwaters designated as a	314 CMR 6.00 would be met by achieving MMCLs for arsenic, cadmium, PCE, and 1,4-dichlorobenzene. The MMCLs will likely be met through natural attenuation processes. Monitoring would be performed to measure changes in contaminant concentrations or

TABLE 18 (continued)
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
				source of potable water supply.	migration; therefore attainment of groundwater MMCLs would eventually be confirmed at the two locations (57M-95-03X and 57M-96-11X).
	Groundwater	Massachusetts Drinking Water Regulations [310 CMR 22.00]	Relevant and Appropriate	These regulations list Massachusetts MCLs applicable to drinking water distributed through a public water system.	As previously stated, Devens groundwater is classified as Class 1, and designated as a source of potable water supply. AOC 57 is currently not within a Zone I or II/Interim Wellhead Protection Area. An AUL would be established at Area 3 until the environmental monitoring program indicates that MMCLs have been achieved for at least three years.

Notes:

AOCs = Area of Contamination
ARARs = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MMCL = Massachusetts Maximum Contaminant Level

TABLE 19
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff, Direct discharge to surface water	Clean Water Act NPDES Permit Program [40 CFR 122,125]	Relevant and Appropriate	The National Pollutant Discharge Elimination System (NPDES) permit program specifies the permissible concentration or level of contaminants in the discharge from any point source, including surface runoff, to waters of the United States.	Construction activities will be controlled to meet USEPA discharge requirements. Water collected from dewatering and stockpile activities will be collected and treated offsite or discharged to Devens WWTP. Any on-site runoff discharges (through none expected) will meet the substantive requirements of these regulations.
	Discharge to Devens Treatment Plant	CWA, General Pretreatment Program (40 CFR Part 403)	Applicable	Discharge of nondomestic wastewater to WWTP must comply with the general prohibitions of this regulation, as well as categorical standards, and local pretreatment standards.	Discharge to Devens WWTP would be sampled to evaluate compliance with pre-treatment standards.
	Groundwater	USEPA OSWER Publication 9345.3-03FS, January 1992	To Be Considered	Management of IDW must ensure protection of human health and the environment.	IDW produced from well sampling will comply with ARARs.
	RCRA – Identification and Listing of Hazardous Wastes	Toxicity Characteristics (40 CFR 261.24)	Applicable	Defines those wastes that are subject to regulations as hazardous wastes under 40 CFR Parts 124 and 264.	Soil/sediment analytical results will be evaluated against the criteria and definitions of hazardous waste. The criteria and definition of hazardous waste will be referred to and utilized in development of the remedial action.
	Disposal of soil	RCRA, Land Disposal	Applicable	Land disposal of RCRA hazardous	Waste materials from Area 3 will be

TABLE 19 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	that contains hazardous waste	Restrictions (40 CFR 268)		wastes without specified treatment is restricted. LDRs require that such wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	evaluated to determine whether the waste is subject to LDRs. If so, the materials will not be disposed of on base but will be treated in accordance with LDRs prior to disposal at an off-base facility.
	Hazardous Waste	Hazardous Waste Management Systems; (RCRA 40 CFR 260)	Relevant and Appropriate	USEPA procedures for making information available to the public; rules for claims of business confidentially.	Does not address cleanup requirements. However, these procedures will be followed when dealing with hazardous waste.
	Hazardous Waste	Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (RCRA 40 CFR 264)	Relevant and Appropriate	Define requirements for RCRA facility operations and management including impoundments, wastepiles, land treatment, landfills, incinerators, storage, closure and post closure.	Operation, management and safety requirements in effect for all portions of remedial process, if hazardous waste is being handled.
	Hazardous Waste	RCRA 40 CFR Part 262, Standards Applicable to Generators of Hazardous Waste	Relevant and Appropriate	RCRA Subtitle C established standards applicable to treatment, storage and disposal of hazardous waste and closure of hazardous waste facilities.	Sediments will be tested to determine whether they contain characteristic hazardous waste. If so, treatment on-site would comply with substantive requirements of these regulations.
State	Hazardous Waste	Massachusetts Hazardous Waste Management Rules; 310 CMR 30.000	Relevant and Appropriate	These rules set forth Massachusetts definitions and criteria for establishing whether waste materials are hazardous and subject to associated hazardous waste regulations.	These regulations supplement RCRA requirements. Those criteria and definitions more stringent than RCRA take precedence over federal requirements.

TABLE 19 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Activities that potentially affect surface water quality	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]	Relevant and Appropriate	A Massachusetts Division of Water Pollution Control Water Quality Certification is required pursuant to 314 CMR 9.00 for dredging-related activities in waters (including wetlands) within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification.	Excavation and filling activities will meet the substantive criteria and standards of these regulations. Remedial activities will be designed to attain and maintain Massachusetts Water Quality Standards in affected waters.
	Activities that affect ambient air quality	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable	These regulation pertain to the prevention of emissions in excess of Massachusetts ambient air quality standards.	Remedial activities will be conducted to meet the standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).

Notes:

ARARs = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
IDW = Investigation-derived waste
LDR = Land Disposal Restrictions
NPDES = National Pollutant Discharge Elimination System
PCB = Polychlorinated biphenyls
PRGs = preliminary remediation goals

TABLE 19 (continued)
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVES III-2A

AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

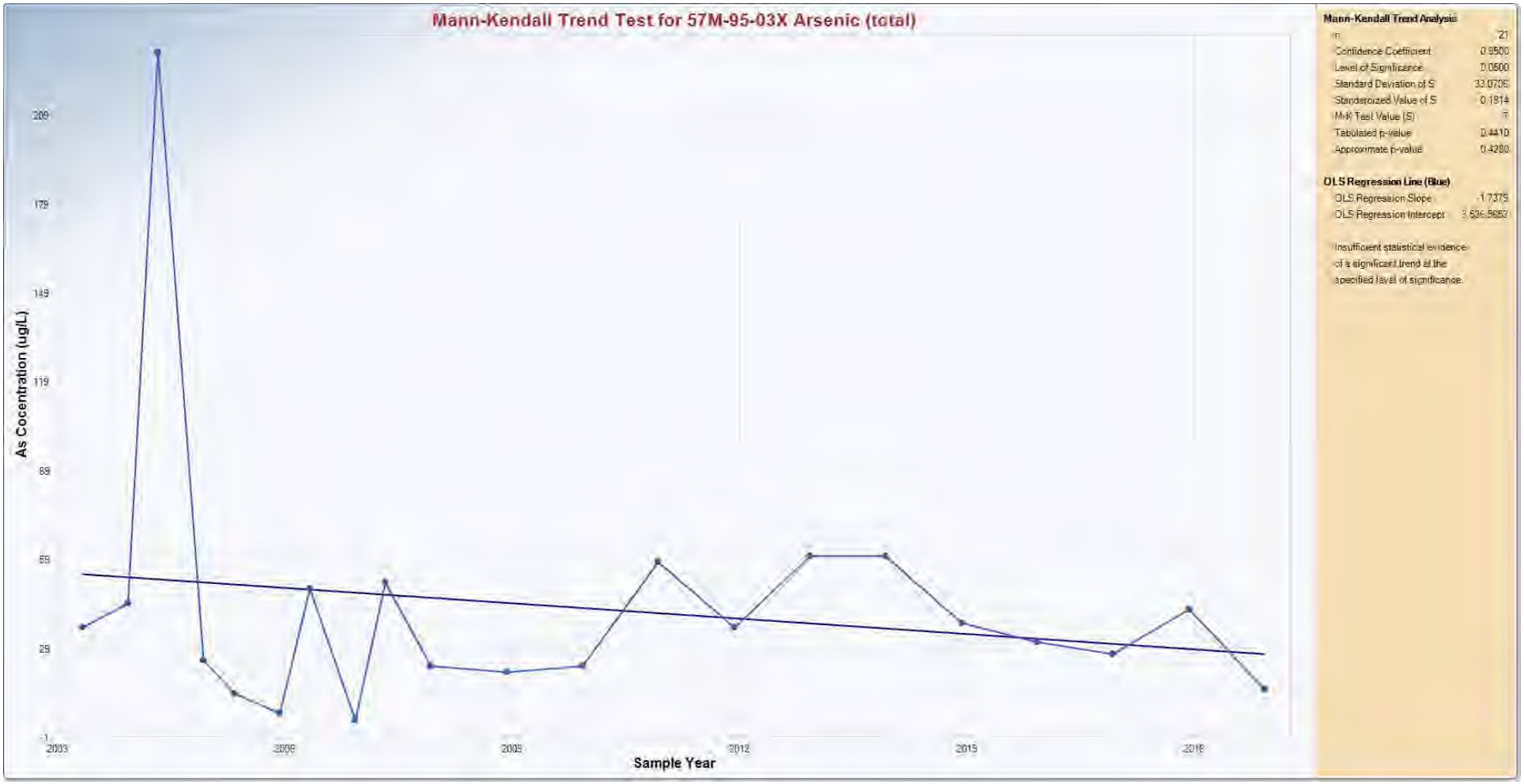
RBCs	=	Risk-based concentrations
RCRA	=	Resource Conservation and Recovery Act
RI	=	Remedial Investigation
TSCA	=	Toxic Substances Control Act
USEPA	=	U.S. Environmental Protection Agency
WWTP	=	Wastewater Treatment Plant

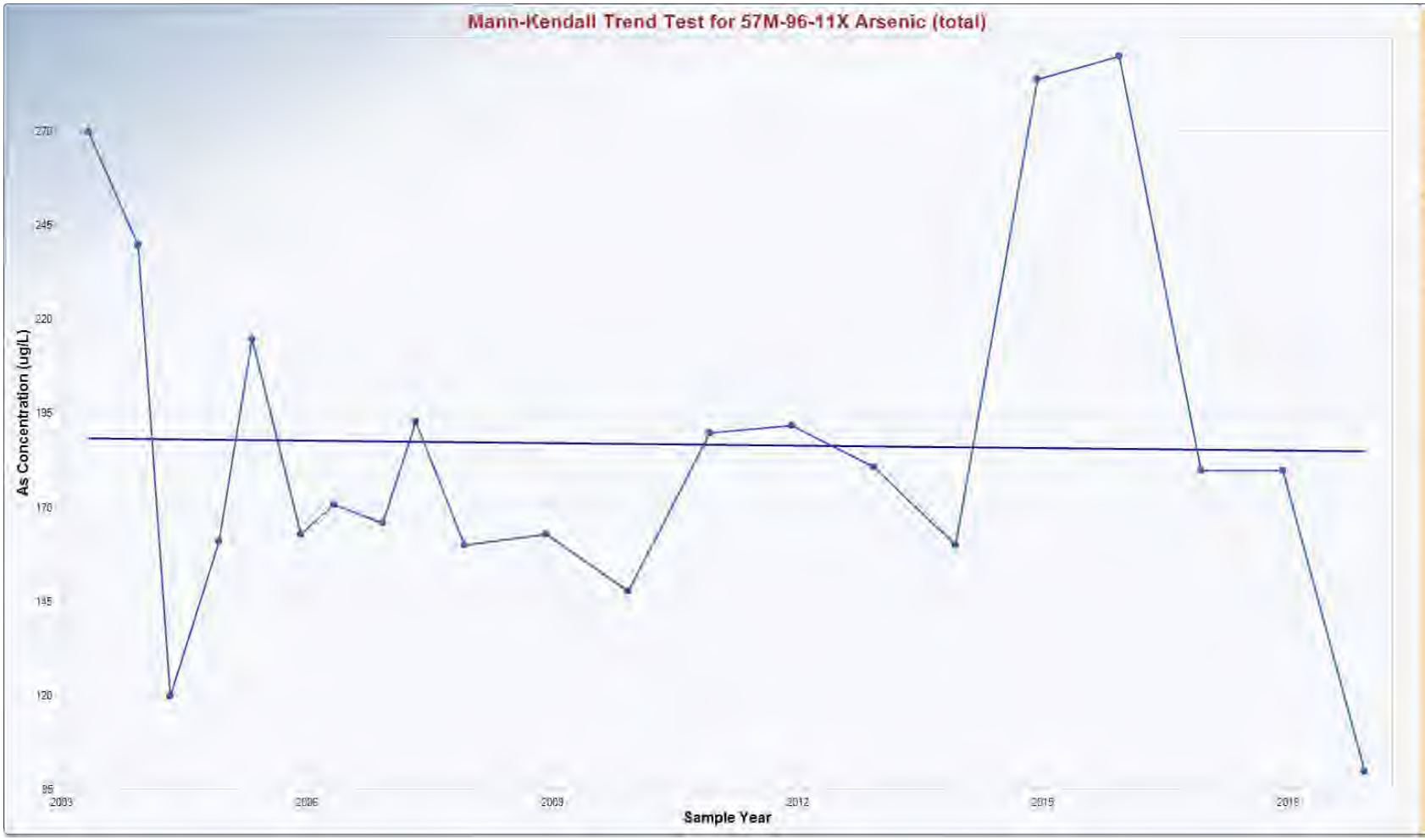
K.6 Building 3713

Fuel Oil Spill Site

Statistical

Analysis


Mann-Kendall Trend Test for 57M-95-03X Arsenic (total)
As Cocentration (ug/L)
209
179
149
119
89
59
29
-1
2003
2006
2009
2012
2015
2018
Sample Year
Mann-Kendall Trend Analysis
n 21
Confidence Coefficient 0.9500
Level of Significance 0.0500
Standard Deviation of S 33.0706
Standardized Value of S 0.1814
M-K Test Value (S) 7
Tabulated p-value 0.4410
Approximate p-value 0.4280
OLS Regression Line (Blue)
OLS Regression Slope -1.7379
OLS Regression Intercept 3,636.5652
Insufficient statistical evidence
of a significant trend at the
specified level of significance.



Mann-Kendall Trend Analysis

n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0706
Standardized Value of S	-0.2419
M-K Test Value (S)	8
Tabulated p-value	0.4170
Approximate p-value	0.4044

OLS Regression Line (Blue)

OLS Regression Slope	-0.2204
OLS Regression Intercept	630.1753

Insufficient statistical evidence of a significant trend at the specified level of significance.

APPENDIX L – Railroad Roundhouse

L.1 SA 71 Railroad Roundhouse

Additional Background Information

Site Chronology

Chronology of Events for AOC 71

Event	Date
Final NPL Listing	November 1989
SI Initiated	1993
Action Memorandum	1999
Soil Removal Action Completed	2000
ROD signed	2015
Annual LUC Inspections	2015-2019
First Five-Year Review	September 2020

Physical Characteristics

The former Railroad Round House site (SA 71) consists of a 200- to 300-foot wide strip of land extending south from Plow Shop Pond along the northeast boundary of Devens for approximately 1,100 feet (Sovereign, 2015). The upland area of Plow Shop Pond at the former Railroad Roundhouse is generally sandy soils in the overburden with increasing silt with depth. The area is sparsely vegetated with small trees and brush. There is a slight slope to the edge of pond (Sovereign, 2015).

The 30-acre Plow Shop Pond (AOC 72) is located southwest of the business and residential district in Ayer, Massachusetts. The pond is currently zoned as Open Space/Recreational Unrestricted (VHB, 1994), with a posted restriction for "Catch and Release" only fishing. Red Cove is located on the western shoreline of the pond adjacent to Shepley's Hill Landfill (SHL). The former Railroad Roundhouse (SA 71) is located at the southern end of Plow Shop Pond, bordered to the east by Pan-AM railroad tracks and rail yard, and is zoned Open Space/Recreation. Both the Red Cove and Railroad Roundhouse upland areas are located within the Devens Enterprise Zone (Sovereign, 2015).

Plow Shop Pond is a man-made pond where water levels are maintained by the concrete Nonacoicus Brook Dam. Plow Shop Pond receives inflow from the Grove Pond to the east through the railroad causeway, and discharges over the dam spillway to Nonacoicus Brook. Plow Shop Pond has a maximum depth of about 9 feet; however, it has an average depth of less than 6 feet. Depth to bedrock under the pond is approximately 40 to 80 feet (Sovereign, 2015).

Both ponds are in an Area of Critical Environmental Concern (ACEC), and in proximity to a protected species habitat in the upland area. An ACEC designation is a formal state designation of a significant ecological area directed to the actions and programs of Massachusetts environmental agencies. Plow Shop Pond is located northeast of SHL, south of Molumco Industrial Park, and west of Grove Pond. The Red Cove area is located in the southwest corner of Plow Shop Pond along the northeast perimeter of SHL (Sovereign, 2015).

Land and Resource Use

Following the 1996 base closure, the Army leased the land formerly occupied by the roundhouse to MassDevelopment as part of the larger lease parcel known as A.1SHL that includes the SHL. This lease parcel will be transferred by deed to MassDevelopment when the SA-71 remedy and

the adjacent SHL remedy are determined to be Operating Properly and Successfully (OPS). The buildings and tracks at the site had been removed, but a few concrete foundations remained in the area. (Sovereign, 2015).

The former Railroad Roundhouse site (SA 71) is currently zoned as Open Space/Recreational per the Devens Reuse Plan. This ROD and subsequent implementation of Land Use Controls (LUCs) will restrict the future use of the upland area of the former Railroad Roundhouse to Open Space/Recreational (Sovereign, 2015).

History of Contamination

The former Railroad Roundhouse (SA 71), at the southeast corner of Plow Shop Pond, is the former location of a railroad roundhouse operated by the Boston and Maine Railroad (B&M) from approximately 1900 to 1935. Historical features included an array of railroad tracks, a coal trestle, ash pit, water tower, and several buildings. The roundhouse was located at the northern end of this strip, immediately adjacent to the southern shore of Plow Shop Pond. The shoreline adjacent to the railroad roundhouse is the location of the Maintenance By-Product Disposal Area that was used as a disposal area for locomotive maintenance waste. Maps and aerial photographs indicate that all of the buildings except a brick storeroom and the water tower were removed by 1942. The Army purchased a 53 acre parcel from the B&M in 1942 (Sovereign, 2015).

Initial Response

<u>SA 71</u>

From 1993 to 1994, the Army conducted site investigations in the area of the former Railroad Roundhouse site. Data gathered during the investigations indicated the widespread presence of coal ash and maintenance byproduct materials in surface and deeper soil across much of the site. The deposits of maintenance byproduct formed a sloping pond bank on their northern side, underlain by naturally deposited sand, silty sand, and peat and extending out into the pond. High concentrations of inorganic analytes, in particular antimony, copper, and lead, were identified in the area of the observed maintenance byproduct materials, and the probable source of these analytes was attributed to be the disposal of maintenance byproducts from the former roundhouse. However, the contamination in soil did not appear to be a source of groundwater contamination (Sovereign, 2015)

Because the majority of soil contaminants occurred in the maintenance byproduct disposal area, and because concentrations of antimony, copper, and lead in soil from that area were substantially above concentrations in the local background area (ABB-ES, 1995a), remediation of these soils was deemed appropriate. Consequently, an Action Memorandum was subsequently prepared in 1999 to propose a Time Critical Removal Action (TCRA) consisting of the excavation and disposal of impacted soil and to solicit public comment regarding the removal action (Sovereign, 2015).

The removal action was conducted at SA 71 from November 1999 to May 2000 and resulted in the removal of approximately 2,400 cubic yards of metals-contaminated soil. The excavation was backfilled with clean soil and in May 2000 was covered with loam and seed. Final sidewall confirmatory samples from the excavation identified concentrations of antimony and lead above the remediation goals. However, due to the large volume of soil already removed and the increased depth of excavation that would be required, additional excavation was put on hold pending results of additional risk evaluations. A subsequent risk evaluation demonstrated acceptable risk for the assume future use (open space/recreation) of the site (Sovereign, 2015).

L.2 SA 71 Railroad Roundhouse

Figures

Legend

Former Fort Devens Boundary

SA 71
2020 Five-Year Review

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 100 200
Feet

Date:
02/13/2020

Figure
L-1

File: 2020_5yrREVIEW_AOC71.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

L.3 SA 71 Railroad Roundhouse

Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Railroad Roundhouse (SA71)	**Date of inspection:** 02/10/20
Location and Region	**EPA ID:**
Agency, office, or company leading the five-year review: Kansas Government Solutions	**Weather/temperature:** 35°F Rain-scattered light wind

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other LUC addressed through Institutional controls
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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

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

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 MA

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State
   ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☐ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☐ Readily available ☐ Up to date
   ☐ Funding mechanism/agreement in place
   Original O&M cost estimate _____ ☐ Breakdown attached

   Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
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

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Restriction of site use Deed Restrictions prohibiting land Residential use

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident
Remarks Discarded Beverage containers observed in the remains of the former Road House

2. **Land use changes on site** ☒ N/A
Remarks

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

B. Other Site Conditions

Remarks lots of Rail Road Debris is present on site. Site is used more for Iron storage of Rails & connections.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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_____

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ 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

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

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

D. Monitored Natural Attenuation

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.

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.).

Remedy is Effective. Land is not being used for residential purposes and thus potential exposure is limited.

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.

NA

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. NA

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. NA

View of southwestern Drainage Area in the former Excavation area

View of Shepley's access gate to SA71 northern drainage area

View of northwestern Drainage Area in the former Excavation area

Grass Area observed north of access gate, south of Plow Shop Pond

View of Plow shop Pond from SA 71

View of railroad track stored in the former Railroad house location,

View of the western portion of the former Railroad Roundhouse

View of the southern portion of the former Railroad Roundhouse

View of debris piles observed in central area of the former Railroad Roundhouse

View of Monitoring well observed in eastern area of the former Roundhouse

View of debris piles observed in eastern area of the former Railroad Roundhouse

View of the northern portion of the former Railroad Roundhouse

View of southeastern wooded area in the former excavation area

View of southern wooded area in the former excavation area

L.4 SA 71 Railroad Roundhouse

ARARs

SA 71 – ARARS FOR SELECTED REMEDY

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
Location –Specific and/or Relevant and Appropriate Requirements					
Federal	Wetland	Protection of Wetlands, Executive Order No. 11990 [40 CFR Part 6, App. A]	TBC	Under this requirement, federal agencies are required to minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values.	There is no invasive work to be performed in this area as a result of the Selected Remedy. If at any time in future invasive activities take place at the site, state and local wetland regulations will take precedence.
State	Wetland	Wetland Protection Act, M.G.L [310 CMR 10]	Applicable	This requirement provides protection of wetland and requirement of local Conservation Commission review. Work within 100-foot buffer of a wetland or surface water body must be permitted or waiver issued by local commission.	There is no invasive work to be performed in this area as a result of the Selected Remedy.
Action –Specific and/or Relevant and Appropriate Requirements					
State	Soil	Deed Restriction, M.G.L. c. 21E § 6, 310 CMR 40.1071-1073	Potentially Applicable	Massachusetts provides regulatory guidance for preparation of a Deed Restriction to address sire constraints.	A Deed Restrictions could be applied as a means of Land Use Controls.

APPENDIX M – Housing Areas

M.1 Former Grant, Oak & Maple Housing Areas and 37-mm Impact Area Site Chronology

Chronology of Events at the former Grant, Oak and Maple HAs and Impact Area

Event	Date
Army/EPA sign Federal Facilities Agreement (FFA) for Former Fort Devens	November 1991
Archive Search Report (ASR) - documented locations of Devens training areas and ranges (USACE)	1994/1995
"Parcel 1" property conveyed from Army to Massachusetts Development Finance Agency (MDFA) (now MassDevelopment) (included portions of former HAs)	1996 (May)
Final Removal Action Report, Ordnance, Ammunition and Explosives Removal Action; (HFA, Inc.)	1996 (October)
"Lease Parcel A.21" property conveyed from Army to MDFA (now MassDevelopment) (included remaining portions of former HAs and entire IA)	2003 (February)
Site-Specific Final Report – DGM & UXO Removal, Grant HA (OER)	2006 (March)
Final Expanded Conceptual Site Model Report (USACE)	2006 (June)
Final Focused Feasibility Study (FFS), Grant HA and Impact Area (Weston)	2008 (April)
Proposed Plan – Grant HA and Impact Area (Weston)	2008 (September)
Final PA/SI/SSI Comprehensive Report (Weston)	2008 (October)
Record of Decision (ROD) - Grant HA and Impact Area	2009 (September)
Land Use Control Implementation Plan (LUCIP) - Grant HA and Impact Area	2011 (May)
MEC RI Report – Former Oak and Maple HAs (HGL)	2012 (November)
Final Supplemental FFS, Former Oak and Maple HAs (Sovereign and HGL)	2013 (March)
Explanation of Significant Differences (ESD) for 2011 Grant HA and Impact Area ROD (to include former Oak and Maple HAs)	2014 (September)
Final 2015 Five Year Review Addendum	2020 (April)

M.2 Former Grant, Oak & Maple Housing Areas and 37-mm Impact Area Figures

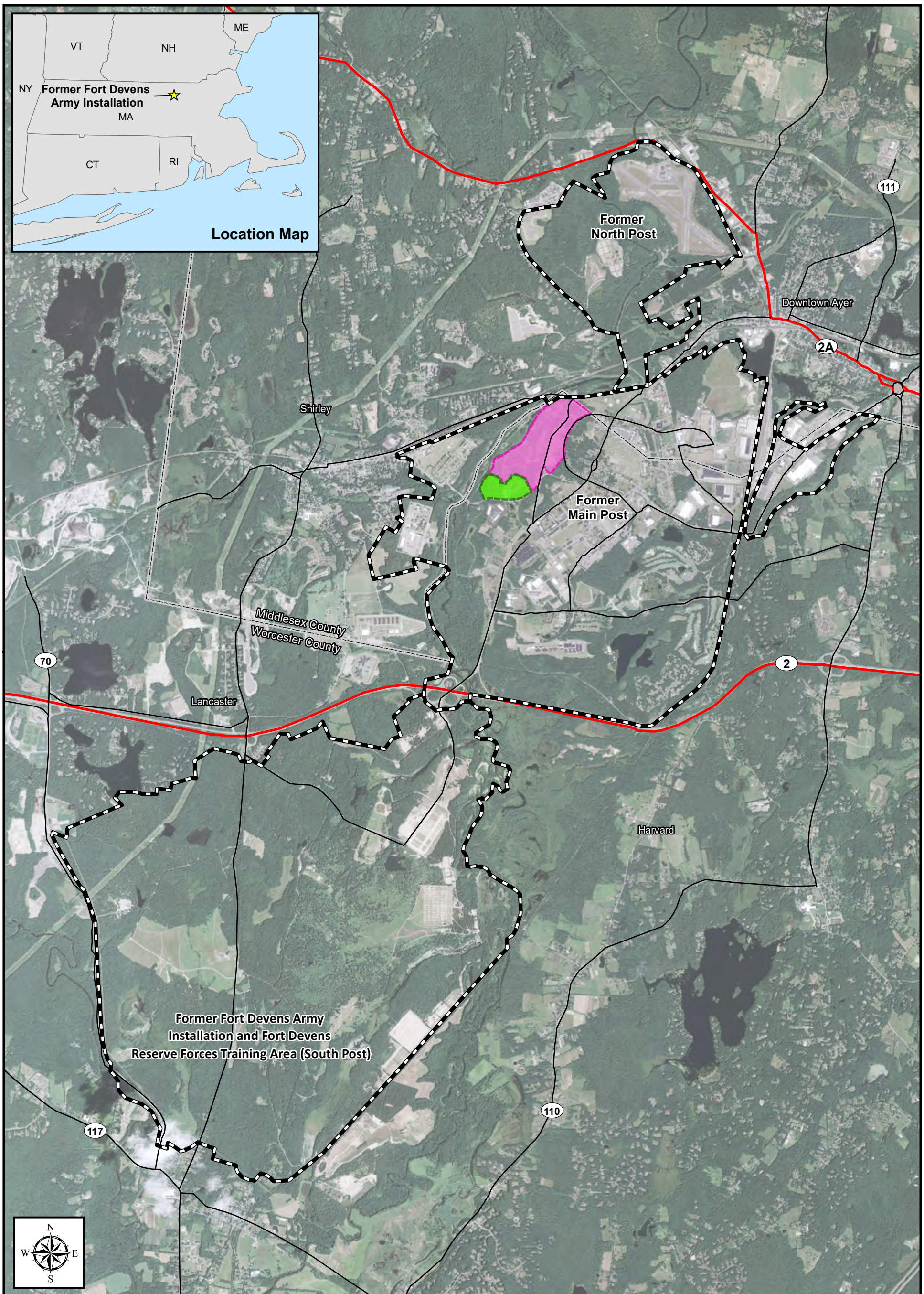


Figure M-1
Site Location - Grant, Oak and Maple Housing Areas
Former Fort Devens Army Installation and Fort Devens Reserve Forces Training Area

References: HGL. LTMMP 2012.
Aerial Sources: 2011, Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend
- Former Grant Housing Area
- Former Oak & Maple Housing Area
- Highway
- Major Road
- County Line
- Former Fort Devens Boundary

2020 Five Year Review
F

Former Fort Devens Army Installation and Fort Devens Reserve Forces Training Area, Devens MA

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

0 1,750 3,500
Feet

Date: 09/29/2016

Figure M-1

File: 2015AR_Fig1_FormeHousingAreas.mxd

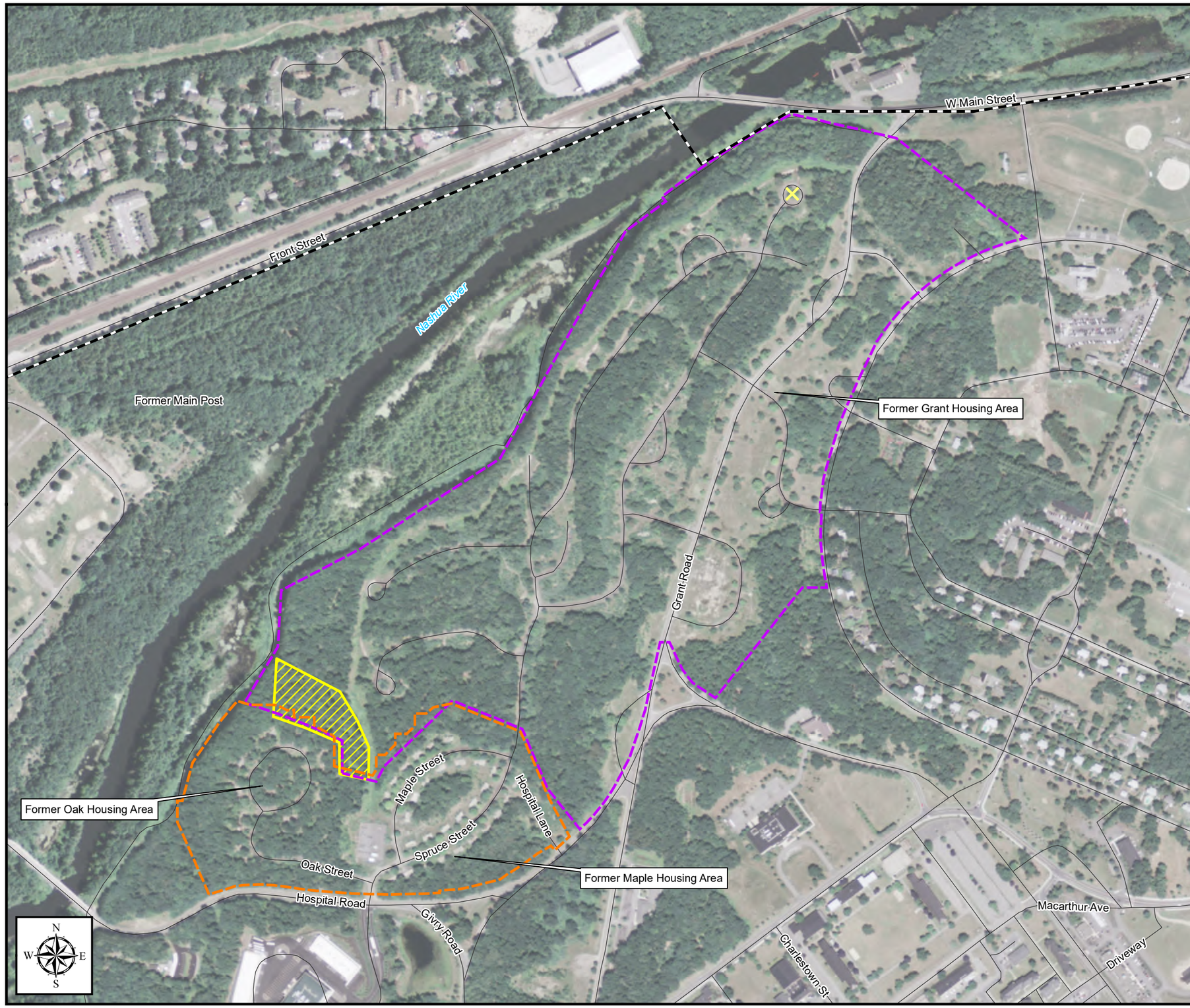


Figure M-2
Site Location
Grant Housing Area/
Oak and Maple Housing Area

Legend

- Former Fort Devens Boundary
- Former Grant Housing Area
- Former Oak & Maple Housing Area
- 37-mm Impact Area
- Approximate Former Firing Location
- Road

References:
HGL. LTMMP 2012.

Aerial Sources: 2011, Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2020 Five Year Review

Former Fort Devens Army Installation and Fort Devens Reserve Forces Training Area, Devens MA

KOMAN Government Solutions, LLC
160 East Main Street, Suite 2F, Westborough, MA 01581

0 250 500
Feet

Date: 09/29/2016

Figure M-2

File: 2015AR_Fig2_GrantHousingAreas.mxd

M.3 Former Grant, Oak & Maple Housing Areas and 37-mm Impact Area Site Inspection

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: Former Grant Housing Area	Date of inspection: 02/[illegible]/20
Location and Region: Devens MA	EPA ID:
Agency, office, or company leading the five-year review: Mamon Government Solutions	Weather/temperature: 27°F, cold clear skies

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls — LUCS
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other [illegible]
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) NA During site visit

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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

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

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 NA

1 **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2 **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

C. Institutional Controls (ICs) NA

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____
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

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Land use controls are In Place

D. General

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

2. **Land use changes on site** ☐ N/A
Remarks Eastern Plains, Redeveloped as Residential House

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

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 _____

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 _____

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 _____

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 _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ 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 N/A

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

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

D. Monitored Natural Attenuation

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.

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.).

UXO signage clearly visible at designated Location in New Development

B. Adequacy of O&M NA during site visit.

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.

C.	Early Indicators of Potential Remedy Problems	NA during site visit
	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.	

D.	Opportunities for Optimization	NA during site visit
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.	

View of access road see throughout the central portion of the former Grant housing area

Additional view of wooded area observed throughout the central and western portion of the former Grant housing

View of wooded area observed throughout the central portion of the former Grant housing

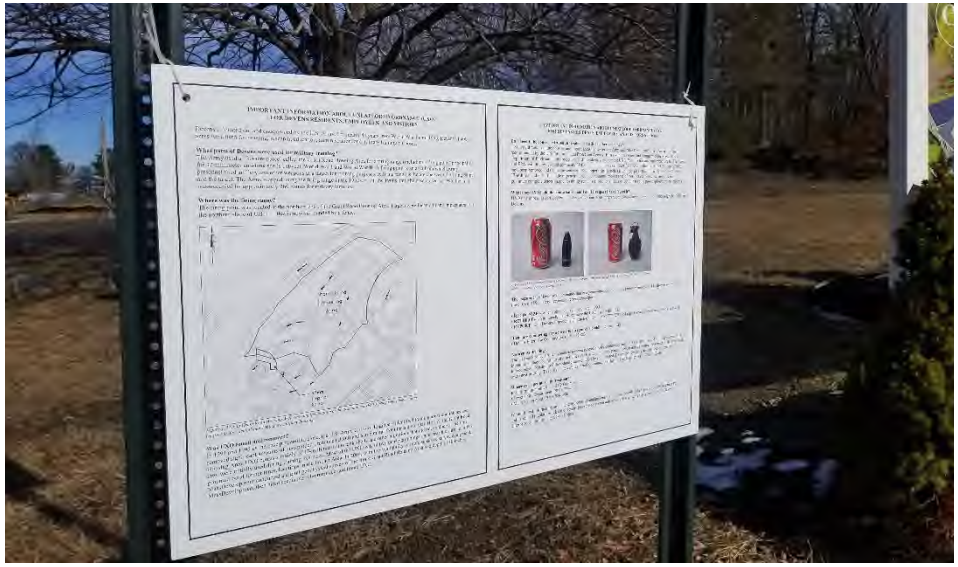
Additional view of access road in the central portion of the former Grant housing

View of residential development in the southeastern portion of the former Grant housing area

View of Grant Road southern entrance

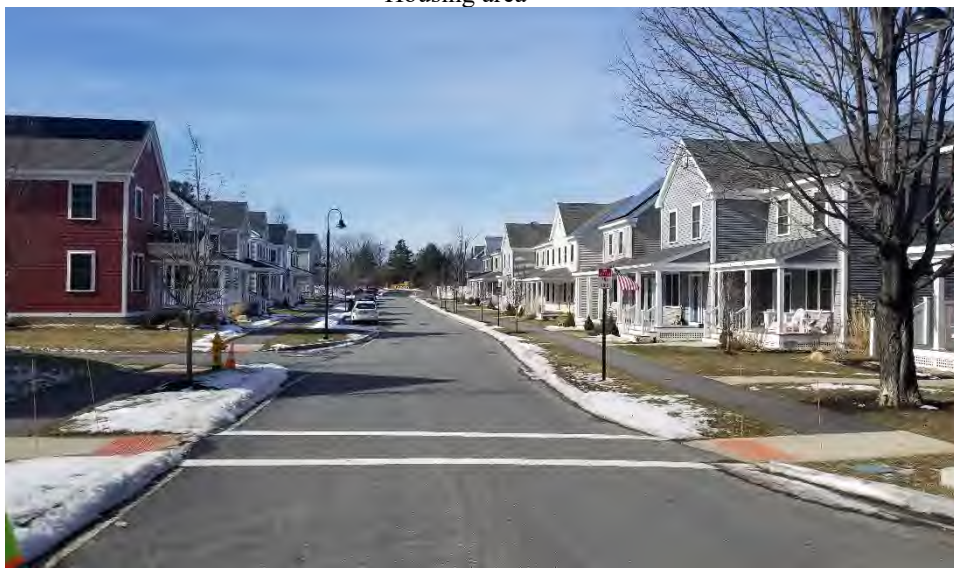
View of residential development in the northeastern portion of the former Grant housing area

View of UXO and housing development signage by the southern Grant Road entrance



View of typical UXO information signage observed posted throughout Grant Housing area

Additional view of new residential develop in the eastern portion of the former grant housing area



View of new residential develop in the eastern portion of the former grant housing area

Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Former [illegible] Housing Area	**Date of inspection:** 02/12/20
Location and Region: Devens MA	**EPA ID:**
Agency, office, or company leading the five-year review: Region Government Solutions	**Weather/temperature:** 27°F, Cold, Clear Skies

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls LUC
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply) NA During site visit

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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

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

Agency _____
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 _____
_____

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

4. **Other interviews** (optional) ☐ Report attached.

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 _____

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 _____

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
☐ Other _____

2 **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if 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 _____

B. Other Access Restrictions

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

Remarks [illegible]
[illegible] Replacement (Damaged) for All

3 Locations

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) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____
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

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

Remarks Land use controls, no change in site use

D. General

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

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

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 _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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 _____

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 Channel? ☐ 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 _____

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 _____

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 _____

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_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ 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 N/A

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

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

D. Monitored Natural Attenuation NA

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.

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.).

[illegible]

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.

[illegible]

C. Early Indicators of Potential Remedy Problems NA

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.

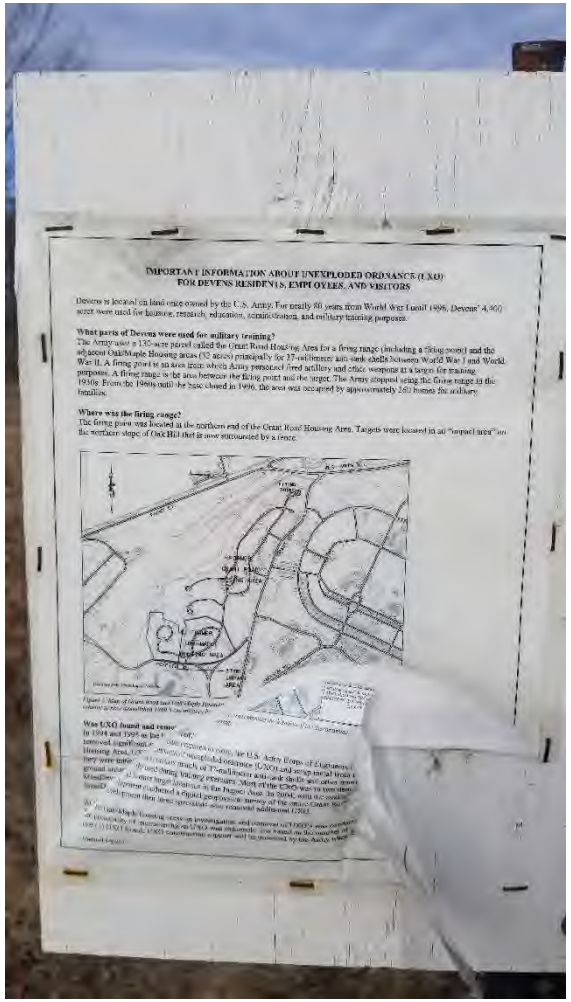
D. Opportunities for Optimization NA

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

View of southeastern road access to Former Oak and Maple housing area

Additional view of former access road to Former Oak and Maple housing area.

View of typical UXO information signage observed posted throughout the former Oak and Maple housing area



View of typical UXO information signage with observed damage

View of grassy are observed within the Former Oak and Maple housing area

View of former house plot within the Former Oak and Maple housing area

View of eastern road access to the Oak and Maple Impact area

View wooded area observed within the Former Oak and Maple housing area

Additional view of eastern road access to the Oak and Maple Impact area

View of Impact area southeastern access gate

View of typical signage observed along the perimeter fence of the Impact Area

View along the perimeter of the impact area fence

Additional view along the perimeter of the impact area fence

View of wooded area observed within the impact area

Additional view of wooded area observed within the impact area

Additional view along the perimeter of the impact area fence

View along the perimeter of the impact area fence

M.4 Former Grant, Oak & Maple Housing Areas and 37-mm Impact Area ARARs

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Chemical-Specific ARARs					
Federal	DoD Facilities	Munitions and Explosives of Concern Hazard Assessment Methodology (October 2008).	TBC	Provides a methodology for assessment of hazards in support of reuse/redevelopment of sites contaminated with ammunition, explosives, or chemical agents.	MEC size, flight path, and penetration depth for each type of MEC found on-site will be considered in remedial planning/ redevelopment decision-making.
Location-Specific ARARs					
State	Wetlands	Wetlands Protection Act – M.G.L. c. 131, Section 40 and 310 CMR 10	Applicable	Provides for protection of wetlands and requirement of Conservation Commission review and permit or waiver for work within the 100-ft buffer zone of a state wetland.	No work is being performed in wetlands or wetland buffer zones during the project. However, hay bales and silt fencing have been previously placed as appropriate to eliminate any potential adverse affects from adjacent on-site construction activities. Erosion control will be maintained in accordance with state regulations.
Federal	Wetlands	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetlands areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values. Not yet promulgated as of July 2007.	No work is being performed in wetlands during the project. In addition, this regulation is not yet promulgated. However, in consideration of state and local wetlands regulations and in the interest of minimizing environmental impacts during remediation, hay bales and silt fencing will be placed as appropriate to eliminate any potential adverse affects from adjacent on-site construction activities. Erosion control will be maintained in accordance with federal regulations.

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Action-Specific ARARs					
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 266 Subpart M – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste management Facilities	Applicable	266.203 – Provides standards for the transportation of solid waste military munitions. 266.204 – Standards applicable to emergency response. 266.205 - Standards applicable to storage of solid waste military munitions. 266.206 - Standards applicable to treatment and disposal of solid waste military munitions.	Should the need for MEC disposal/treatment arise, the requirements of Subpart M regarding transportation and disposal will be followed.
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 264 Subpart X – Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; Miscellaneous units	Relevant and Appropriate if UXO blown in place. Applicable if UXO moved from site prior to detonation.	264.601- A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment.	Should the need for UXO disposal/treatment arise, it could require the use of technologies defined as "miscellaneous units" in Subpart X, including OB/OD units, shredders, crushers, etc.

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Federal	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	RCRA - 40 CFR 264 Subpart X – Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; Miscellaneous units	Relevant and Appropriate if UXO blown in place. Applicable if UXO moved from site prior to detonation.	Subpart X outlines procedures for issuing permits to miscellaneous units that treat, store, or dispose of hazardous waste. Miscellaneous units include OB/OD units, enclosed combustion devices, carbon and catalyst regeneration units, thermal desorption units, shredders, crushers, filter presses, and geologic repositories. Subpart X does not specify minimum technology requirements or monitoring requirements for miscellaneous units. Subpart X specifies an environmental performance standard that must be met through conformance with appropriate design, operating, and monitoring requirements.	
Federal	DoD sites	DoD 6055.09 – M Volume 7	Applicable	DoD Ammunition and Explosives Safety Standards: Criteria for Unexploded Ordnance, Munitions Response, Waste Military Munitions, and Material Potentially Presenting an Explosive Hazard.	MEC clearance and MEC construction support will be conducted to meet safety standards per the requirement.

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
Federal	Army Project Sites	USACE EP 75-1-2 Chapter 6 – MEC Support during Construction Activities	TBC	Chapter 6 details MEC support during construction activities. Key components of the MEC support includes UXO team composition, planning, responsibilities, authority, standby support, subsurface removal in support of construction activities, MEC destruction and quality management.	Implement for MEC construction support in accordance with DoD standards.
State	Regulation of Waste Management Portion of Response Actions that involve treatment or disposal of UXO.	310 CMR 30.606 – Standards for treatment, storage and disposal facilities, miscellaneous units.	Applicable or relevant and Appropriate to the extent that implementation authority for RCRA has been delegated to the Commonwealth of Massachusetts.	Miscellaneous Unit means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not one of the following: a container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, unit excluded from licensing requirements pursuant to 310 CMR 30.801, or a research facility. Part 606 prescribes environmental performance standards for miscellaneous units including location, design, construction, operation, maintenance, and closure. Operation, monitoring, inspection, and post-closure care provisions are included to protect public health, safety, welfare, and the environment.	Should the need for UXO disposal/treatment arise, it could require the use of technologies defined as "miscellaneous units" in Subpart X, including OB/OD units, shredders, crushers, etc.

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC)

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain ARAR to the Extent Practicable
TBC					
State	Soil	GERE M.G.L. c. 21E § 6, 310 CMR 40.1071-1073	Not Applicable for Oak and Maple Housing Areas.	Massachusetts provides regulatory guidance for the preparation of a Grant of Environmental Restriction to address site restrictions.	Restriction could be applied as a means of LUC at adjacent 37-mm Impact Area, as detailed in 2008 FFS. This restriction is not required for the Oak and Maple Housing Areas.

Notes:
CFR=Code of Federal Regulations
CMR=Code of Massachusetts Regulations
M.G.L.=Massachusetts General Law
OB/OD=open burn/open detonation
RCRA=Resource Conservation and Recovery Act
TBC=to be considered

M.5 Former Grant, Oak & Maple Housing Areas and 37-mm Impact Area

LUC Instruments

M.5-1

1996 "PARCEL 1" DEED

Devens 1
Parcels 1-6
2024.66 Acres

BK 26317 PG 003 Middlesex South
BK 17907 PG 001 Worcester

YO-N

Recorded Deed

BRAC 96054

QUITCLAIM DEED

WHEREAS, pursuant to the Defense Base Closure and Realignment Act of 1990, Public Law 101-510, as amended, and codified at 10 U.S.C. 2687, note, the military installation at Fort Devens, Massachusetts (Fort Devens), must close not later than July 10, 1997; and

WHEREAS, it is the intention of the Army to retain the South Post and certain portions of Fort Devens as the Devens Reserve Forces Training Area (Devens RFTA), and to transfer other portions of Fort Devens to the Department of Labor, the Federal Bureau of Prisons, and the U.S. Fish and Wildlife Service (collectively, "Federal Parcels"); and

WHEREAS, pursuant to Chapter 498 of the Massachusetts Act of 1993, as amended, the Government Land Bank ("Land Bank") was granted the authority to oversee and implement the civilian reuse of Fort Devens in accordance with a local-approved reuse plan; and

WHEREAS, the Land Bank, a Local Reuse Authority, has made application for an Economic Development Conveyance (EDC) for the purchase of the property; and

WHEREAS, the Army, as authorized by the Base Closure Law, Public Law 101-510, as amended, and implementing regulations has determined that the application meets the criteria for conveyance to assist economic redevelopment and job creation and has accepted the Land Bank's application and made a final disposal decision with regard to the Property; and

WHEREAS, pursuant to Public Law 101-510, as amended, the Army has the authority to convey and intends to convey to the Land Bank the portions of Fort Devens exclusive of the Federal Parcels (hereinafter referred to as the "Property"); and

KNOW ALL MEN BY THESE PRESENTS that the UNITED STATES OF AMERICA (the "Grantor"), acting by and through the SECRETARY OF THE ARMY (the "Army"), under and pursuant to the Defense Base Closure and Realignment Act of 1990, as

Property Address: Devens - Shirley, Ma.

Nyer to

Plan No # 411

SEE PLAN IN RECORD BOOK 26317 PAGE 001

MSD 05/15/96 01:17:20 649 101.00

amended, (Public Law 101-510, as amended, 10 U.S.C. 2687, note), in consideration of $17,897,438, does hereby grant, remise, release, and forever quitclaim unto the GOVERNMENT LAND BANK (the "Grantee"), a Massachusetts body politic and corporate created by Chapter 212 of the Acts of 1975, as amended, having its principal place of business at 75 Federal Street, 10th Floor, Boston, Massachusetts 02110 (the "Land Bank"), and its successors and assigns, all its right, title, and interest in and to the property located in the towns of Ayer, Harvard, and Shirley, in the counties of Middlesex and Worcester, Massachusetts (the "Property"), which Property is more particularly described as Parcel 1, Parcel 2, Parcel 3, Parcel 4, Parcel 5, and Parcel 6 in Exhibit A, attached hereto and made a part hereof, said Property being set forth in a plan prepared by Howe Surveying Associates, Inc., for the Grantee, entitled "Plan of Land Conveyed to the Government Land Bank by the Secretary of the Army, Ayer, Harvard and Shirley, MA," dated May 9, 1996 (the "Plan"), and recorded herewith at the Middlesex County, Southern District, Registry of Deeds at Plan Book #411 of 1996, Plan _____, and the Worcester County Registry of Deeds at Plan Book 703, Plan 112, excepting from the Property parcels identified on the Plan as:

A. Parcels C, D, F, H, and I, which Parcels are being retained by the Grantor, under the jurisdiction of the Army;

B. Parcel J, which Parcel is being retained by the Grantor, under the jurisdiction of the Federal Bureau of Prisons (the "Bureau");

C. Parcel G, which Parcel is being retained by the Grantor, under the jurisdiction of the Department of Labor; and

D. Parcels A-1 through A-17, and Parcels A-20 through A-31, which Parcels are being leased by the Grantor to the Grantee pursuant to a lease of even date herewith, a notice of which is being recorded.

Parcel A, Parcel B, and Parcels 1a through 1e, as shown on the Plan, which Parcels are being retained by the Grantor, under the jurisdiction of the Bureau, the Army, and the Department of the Interior, Fish and Wildlife Service

(the "Service"), respectively, are not being conveyed hereby; and Parcel A-19, as shown on the Plan, is being leased to the Grantee pursuant to the lease referenced above, and not conveyed hereby.

The Property includes:

a. all buildings, facilities, utility systems, utilities, utility lines and poles, conduits, infrastructure, roadways, railroads, bridges, and improvements thereon and appurtenances thereto;

b. all easements, reservations, and other rights appurtenant thereto;

c. all hereditaments and tenements therein and reversions, remainders, issues, profits, and other rights belonging or related thereto;

d. all mineral rights; and

e. all appurtenant easements granted under Sections I, II, III, and IV hereof, the specific location of certain of said appurtenant easements to be more particularly described in a document to be entitled "Confirmatory Deed and Easement Locations" and recorded by the parties hereafter.

The legal description of the Property has been provided by the Land Bank and the Land Bank shall be responsible for the accuracy of the description of the Property conveyed herein and shall indemnify and hold the United States harmless from any and all liability resulting from any inaccuracy in the description.

I. Appurtenant Easements Granted Over Parcels B, C, D, F, H and I, as shown on the Plan, said Parcels being hereinafter collectively referred to as the "Reserve Enclaves"

The following appurtenant rights and easements are hereby granted to the Grantee and its successors and assigns, in perpetuity:

A. Electric, Telephone, and Other Utility Service to the Reserve Enclaves

1. Easements

For the purposes of providing and maintaining electric service, cable television, and telephone service to the Reserve Enclaves, the nonexclusive perpetual right and easement within the Reserve Enclaves, centered on the existing utility poles, lines, or appurtenances, the widths and dimensions as necessary to exercise the rights and perform the conditions set forth below, and in other areas as may be necessary to provide such service, all as agreed upon in good faith by the Grantor and Grantee:

a. to operate, renew, maintain, replace, and remove existing aboveground cables or poles, underground buried cables, handholes, conduits, cables, pipes, poles, anchors and guys, fixtures, appurtenances, and service connections, with the wires and cables therein or thereon, constituting a line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television service, and the provision of telephone service;

b. to replace and maintain, as necessary, to provide electric, cable television, and telephone service to said Reserve Enclaves, transformer pads or poles, with transformers thereon, handholes, wire distributing facilities, fixtures, apparatus, and service connections;

c. to repair, renew, and maintain conduits, the necessary wires, underground buried cables, cables, fixtures, and appurtenances for service connections to said transformers, handholes, and wire distributing facilities;

d. to use said line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television, and the provision of telephone service to other customers of the Grantee;

e. to cut, trim, and remove trees, brush, overhanging branches, and any other obstructions to the extent that the Grantee deems necessary to clear and keep clear and operate safely the said equipment;

f. to use and operate such vehicles and equipment within the easement as may be necessary to perform the functions authorized hereunder; and

g. to enter upon and authorize or permit others to enter upon said land of the Grantor from time to time for all of the foregoing purposes.

2. Conditions

The Grantee shall, in the utilization of said utility line easement rights granted in this Subsection I.A.:

a. restore any areas disturbed in connection with work undertaken hereunder to a safe and usable condition;

b. protect, in a workmanlike manner, at crossings and at places in proximity to the easement, in accordance with the National Electric Safety Code, all power transmission lines from contact and all roads from obstruction and maintain said lines in such a manner as to not menace life or property;

c. except in the case of an emergency, provide the Grantor prior notice of its entry onto the easement area.

B. Water, Sanitary Sewer, Gas, and Storm Sewer Service to the Reserve Enclaves

1. Easements

For the purposes of providing and maintaining water, sanitary sewer, gas, and storm water drainage services to the Reserve Enclaves, the nonexclusive perpetual right and easement within the Reserve Enclaves, centered on the existing utility lines (whether above or below ground), and appurtenances, the widths and dimensions as necessary to exercise the rights and perform the conditions set forth below, and in other areas as may be necessary to provide such service, all as agreed upon in good faith by the Grantor and Grantee:

a. to lay, construct, install, maintain, enlarge, remove, replace, operate, or repair water, sanitary

sewer, gas, or storm sewer mains, lines, manholes, conduits, catch basins, and all related equipment and appurtenances thereto;

b. to use said mains, lines, and appurtenances for their intended purposes, including the transmission of drinking water, storm water, gas, and sanitary sewage;

c. make the excavations and improvements, above and below ground, as required to exercise the rights granted in Subsection I.B.1.a. and I.B.1.b. above;

d. to use and operate such vehicles and equipment within the easement as may be necessary to perform the functions authorized hereunder; and

e. to enter upon and authorize and permit others to enter upon said land of the Grantor from time to time for all of the foregoing purposes.

2. Conditions

a. The Grantee shall, in the utilization of said storm sewer, water, gas, and sanitary sewer easement rights granted in this Subsection I.B. exercise due care in the performance of excavations and other work required hereunder and restore the easement lands following such work to a safe and usable condition;

b. except in the case of an emergency, provide the Grantor prior notice of its entry onto the easement area.

C. Access Rights Over Land Within the Reserve Enclaves

1. Easements

In all or portions of MacArthur Street, Queenstown Street, and Quebec Street, as said streets cross Parcel D, and in areas over Parcel C and Parcel F designated as "Right of Way Easement" on the Plan, the nonexclusive perpetual right and easement to use said streets, roads, and rights of way, in common with the Grantor and others, for all purposes for which streets and ways are now or may be hereafter used in the Commonwealth of Massachusetts or any political subdivision thereof, including, without

limitation, access on foot and in vehicles, and installing, maintaining, replacing, removing, and using underground and aboveground utility pipes and lines, including, without limitation, sewers, drains, water mains, gas pipes, catch basins, electric lines, telephone lines, and cable television lines, provided that the Grantor reserves the right:

a. to control the speeds of vehicles utilizing said streets within the Reserve Enclaves; and

b. in cases of national emergency, to block access to said streets until such time as the national emergency is abated.

2. Conditions

The Grantee shall, in the utilization of said access easement rights granted in this Subsection I.C.:

a. exercise due care in the performance of any maintenance work or excavations undertaken hereunder; and

b. maintain said roads in a safe and passable condition, including the removal of snow, ice, sand, salt, and debris therefrom, to the same standard other such roads are maintained by the Grantee within the Devens Regional Enterprise Zone.

II. Appurtenant Easements Granted Over Parcels 1a through 1e, as shown on the Plan, said Parcels being hereinafter collectively referred to as the "Service Parcels"

A. Terms and Conditions of Appurtenant Easements Over Land Under the Jurisdiction of the Service

By accepting the appurtenant easements set forth in this Section II (the "Easements"), the Grantee agrees to the following terms and conditions:

1. to comply with state and federal laws and lawful existing regulations thereunder that govern the holders of easements (collectively "Applicable Law") within the boundaries of units of the National Wildlife Refuge System, of which the expanded wildlife refuge at Fort Devens (the "Refuge") is a part;

2. to mechanically and non-chemically keep clear the lands within the Easements to the extent necessary to operate the utility lines safely and to comply with Applicable Law, and to dispose of all vegetative and other material cut, uprooted, or otherwise accumulated as a result of the Grantee's activities within Easement areas in such a manner as to decrease fire hazards and also in accordance with Applicable Law;

3. to make diligent efforts to prevent the disturbance or removal of any public land survey monument or Refuge boundary monument;

4. to take such soil and resource conservation and protection measures on the land covered by the Easements as required under Applicable Law;

5. to do everything reasonable within its power, both independently and on request of any duly-authorized representative of the Service or its successor, to prevent and suppress fires on or near lands to be occupied under the Easements, including making available such qualified manpower or assistance as may be reasonably obtainable for the suppression of such fires;

6. to rebuild and repair such roads, fences, structures, and trails as may be destroyed or injured by construction work undertaken by the Grantee within the Easements, and to build and maintain necessary and suitable crossings for all existing roads and trails that intersect the works constructed, maintained, or operated under authority of this grant of easement as mutually agreed by the Service and Grantee;

7. to pay the Service the full value for all damages to the lands or other property of the United States caused by the Grantee or its employees, contractors, or employees of the contractors arising from its use, occupancy, or operations within the Easement areas, provided that all work done as authorized under this grant of easement shall not be considered as damages to lands; and to indemnify the United States against any liability for damages to life, person, or property arising from the occupancy or use of the lands under the Easements, except

where such liability arises as a result of acts of the United States, its employees, or contractors, or where the Easements are granted hereunder to a state or other governmental agency which has no legal power to assume such liability with respect to damages caused by it to lands and property, in which case such agency in lieu therefore agrees to pay all such damages;

8. to keep the manager of the Refuge informed at all times of the address of the Grantee's principal place of business and the names and addresses of its principal officers;

9. to allow the occupancy and use by the Service, its grantees, permittees, or lessees of any part of the Easement areas not actually occupied or required for the purpose of the full and safe utilization thereof by the Grantee, so long as such occupancy and use does not compromise the ability of the Grantee to use the Easements for their intended purposes, as set forth herein; and that authorized representatives of the Service shall have the right of access to the Easement areas for the purpose of making inspections and monitoring the construction, operation, and maintenance of the facilities and for other operations and uses of the Refuge that do not interfere with or compromise the ability of the Grantee to use the Easements for their intended purposes, as set forth herein;

10. that the Easements granted shall be for the specific use described and may not be construed to include the further right to authorize any other use within the Easements unless approved in writing by the Service;

11. that any transfer of the Easements by assignment, lease, operating agreement, or otherwise must be filed in triplicate with the Service and must be supported by a stipulation that the transferee agrees to comply with and be bound by the terms and conditions of the original grant; and that a twenty-five dollar ($25.00) non-returnable service fee must accompany such transfer documentation;

12. that, unless otherwise provided, no interest granted shall give the Grantee any right to remove any material, earth, or stone for consideration or other purpose except as necessary in exercising its rights hereunder;

13. to protect, in a workmanlike manner, at crossings and at places in close proximity to the Easement areas, in accordance with the National Electric Safety Code, all telephone, telegraph, and power transmission lines from contact and all highways, roads, and railroads from obstruction, and to maintain said transmission lines in such manner as to not menace life or property;

14. that a rebuttal presumption of abandonment of any of the Easements is raised by the deliberate failure of the Grantee to use for any continuous four (4) year period an Easement for the purpose for which it was granted hereby; and that, in the event of such abandonment, the Grantor or its successor will notify the Grantee of its intention to terminate the Easement for abandonment sixty (60) days from the date of the notice, unless prior to the end of said sixty (60) day period the Grantee either resumes its use of the Easement or demonstrates conclusively that said resumption of use will occur within a reasonable amount of time thereafter, not to exceed an additional ninety (90) day period;

15. to restore any Easement area so far as it is reasonably possible to do so upon abandonment or release of any Easement as provided herein, unless this requirement is waived in writing by the Service; provided that in the case of sewer or water lines, restoration shall require flushing and capping of said systems, but not the removal of underground lines, and in the case of electric poles and lines, restoration shall require removal of said poles and lines, unless otherwise requested by the manager of the Refuge; and provided further that prior to undertaking any such restoration activities, the Grantee shall consult with the manager of the Refuge to ensure that said activities are coordinated with other ongoing activities at the Refuge; and

16. that any and all disputes between the Grantor and the Grantee regarding compliance with the above terms and conditions, shall be subject to the appeal procedures set forth in 50 CFR 25.45, provided that, notwithstanding the provisions of this subsection, said Easements are not subject to termination except as indicated in Subsection II.H. hereof.

B. Electric and Telephone Easements in the Vicinity of Hospital Road, Filter Bed Road, and Sheridan Road

The Grantor hereby grants and conveys to the Grantee the following described Easements in perpetuity, unless specifically provided otherwise below, to replace, repair, maintain, and patrol utility lines for the transmission and distribution of electrical current and the provision of telephone and cable television service consisting in each case of a single line of poles, unless otherwise indicated, including guys, fixtures, anchors, wires, and other appurtenances thereto, over, on, and across lands of the Grantor, with right of ingress and egress thereto, including the right to use and operate such vehicles and equipment necessary to perform the functions authorized hereunder, recognizing that the Grantee will use the minimum amount of equipment necessary to accomplish the purposes hereof, together with the right to trim and cut from time to time trees and underbrush along said lines and to use said utility lines for the above purposes, in the following widths and locations:

1. Easement U1-1e:

a thirty (30) foot wide easement centered on existing utility poles across Parcel 1e, as designated on the Plan, beginning at a point in the vicinity of monument 152 and running westerly across the Nashua River and along Filter Bed Road to a point in the vicinity of monument 173;

2. Easement U1-1a:

a thirty (30) feet wide easement centered on existing utility poles across Parcel 1a, as designated on the Plan, which Easement shall terminate upon the reconstruction of McPherson Road by the Grantee, as more particularly provided in Subsections II.D. and II.H. hereof;

3. Easement U1-1c:

a fifty (50) foot wide easement centered on existing utility poles across Parcel 1c, as designated on the Plan, beginning on the southeasterly side of the Nashua River near monument 240 and heading southwest, crossing Hospital Road to a point near monument 100;

4. Easement U1-1d:

a fifty (50) foot wide easement bounded on the northerly side by Parcel A and containing utility poles

along Sheridan Road and across Parcel 1d, as designated on the Plan, for the purposes set forth above, and, in addition, to allow for the nonexclusive access on Sheridan Road to the Shebokin Well and ancillary facilities and to the underpass to the South Post, across Parcel 1d as designated on the Plan, beginning at a point in the vicinity of monument 213, thence heading northwesterly along Sheridan Road to a point near monument 195, thence continuing in an easterly direction over said Parcel 1d to a point in the vicinity of monument 194. The location of the easement between monuments 195 and 194 shall be determined by the parties based on the as-built location of the electrical line to be constructed by the Federal Bureau of Prisons and associated access trail to be constructed by the Service;

5. Easement U2-1e:

a thirty (30) foot wide easement centered on existing electric utility poles across Parcel 1e, as designated on the Plan, beginning at a point between monuments 154 and 155, thence northerly to the easterly boundary of said Parcel 1e in the vicinity of monument 160; and

6. Easement U3-1e:

a thirty (30) foot wide easement centered on existing telephone utility poles across Parcel 1e, as designated on the Plan, beginning at a point between monuments 154 and 155, thence northerly to the easterly boundary of said Parcel 1e in the vicinity of monument 160.

C. Sewer and Water Easements

The Grantor hereby grants and conveys to the Grantee the following described Easements in perpetuity, unless specifically provided otherwise below, to replace, repair, maintain, and patrol water and/or sanitary sewer, or both, as specified below, mains, lines, manholes, and all related equipment and appurtenances thereto, for the transmission of water and sanitary sewage over, on, under, and across lands of the Grantor, with right of ingress and egress thereto, including the right to use and operate such vehicles and equipment necessary to perform the functions authorized hereunder, recognizing that the Grantee will use the minimum amount of equipment and vehicles necessary to accomplish the purposes hereof, together with the right to trim and cut from time to time trees and underbrush along

said lines and use said mains, lines, and appurtenances for the above purposes, in the following widths and locations:

1. Easement S1-1e:

a thirty (30) foot wide easement for a sewer force main centered on the existing force main on Parcel 1e north of the Bailey Bridge, as designated on the Plan, beginning at the existing sewer pump station on the east side of the Nashua River and continuing under said Nashua River to the existing filter beds on the west side of the Nashua River, activities with regard to this Easement include the ability to undertake and complete the construction of a new main or the reconstruction of the existing main and access rights necessary to do such construction and reconstruction, in addition to the other activities set forth above;

2. Easement S1-1a:

a thirty (30) foot wide easement for a sewer line centered on the existing sewer line across Parcel 1a, as designated on the Plan, which Easement will terminate upon the completion of the reconstruction of McPherson Road, as indicated in Subsection II.H. hereof;

3. Easement W1-1a:

a thirty (30) foot wide easement for a water line centered on the existing water line across Parcel 1a, as designated on the Plan, which Easement will terminate upon the completion of the reconstruction of McPherson Road, as indicated in Subsection II.H. hereof;

4. Easement S1-1c:

a thirty (30) foot wide easement for a sewer line centered on the existing sewer line across Parcel 1c, as designated on the Plan, on the southeasterly side of the Nashua River near West Main Street, beginning at a point near monument 240, heading southwesterly to a point near Hospital Road and monument 241, which grant of easement is subject to the following conditions:

a. if the sewer line is expanded or requires major reconstruction, said line will be moved out of the floodplain and relocated onto property owned by the Grantee;

b. all repairs to the sewer line will employ construction methods that will minimize disturbance to the floodplain, i.e. slip-lining;

5. Easement S2-1e:

a thirty (30) foot easement for sewer lines centered on existing sewer lines across Parcel 1e, as designated on the Plan, beginning at a point between monuments 154 and 155, hence northerly to the easterly boundary of said Parcel 1e in the vicinity of monument 160, which easement will terminate upon the completion of the reconstruction of McPherson Road, as indicated in Subsection II.H. hereof;

6. Easement W1-1e:

a thirty (30) foot easement for water lines centered on existing water lines across Parcel 1e, as designated on the Plan, beginning at a point between monuments 154 and 155, hence northerly to the easterly boundary of said Parcel 1e in the vicinity of monument 160, which Easement will terminate upon the completion of the reconstruction of McPherson Road, as indicated in Subsection II.H. hereof.

D. McPherson Road Easements

The Grantor hereby grants and conveys to the Grantee the following Easements along McPherson Road:

1. Existing Utilities Easement U4-1e:

the right to replace, repair, maintain, and patrol, as specified below, all existing utilities along McPherson and Bishop Roads across Parcel 1e from the B & M Railroad property line, thence northerly and northwesterly to a point just south of monument 192, said Easement then splitting and running northeasterly as McPherson Road lies to monument 159 and easterly as Bishop Road lies to monument 311 on the easterly boundary of Parcel 1e, including all water, sanitary sewer, and/or gas mains, lines, manholes, and all related equipment and appurtenances thereto for the transmission of water, sanitary sewage, and gas, and utility lines for the transmission and distribution of electrical current and the provision of telephone and cable television service, consisting of utility poles, including guys, fixtures, anchors, wires, and all appurtenances thereto, over, on, under, and across lands of the Grantor, with right

to ingress and egress thereto, including the right to use and operate such vehicles and equipment necessary to perform the functions authorized hereunder, recognizing that the Grantee will use the minimum amount of equipment and vehicles necessary to accomplish the purposes hereof, together with the right to trim and cut from time to time trees and underbrush along said lines and use said mains, lines, and appurtenances for the above purposes;

2. Existing Roadway Easement R1-1e:

the right to use, maintain, and repair the existing McPherson Road and Bishop Road for access on foot and by vehicle and for the uses described above, as said lines, mains, and roads now exist across Parcel 1e and Parcel 1a, as designated on the Plan, beginning at a point on West Main Street in the vicinity of monument 264, thence running northerly and northeasterly to a point just south of monument 192; said Easement then splitting and running northeasterly as McPherson Road lies to monument 159 and easterly as Bishop Road lies to monument 311 on the easterly boundary of Parcel 1e,

Easements granted in Subsection II.D.1 and II.D.2 above. will terminate following the final completion of the reconstruction of McPherson and Bishop Roads, as provided below, and as indicated in Subsection II.H. hereof;

3. Future Utilities Construction and Use Easement:

the right to construct, reconstruct, replace, repair, maintain, and patrol water, sanitary sewer, and gas mains, lines, manholes, and all related equipment and appurtenances thereto for the transmission of water, sanitary sewage, and gas, and utility lines for the transmission and distribution of electrical current, the transmission of intelligence by electricity, and the provision of telephone and cable television service, consisting of utility poles, underground conduits, including guys, fixtures, anchors, wires, and all appurtenances thereto, over, on, under, and across lands of the Grantor, with right to ingress and egress thereto, including the right to use and operate such vehicles and equipment necessary to perform the functions authorized hereunder, recognizing that the Grantee will use the minimum amount of equipment and vehicles necessary to accomplish the purposes hereof, together with the right to trim and cut from time to

time trees and underbrush along said lines and use said mains, lines, and appurtenances for the above purposes; said Easement to be terminated and replaced by a thirty (30) foot permanent utility easement for water, sewer, gas, electrical, telephone, and cable television lines and mains from West Main Street across said Parcel 1a and continuing five hundred and forty (540) feet north of the B & M Railroad property line, as indicated in Subsection II.H. hereof;

4. Future Road Construction and Use Easement:

the right to construct, reconstruct, and use McPherson Road and Bishop Road for all purposes public ways may be used in the Commonwealth of Massachusetts and political subdivisions thereof, including access on foot and by vehicle and for the uses described above, across Parcel 1e and Parcel 1a, as designated on the Plan, beginning at a point on West Main Street in the vicinity of monument 264, then running northerly and northeasterly to a point just south of monument 192; said Easement then splitting and running northeasterly as McPherson Road lies to monument 159 and easterly as Bishop Road lies to monument 311 on the easterly boundary of said Parcel 1e,

said Easement is three hundred (300) feet in width from the point of beginning, across said Parcel 1a, and running approximately five hundred and forty (540) feet north of the B & M Railroad property line. The Easement is then reduced to one hundred and fifty (150) feet in width for the remainder of its length. The final location of said Easement shall be based on the requirements of applicable laws, regulations, and permits required to complete the construction and reconstruction of McPherson Road and Bishop Road,

said three hundred (300) and one hundred and fifty (150) foot Easements will be terminated and replaced by a seventy-five (75) foot permanent roadway easement based on the recorded as-built location of the roadways, as indicated in Subsection II.H. hereof; and

5. Future Mitigation Area Easement:

an easement of approximately three and one-half (3½) acres for mitigation required by the roadway reconstruction located on said Parcel 1a; the exact size and

location of the mitigation area to be determined by the conditions included in permits that may be received for the reconstruction of McPherson Road.

E. Access Easement

The Grantor hereby grants and conveys to the Grantee an easement for the maintenance, repair, and use of an existing road and the Bailey Bridge for access on foot and by vehicle across Parcel 1e, as designated on the Plan, beginning at a point on McPherson Road near monument 192, thence running northwesterly as said Road now exists to a point, thence turning and running westerly across the Nashua River on the Bailey Bridge, thence southwesterly as the road and trail lies approximately two thousand seven hundred (2,700) feet to a point on Walker Road near monument 1097, provided that:

1. said Easement shall terminate in ten (10) years from the date of this Deed, unless the Easement is extended by mutual agreement of the Grantor and Grantee, as indicated in Subsection II.H. hereof; and

2. the Grantee shall dismantle the Bailey Bridge within one year after the termination of the Easement.

F. Drainage Easements

The Grantor hereby grants and conveys to the Grantee in perpetuity easements for drainage across Parcel 1a, Parcel 1b, Parcel 1c and Parcel 1e, as designated on the Plan, including all existing headwalls, outfalls, and drainage pipes in their current locations. Said easements shall be sufficient width to allow for access to and maintenance of said existing structures, provided that existing roads and trails shall be used for such access wherever possible. Major repairs or replacements of said structures shall be covered by Best Management Practices.

G. Hospital Bridge Easement

The Grantor hereby grants and conveys to the Grantee the following described Easement in perpetuity for the Hospital Bridge crossing the Nashua River, the Grantee being conveyed said Hospital Bridge in fee hereby, and the Grantor retaining the fee in the banks and the bed of the Nashua River, which Easement shall include rights:

1. to improve, repair, maintain, construct, reconstruct, and relocate, within the Easement area, Hospital Bridge;

2. to utilize Hospital Bridge for the purpose of extending utilities across the Nashua River, including electric, telephone, and cable television lines, and lines for the transmission of intelligence by electricity, and all necessary equipment and appurtenances thereto, and sanitary sewer, water, and gas lines and mains, and all necessary equipment and appurtenances thereto;

3. to repair, relocate, maintain, construction, and reconstruction said utility lines, mains, and appurtenances;

4. to use said lines and mains for their intended purposes; and

5. to use Hospital Bridge for all of the purposes public ways are utilized in the Commonwealth of Massachusetts and political subdivisions thereof, including access on foot and by vehicle and for the uses described above.

Said Easement area begins at a point seventeen and two/hundredths (17 2/100) feet northeast of monument 228, thence, on a bearing of North 40 11' 55" East a distance of one hundred and fifty (150) feet to a point, thence on a bearing of South 48 36' 07" East a distance of four hundred seventeen and seventy-three/hundredths (417 73/100) feet to a point, thence on a bearing of South 39 27' 48" West a distance of one hundred and fifty (150) feet to a point, thence on a bearing of North 48 46' 07" West a distance of four hundred nineteen and sixty-six/hundredths (419 66/100) feet to the point of beginning. Said Easement area contains sixty-two thousand eight hundred and four (62,804) square feet.

H. Termination of Easements

The Easements described above and designated as Easement numbers U1-1a, S1-1a, W1-1a, W1-1e, U4-1e, R1-1e, S2-1e, and Subsections II.D.1 through II.D.4., shall terminate upon the granting of replacement easements, in conjunction with the planned construction of roads and other

facilities in the future, or upon the occurrence of other events, all as described elsewhere in this deed.

III. Appurtenant Easements Granted Over Parcel G, as shown on the Plan, said Parcel being hereinafter referred to as the "Job Corps Parcel"

For the purposes of providing and maintaining electric service, cable television, telephone, water, sewer, drainage, and other utility service to the Job Corps Parcel and to land of the Grantee, the perpetual right and easement over, across, under, and through the areas shown on the Job Corps Parcel of the Plan and designated thereon as "30' Wide Electric Easement" and "75' Wide Utility Easement":

A. to construct, enlarge, operate, renew, maintain, replace, and remove aboveground cables or poles, underground buried cables, handholes, conduits, cables, pipes, poles, anchors and guys, fixtures, appurtenances, and service connections, with the wires and cables therein or thereon, constituting a line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television service, and the provision of telephone service;

B. to replace and maintain, as necessary, to provide electric, cable television, and telephone service to said Job Corps Parcel, transformer pads or poles, with transformers thereon, handholes, wire distributing facilities, fixtures, apparatus, and service connections;

C. to repair, renew, and maintain conduits, the necessary wires, underground buried cables, cables, fixtures, and appurtenances for service connections to said transformers, handholes, and wire distributing facilities;

D. to use said line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television, and the provision of telephone service to other customers of the Grantee;

E. to cut, trim, and remove trees, brush, overhanging branches, and any other obstructions to the extent that the Grantee deems necessary to clear and keep clear and operate safely the said equipment;

F. to lay, construct, install, maintain, enlarge, remove, replace, operate, or repair water, sanitary sewer, gas, or storm sewer mains, lines, manholes, conduits, catch basins, and all related equipment an appurtenances thereto;

G. to use said mains, lines, and appurtenances for their intended purposes, including the transmission of drinking water, storm water, gas, and sanitary sewage;

H. to make the excavations and improvements, above and below ground, as required to exercise the rights granted above;

I. to use and operate such vehicles and equipment within the easement areas as may be necessary to perform the functions authorized hereunder; and

J. to enter upon and authorize or permit others to enter upon said land of the Grantor from time to time for all of the foregoing purposes.

IV. Appurtenant Easements Granted Over Parcel J, as shown on the Plan, said Parcel being hereinafter referred to as the "Prison Parcel"

The following appurtenant rights and easements are hereby granted to the Grantee and its successors and assigns, in perpetuity:

A. Electric, Telephone, Water, Sewer and Other Utility Service

1. Easements

For the purposes of providing and maintaining electric service, cable television, telephone, water, sewer, drainage, and other utility service to the Prison Parcel as shown on the Plan and to other land of the Grantee, the perpetual right and easement over, across, under, and through said Prison Parcel, centered on the existing utility poles, lines, or appurtenances, with widths and dimensions necessary to exercise the rights and perform the conditions set forth below:

a. to operate, renew, maintain, replace, and remove aboveground cables or poles, underground buried

cables, handholes, conduits, cables, pipes, poles, anchors and guys, fixtures, appurtenances, and service connections, with the wires and cables therein or thereon, constituting a line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television service, and the provision of telephone service;

b. to replace and maintain, as necessary, to provide electric, cable television, and telephone service to said Prison Parcel, transformer pads or poles, with transformers thereon, handholes, wire distributing facilities, fixtures, apparatus, and service connections;

c. to repair, renew, and maintain conduits, the necessary wires, underground buried cables, cables, fixtures, and appurtenances for service connections to said transformers, handholes, and wire distributing facilities;

d. to use said line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television, and the provision of telephone service to other customers of the Grantee;

e. to cut, trim, and remove trees, brush, overhanging branches, and any other obstructions to the extent that the Grantee deems necessary to clear and keep clear and operate safely the said equipment;

f. to install, maintain, remove, replace, operate, or repair water, sanitary sewer, gas, or storm sewer mains, lines, manholes, conduits, catch basins, and all related equipment and appurtenances thereto;

g. to use said mains, lines, and appurtenances for their intended purposes, including the transmission of drinking water, storm water, gas, and sanitary sewage;

h. to make the excavations and improvements, above and below ground, as required to exercise the rights granted above;

i. to use and operate such vehicles and equipment within the easement areas as may be necessary to perform the functions authorized hereunder; and

j. to enter upon and authorize or permit others to enter upon said land of the Grantor from time to time for all of the foregoing purposes.

2. Conditions

The Grantee shall, in the utilization of said utility line easement rights granted in this Subsection IV.A.:

a. restore any areas disturbed in connection with work undertaken hereunder to a safe and usable condition;

b. protect, in a workmanlike manner, at crossings and at places in proximity to the easement, in accordance with the National Electric Safety Code, all power transmission lines from contact and all roads from obstruction, and maintain said lines in such a manner as to not menace life or property; and

c. the Grantee shall terminate any of the easements granted in Subsection IV.A. upon a determination by the Grantee that any of said easements are no longer needed for the purposes set forth above.

B. Access Rights Over Land Within Prison Parcel

1. Easements

In all or portions of Antietam Street that is located on said Prison Parcel, the nonexclusive perpetual right and easement to use said street, in common with the Grantor and others, for all purposes for which streets and ways are now or may be hereafter used in the Commonwealth of Massachusetts or any political subdivision thereof, including, without limitation, access on foot and in vehicles, and installing, maintaining, replacing, removing, and using underground and aboveground utility pipes and lines, including, without limitation, sewers, drains, water mains, gas pipes, catch basins, electric lines, telephone lines, and cable television lines.

2. Conditions

The Grantee shall, in the utilization of said access easement rights granted in this Subsection IV.B.:

a. exercise due care in the performance of any maintenance work or excavations undertaken hereunder; and

b. maintain said streets in a safe and passable condition, including the removal of snow, ice, sand, salt, and debris therefrom, to the same standard other such roads are maintained by the Grantee within the Devens Regional Enterprise Zone.

V. Easements and Other Uses Reserved Over and on Land Conveyed to the Grantee for the Benefit of the Grantor, Acting By and Through the Army

The following rights and easements are hereby reserved from the Property by the Grantor:

A. Access to and from Reserve Enclaves

For the purpose of providing ingress and egress to the Reserve Enclaves, a nonexclusive right and easement to use in common with the Grantee and others for access by vehicle and on foot over the following roads and streets as set forth in Exhibit B, attached hereto and made a part hereof. These reserved rights and easements will terminate with reference to particular roads and/or streets set forth above when said roads and/or streets, as they may be improved, relocated, or renamed, or other roads or streets providing substantially equivalent access to the Grantor, are legally designated and accepted as public ways pursuant to applicable law, and shall otherwise be perpetual. With regard to the access rights reserved by the Grantor herein, the Grantee shall retain the right to maintain, improve, repair, widen, alter, rename, or relocate any of the above-referenced roads and/or streets, so long as the Grantor is given continuous alternate access of similar quality during any periods of time any such road or street is not usable for the purposes specified herein.

B. Access to and Training at Mirror Lake

1. Easement

A perpetual and nonexclusive easement for the purposes of:

a. providing ingress and egress to and from Mirror Lake, as said lake is identified on the Plan, for the uses identified herein; and

b. allowing the use of Mirror Lake for the training of all units and members of the United States Armed Forces and Coast Guard, including Active Duty, Reserve Forces, National Guard, and other related unit members; for all units and members of such forces from other countries, so long as they are training with members of the United States forces; and for units and members of the Federal Emergency Management Agency, all local emergency management agencies and civil defense forces, and all law enforcement forces, so long as they are training with members of the United States or other country forces, including the right to transport equipment, weapons, ammunition, and other training aides to and from Mirror Lake; and to lay and remove temporary utility lines to and from Mirror Lake, as necessary to support the above training activities.

2. Conditions

The Grantor shall, in the utilization of the easement rights reserved in this Subsection V.B.:

a. restore any areas disturbed in connection with activities undertaken hereunder to at least the condition as existed before the commencement of such activities;

b. provide to the Grantee, except in cases of emergency, prior written notice at least two (2) days prior to the commencement of training exercises at Mirror Lake;

c. make good faith efforts not to unduly interfere with recreation activities of the Grantee ongoing at and adjacent to Mirror Lake; and

d. utilize Mirror Lake consistent with the conservation purposes, as described in Subsection XI.C. herein.

C. Electric, Telephone, and Other Utility Service to the Reserve Enclaves and the South Post of Fort Devens

1. Easement

For the purposes of providing and maintaining electric service, cable television, and telephone service to the Reserve Enclaves, and from the Reserve Enclaves to the South Post of Fort Devens, the perpetual right and easement, at no cost to the Army, for the nonexclusive use of existing utility poles, and the area centered on the underground fiber optic cable running from the Verbeck Gate, so-called, to Building P-2, said building being subject to a seven (7) year lease with New England Telephone and Telegraph Company:

a. to install and maintain underground conduits and cable in the area from Verbeck Gate to Building P-2;

b. to operate, renew, maintain and replace existing aboveground cables or poles, underground buried cables, handholes, conduits, cables, pipes, poles, anchors and guys, fixtures, appurtenances, and service connections, with the wires and cables therein or thereon, constituting a line or lines for the transmission and/or distribution of electricity, the transmission of intelligence by electricity, the provision of cable television service, and the provision of telephone service;

c. to replace and maintain, as necessary, to provide electric, cable television, and telephone service to said Reserve Enclaves, existing transformer pads or poles, with transformers thereon, handholes, wire distributing facilities, fixtures, apparatus, and service connections;

d. to repair, renew, and maintain conduits, the necessary wires, underground buried cables, cables, fixtures, and appurtenances for service connections to said transformers, handholes, and wire distributing facilities;

e. to use said line or lines for the transmission and/or distribution of electricity, the

transmission of intelligence by electricity, the provision of cable television, and the provision of telephone service to other customers of the Grantee;

f. to cut, trim, and remove trees, brush, overhanging branches, and any other obstructions to the extent that the Grantee deems necessary to clear and keep clear and operate safely the said equipment;

g. to use and operate such vehicles and equipment within the easement as may be necessary to perform the functions authorized hereunder; and

h. to enter upon and authorize or permit others to enter upon said land of the Grantor from time to time for all of the foregoing purposes.

2. Conditions

The Grantee shall, in the utilization of the easement rights reserved in this Subsection V.C.:

a. restore any areas or poles damaged or disturbed in connection with activities undertaken hereunder to at least the condition as existed prior to the commencement of said activities; and

b. protect, in a workmanlike manner, at crossings and at places in proximity to said poles and easement area, in accordance with the National Electric Safety Code, all transmission lines from contact and all roads from obstruction, and maintain said lines and cables in such a manner as to not menace life or property.

D. Water, Sanitary Sewer and Gas Service

The Army hereby reserves the possession, use, and operation of the water and wastewater/sewer systems until September 30, 1996 and the gas distribution system until July 1, 1996, including all appurtenances and facilities related thereto. Upon expiration of said periods of reservation, said rights of possession shall terminate, the Land Bank shall assume possession and operation of said systems and will provide the Reserve Enclaves with utilities as provided for in the Utility Agreement between the parties hereto.

E. Reservation of Use and Occupancy of Certain Buildings

The Grantor reserves the use and occupancy of the following buildings, including parking and other facilities currently being used by the Grantor in connection with the use of said buildings, until July 10, 1997:

1. Buildings

Headquarters (P-1), Administrative (P-3), BOQ/BEQ (P-20), BOQ/BEQ (P-21), Administrative (P-25), Administrative (P-227), Administrative (P-243), Administrative (3701), UXO Operations (T-622), Riggs Gym (P-692), Supply Warehouse (P-1400), TASC Operations (T-1434), Administrative (P-1451), TASC Photo (P-1453), AAFES (P-2021), Warehouse (T-2294), Administrative (T-2734), Administrative (T-2735), Warehouse (T-3525), Warehouse (T-3544) and AAFES (T-3573); and

2. Housing Units

573 Spruce Street; 824, 826, 829, 835, 851, 852, 854, 861 Birch Street; 891, 892, 894 Beech Street; 40, 46, 47, 48, 50, 51, 54, 55, 59, 61, 81, 85, 92 Walnut Street; 366, 367 El Caney Street; 143, 147 Cavite Street; 859, 861, 864 Poplar Street; 582, 584 Maple Street; 308, 350 Antietam Street; 856, 869 Cedar Street; 549, 552, 554, 548 Locust Street; 108, 117, 118 Auman Street; 64, 67, 69, 72, 76, 77, 79 Elm Street; 130, 131, 137, 138 Bates Service Road; 154, 157, 162, 163 Adams Circle; 363 Chance Street; 876, 878 Hospital Road; and 331 Grant Street.

The Grantee further reserves the right of ingress and egress to said buildings and facilities. The Grantor may relinquish the right to use and occupy said buildings and facilities at any time by giving the Grantee thirty (30) days written notice.

VI. Easements Reserved Over Land Conveyed to the Grantee for the Benefit of the Grantor, Acting By and Through the Service

The following rights and easements are hereby reserved from the Property by the Grantor, acting for and on the behalf of the Service:

A. Hospital Road Parking Area and Access

For the purpose of providing a parking area ancillary to the Refuge and access thereto, the perpetual right and easement to use the area designated on the Plan as the "Refuge Parking Area" for the parking of vehicles, including the right to maintain, repair, and improve said area, and restrict access thereto with gates or otherwise, as necessary for the uses specified herein. Included in this reservation are rights of access off of Hospital Road shown as Easement number 1c-R1 on the Plan as necessary to accommodate said parking uses, taking safety considerations into account, provided that the parties agree that the access area currently shown on the Plan may be adjusted to accommodate improvements made to Hospital Road by the Grantee, so long as said access is not permanently impaired.

B. Jackson Road Access

1. Easement 1c-R:

For the purpose of providing access from Parcel 1c, as designated on the Plan, to Jackson Road, the perpetual right and easement to cross and recross Parcel 1, as designated on the Plan as Easement 1c-R, beginning at monument number 224, thence South 66° 24' 13" East one hundred and twenty (120±) feet to the pavement on Jackson Road; thence South 15° West along Jackson Road thirty (30±) feet; thence North 66° 24' 13" West one hundred and twenty (120±) feet to a point on the boundary line of said Parcel 1c; thence along the boundary of said Parcel 1c North 15° 00' 36" East thirty (30±) feet to the point of beginning. Said easement area contains three thousand six hundred (3,600±) square feet.

2. Easement 1d-R:

For the purpose of providing access to said Parcel 1d, the perpetual right and easement fifty (50) feet in width to cross and recross said Parcel 1 and to install electric lines from the vicinity of monument 194 to the pavement of Jackson Road. These reservations are subject to the following conditions:

a. the Grantee shall not be restricted in the undertaking and completion of improvements to Jackson Road, provided that the access rights reserved will be restored thereafter; and

b. the location of the Easement areas may be altered by mutual consent of the Grantor, acting by and through the Service, and Grantee.

VII. CERCLA Covenants and Notice

Pursuant to Sections 120(h)(3) and (4) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. § 9601 et seq ("CERCLA"):

A. For the Property, except that portion of the Property described in Section V.B below:

1. The Grantor hereby notifies the Grantee of the storage, release, and disposal of hazardous substances on the Property. Available information regarding the type, quantity, and location of such substances and action taken is at Exhibit C herein. The information regarding this storage, release, and disposal indicates that there is no threat to human health and the environment.

2. The Grantor hereby covenants that:

a. all remedial action necessary to protect human health and the environment with respect to any such substances remaining on the Property has been taken before the date of conveyance hereunder; and

b. any additional remedial action found to be necessary after the date of the conveyance that resulted from past activities shall be conducted by the Grantor.

3. The Grantor reserves a right of access to the Property in any case in which remedial action or corrective action is found to be necessary after the date of this conveyance.

B. CERFA Parcels: The Grantor has identified, in the Community Environmental Response Facilitation Act ("CERFA") Report for Fort Devens dated April 1994, a copy of which has been provided to the Grantee, portions of the Property on which no hazardous substances and no petroleum products or their derivatives were stored for one year or more, or known to have been released or disposed of. With regard to the

portions of the Property identified in the CERFA Report, the Grantor covenants that any response action or corrective action found to be necessary after the date of this conveyance shall be conducted by the Grantor. The Grantor reserves a right of access to the said portions of the Property in any case in which a response action or corrective action is found to be necessary after the date of conveyance, or such access is necessary to carry out a response action or corrective action on adjoining property.

VIII. Federal Facilities Agreement

By accepting this Deed, the Grantee acknowledges that the Grantor has provided the Grantee with a copy of the Federal Facilities Agreement (the "FFA") between the Grantor and the U.S. Environmental Protection Agency ("EPA"),dated May 11, 1991, and the modification thereto, dated March 26, 1996. The Grantor shall provide the Grantee with a copy of any future amendments to the FFA.

A. The Grantor, EPA, and the Commonwealth of Massachusetts, and their agents, employees, and contractors, shall have access to and over the Property as may be necessary for any investigation, response, or corrective action pursuant to CERCLA or the FFA found to be necessary before or after the date of this Deed on the Property or on other property comprising the Fort Devens National Priorities List (the "NPL") site. This reservation includes the right to access to and use of, to the extent permitted by law, any available utilities at reasonable cost to the United States.

B. In exercising the rights hereunder, the United States and the Commonwealth shall give the Grantee or its successors or assigns reasonable notice of actions taken on the Property under the FFA and shall, to the extent reasonable, consistent with the FFA, and at no additional cost to the United States, endeavor to minimize the disruption to the Grantee's, its successors', or assigns' use of the Property.

C. The Grantee agrees that notwithstanding any other provision of the Deed, the United States assumes no liability to the Grantee, its successors, or assigns, or any other person, should implementation of the FFA interfere with the use of the Property. The Grantee and its

successors and assigns shall have no claim on account of any such interference against the United States or the Commonwealth or any officer, agent, employee, or contractor thereof.

D. Prior to the determination by the United States that all remedial action is complete under CERCLA and the FFA for the Fort Devens NPL site, (i) the Grantee, its successors and assigns, shall not undertake activities on the Property that would interfere with or impede the completion of the CERCLA clean-up at the Fort Devens NPL site and shall give prior written notice to the Grantor, EPA, and the Commonwealth of any construction, alterations, or similar work on the Property that may interfere with or impede said clean-up, and (ii) the Grantee shall comply with any institutional controls established or put in place by the Grantor relating to the Property which are required by any record of decision ("ROD") or amendments thereto, related to the Property, which ROD was approved by the Grantor and EPA and issued by the Grantor pursuant to CERCLA or the FFA before or after the date of this Deed. Additionally, the Grantee shall ensure that any leasehold it grants in the Property or any fee interest conveyance of any portion of the Property provides for legally binding compliance with the institutional controls required by any such ROD.

E. For any portion of the Property subject to a response action under CERCLA or the FFA, prior to the conveyance of an interest therein, the Grantee shall include in all conveyances provisions for allowing the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to CERCLA or the FFA on said portion of the Property and shall notify the Grantor, EPA, and the Commonwealth by certified mail, at least sixty (60) days prior to any such conveyance of an interest in said property, which notice shall include a description of said provisions allowing for the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to CERCLA or the FFA.

F. Prior to the determination by the United States that all remedial action under CERCLA and the FFA is complete under CERCLA and the FFA for the Fort Devens NPL site, the Grantee and all subsequent transferees of an interest in any

portion of the Property will provide copies of the instrument evidencing such transaction to the Commonwealth, the EPA, and the Grantor by certified mail, within fourteen (14) days after the effective date of such transaction.

G. The Grantee and all subsequent transferees shall include the provisions of this Section VIII in all subsequent leases, transfer, or conveyance documents relating to the Property or any portion thereof that are entered into prior to a determination by the United States that all remedial action is complete at the Fort Devens NPL site.

IX. Environmental Baseline Survey ("EBS") and Finding of Suitability to Transfer ("FOST")

The Grantee has received the technical environmental reports, including the EBS and FOST, prepared by, or on behalf of, the Grantor, the Grantee, and others, and agrees, to the best of the Grantee's knowledge, that they accurately describe the environmental condition of the Property. The Grantee has inspected the property and accepts the physical condition and current level of environmental hazards on the Property and deems the Property to be safe for the Grantee's intended use. If, after conveyance of the Property to Grantee, there is an actual or threatened release of a hazardous substance on the Property, or in the event that a hazardous substance is discovered on the Property after the date of the conveyance, whether or not such substance was set forth in the technical environmental reports, including the EBS, Grantee or its successor or assigns shall be responsible for such release or newly discovered substance unless Grantee is able to demonstrate that such release or such newly discovered substance was due to Grantor's activities, ownership, use, or occupation of the Property, or the activities of Grantor's contractors and/or agents. Grantee, its successors and assigns, as consideration for the conveyance, agrees to release Grantor from any liability or responsibility for any claims arising out of or in any way predicated on release of any hazardous substance on the Property occurring after the conveyance, where such substance was place on the Property by the Grantee, or its agents or contractors, after the conveyance. This paragraph shall not affect the Grantor's responsibilities to conduct response actions or corrective actions that are required by

applicable laws, rules and regulations, or the Grantor's indemnification obligations under applicable laws.

X. "AS IS"

All of the Property and personal property is conveyed under this agreement in an "as is", "where is" condition, without any representation or warranty whatsoever by the Army concerning the state of repair or condition of said Property.

XI. Wetlands and Floodplains

A. General Provisions

The Property contains wetlands protected under state and federal laws and regulations. Applicable laws and regulations restrict activities that involve draining wetlands or the discharge of fill materials into wetlands, including, without limitation, the placement of fill materials; the building of any structure; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and dams and dikes. To fulfill the Grantor's commitment in the Fort Devens Disposal and Reuse Environmental Impact Statement Record of Decision, made in accordance with the National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq, this Deed provides for protection of wetlands beyond what would otherwise specifically be required under federal and state law.

B. Wetlands Protection

To protect water quality, groundwater recharge, and wildlife habitat, the Grantee, its successors, and assigns shall restrict activities within and protect wetlands on the Property herein conveyed; as provided for in Article VII.C. of the Devens By-Laws, dated November 18, 1994, and approved by the towns of Ayer, Harvard, and Shirley on December 7, 1994, as said Article VII.C. of the Devens By-Laws may be amended from time to time in accordance with applicable law, provided that any such amendment will not affect the obligation of the Grantee and its successors and assigns hereunder to comply with Article VII.C. of the Devens By-Laws in its form as of the date of this Deed, unless such amendment receives the written consent of the Massachusetts Department of Environmental Protection ("DEP").

C. Conservation Restriction Benefiting the Public

1. The Grantee covenants for itself, its successors, and assigns that it will conserve in perpetuity the natural and open qualities of those four (4) portions of the Property described in Exhibit D herein (hereinafter the "Parcels"). The Grantee, its successors, or assigns will not undertake or allow any activity on or use of the Parcels that may adversely affect or detract from the conservation of the natural and open qualities of the Parcels, including, but not limited to, the construction of buildings and structures or significant alteration of the vegetation or hydrology of the Parcels. This restriction shall run with the land. The parties agree that the Army's ongoing training activities on and the recreational use of Mirror Lake are consistent with the purposes of this conservation restriction.

2. The Grantor, through the U.S. Army Corps of Engineers, New England Division, will release this conservation restriction upon the recordation of a conservation restriction for the Parcels granted by the Grantee in accordance with Sections 31, 32, and 33 of Chapter 184 of the General Laws of Massachusetts, with the written consent of DEP.

D. Enforcement

The Grantee covenants for itself, its successors, and assigns that it shall include, and otherwise make legally binding, the restrictions in this Section XI in all subsequent lease, transfer, or conveyance documents relating to the Property subject thereto or any portion thereof. The restrictions and protections provided for in this Section XI shall run with the land. The restrictions in this Section XI benefit the lands retained by the United States that formerly comprised Fort Devens, as well as the public generally. The United States or the Commonwealth of Massachusetts shall have the right to enforce the wetlands and conservation restrictions provided for in this Section XI, by appropriate legal proceedings and to obtain injunctive and other equitable relief against any violations, including, without limitation, relief requiring restoration of the Parcels to their condition prior to the time of the injury complained of (it being agreed that the Grantor and Commonwealth of Massachusetts may have no

adequate remedy at law), and shall be in addition to, and not in limitation of, any other rights and remedies available to the Grantor and the Commonwealth of Massachusetts.

XII. Notice of the Presence of Asbestos

A. The Grantee is hereby informed and does acknowledge that friable and non-friable asbestos or asbestos-containing materials ("ACM") has been found on the Property, as described in the EBS. The ACM on the Property does not currently pose a threat to human health or the environment. All friable asbestos that posed a risk to human health has either been removed or encapsulated.

B. The Grantee covenants and agrees that its use and occupancy of the Property will be in compliance with all applicable laws relating to asbestos; and that the Grantor assumes no liability for damages for personal injury, illness, disability, or death, to the Grantee, its successors or assigns, or to any other person, including members of the general public, arising from or incident to the purchase, transportation, removal, handling, use, disposition, or other activity causing or leading to contact of any kind whatsoever with asbestos on the Property described in this Deed, whether the Grantee, its successors or assigns have properly warned or failed properly to warn the individual(s) injured.

XIII. Notice of the Presence of Lead-Based Paint

Every purchaser of any interest in residential real property (target housing) on which a residential dwelling was built prior to 1978 is notified that such property may present exposure to lead from lead-based paint that may place young children at risk of developing lead poisoning. Lead poisoning in young children may produce permanent neurological damage, including learning disabilities, reduced intelligence quotient, behavioral problems and impaired memory. Lead poisoning also poses particular risk to pregnant women. The seller of any interest in target housing is required to provide the buyer with any information on lead-based paint hazards from risk assessments or inspections in the seller's possession and notify the buyer of any known lead-based paint hazards. A risk assessment or inspection for possible lead-based paint

hazards is recommended prior to purchase. "Target housing" means any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides or is expected to reside in such housing) or any 0-bedroom dwelling.

A. Available information concerning known lead-based paint and/or lead-based paint hazards, the location of lead-based paint and/or lead-based paint hazards, and the condition of painted surfaces is contained in the EBS, March 8, 1996, and in the Finding of Suitability to Transfer (FOST), dated March 1996, copies of which have been provided to the Grantee. The Grantee hereby acknowledges receipt of the information described in this paragraph and the federally required lead-hazard information pamphlet.

B. The Grantee acknowledges that it has received the opportunity to conduct a risk assessment or inspection for the presence of lead-based paint and/or lead-based paint hazards, as required by law and regulation.

C. The Grantee and its successors and assigns shall not permit the occupancy of any target housing without first abating and eliminating lead-based paint hazards by treating any defective lead-based paint surface in accordance with all applicable laws and regulations. This covenant runs with the land. The Grantee shall ensure that any assignee, transferee, affiliate, successor, or foreclosure purchaser of the property shall be bound by the provisions hereof.

XIV. Notice of the Presence of Radiation and Radon

A. Radiation. Low level radioactive materials (such as luminous paint, lens coatings, calibration sources, and other sealed sources) were used in various buildings on the Property, as described in the EBS. Except as provided below, results from radiation surveys indicate that the radiation on the Property is at background levels or below action levels and, therefore, does not pose a threat to human health or the environment. Nothing in this section shall limit the Grantor's remediation responsibility, including response costs, for radioactive material under applicable laws and regulations.

Radiation surveys have not been completed for the following buildings (the "Buildings") on the Property:

P-3	Headquarters Building	Temp. Enclave Bldg	960610
P-204	ASP Operations	Temp. Enclave Bldg	960610
P-1400	Warehouse	Temp. Enclave Bldg	961230
P-3756	Warehouse		
P-3758	Warehouse	Temp. Enclave Bldg	961030
P-3759	Warehouse	Temp. Enclave Bldg	960930
P-3773	Burke USAR Center	Temp. Enclave Bldg	960706
P-3774	Org Maintenance Shop	Temp. Enclave Bldg	960706

The Grantee agrees not to use or occupy any Building listed above until the Grantor has completed a radiation survey thereon and provided the Grantee written certification that radiation at said Building is at background levels or below action levels, and that use and occupancy of the Building does not pose a risk to human health or the environment. The Grantor agrees to complete the radiation surveys for all of the Buildings not later than September 1, 1996, subject to the availability of funds.

Furthermore, if the radiation surveys reveal that radiation within or associated with any of the Buildings exceeds action levels or poses a threat to human health or the environment, the Grantor will promptly, subject to the availability of funds, undertake remediation and response measures that are legally required to abate said threat, allowing full occupancy and use of the subject Building by the Grantee.

B. Radon. Buildings on the Property may contain unhealthy levels of radon. Available and relevant radon assessment data pertaining to the Lease Premises are in the EBS.

XV. Notice of the Presence of Underground Storage Tanks ("USTs")

The Grantee is hereby informed and does acknowledge that USTs have been located on the Property, as described in the EBS. The Grantee has further been informed by the Grantor that:

A. all USTs that have been removed from the Property were tested at the time of removal and any contamination identified was removed or remediated prior to backfilling;

B. all USTs that have not been removed have been identified, as a component of Grantor's ongoing UST management program; and

C. all former UST sites have been demonstrated to be clean.

XVI. Notice of Programmatic Agreement

The Grantee agrees to comply with applicable provisions of the Programmatic Agreement among the Grantee, the Advisory Council on Historic Preservation, and the Massachusetts Historic Commission dated March 20, 1996, with which the Grantor concurred. Said Programmatic Agreement is related to activities that may affect structures, facilities, or cultural or archeological sites eligible for or listed on the National Register of Historic Places.

XVII. Notice of Unexploded Ordnance

The Grantor completed a comprehensive records search, and based on that search, has undertaken and completed statistical and physical testing of areas on the Property where the existence of unexploded ordnance ("UXO") was considered to be present. Based upon said search and testing, the Grantor represents that, to the best of its knowledge, no UXO is currently present on the Property. The Grantor and the Grantee acknowledge that, due to the former use of the Property as an active military installation and notwithstanding the above records search and testing, UXO may exist on the Property. Upon due notice, the Grantor agrees to remove any such remaining UXO discovered on the Property, as required under applicable law and regulation, as expeditiously as reasonable and practicable, subject to the availability of funds.

XVIII. Notice of Non-Discrimination

With respect to activities related to the Property, the Grantee shall not discriminate against any person or persons or exclude them from participation in the Grantee's operations, programs or activities conducted on the Property, because of race, color, religion, sex, age, handicap, or national origin.

XIX. Indemnification

A. The Grantor recognizes its obligation to hold harmless, defend, and indemnify the Grantee and any successor, assignee, transferee, lender, or lessee of the Grantee or its successors and assigns, as provided in Section 330 of the Department of Defense Authorization Act of 1993, as amended, and to otherwise meet its obligations under law.

B. The Grantee shall indemnify and hold the Army harmless from all claims, liability, loss, cost, environmental contamination, or damage arising out of or resulting from any improvements made to or work conducted on the property conveyed herein by the Grantee, its agents, employees, or contractors prior to the date of this deed, except where such claims, liability, loss, cost, environmental contamination, or damage is the result of the gross negligence or willful misconduct of the Army or its employees, agents, or contractors.

IN WITNESS WHEREOF, the Grantor hereunder sets its hand and seal as of the 9th day of May, 1996.

UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY

By: Togo D. West
Togo D. West, Jr.
Secretary of the Army

COMMONWEALTH OF VIRGINIA)
SS
COUNTY OF ARLINGTON)

I, the undersigned, a Notary Public in and for the Commonwealth of Virginia, County of Arlington, whose commission as such expires on the 30th day of September 1999, do hereby certify that this day personally appeared before me in the Commonwealth of Virginia, County of Arlington, Togo D. West, Jr., Secretary of the Army, whose name is signed to the foregoing instrument, acknowledged the foregoing instrument to be his free act and deed, dated 10th day of May 1996, and acknowledged the same for and on behalf of the United States of America.

Joel B. Hud
Notary Public

ACCEPTANCE: The Government Land Bank, a Massachusetts body politic and corporate created by Chapter 212 of the Acts of 1975, as amended, by its duly qualified and authorized Executive Director, Michael P. Hogan, does hereby accept and approve this Quitclaim Deed and agrees to all of the terms and conditions thereof as of the 13th day of May, 1996.

THE GOVERNMENT LAND BANK,
A MASSACHUSETTS BODY POLITIC
AND CORPORATE,

BY: Michael P. Hogan
Michael P. Hogan
Executive Director

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss. May 13, 1996

Then personally appeared the above-named Michael P. Hogan, Executive Director of the Government Land Bank, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of said Government Land Bank, before me

Beth L. R
Notary Public Beth Brown
My Commission expires: 11/12/99

Exhibits:

A. Property Description

B. Access Roads and Streets

C. CERCLA Notice

D. Conservation Parcels

EXHIBIT A

PROPERTY DESCRIPTIONS

PARCEL 1

A certain parcel of land located in the Town of Ayer, Middlesex County, MA. and the Town of Harvard, Worcester County, MA., known as parcel 1, beginning at a point on the northerly sideline of Route 2 and Jackson Gate with the NAD coordinates of N3015446.7100, E620708.8332;

- Thence along Rt. 2, N03°-03'-13"W, five hundred two and sixteen one hundredths feet (502.16') to a point;
- Thence still along Rt. 2, N73°-08'-13"W, ninety and no one hundredths feet (90.00') to a point;
- Thence still along Rt. 2, S23°-40'-06"W, three hundred seventy five and eighty four one hundredths feet (375.84') to a point at the sideline of Jackson Road and parcel 1C;
- Thence along Jackson Road and parcel 1c, N15°-00'-36"E, one thousand eight hundred ten and twenty-nine one hundredths feet (1,810.29') to Fish & Wildlife monument #224;
- Thence along parcel 1c, N66°-24'-13"W, one hundred thirty seven and twenty nine one hundredths feet (137.29') to a point;
- Thence N16°-40'-46"W, four hundred thirty four and ninety one one hundredths feet (434.91') to a point;
- Thence N33°- 09'-11"W, three hundred seventy one and seventy eight one hundredths feet (371.78') to a point;
- Thence N36°-49'-52"W, three hundred seventy five and twenty two one hundredths feet (375.22') to a point;
- Thence N09°-40'-16"W, two hundred seventy seven and fourteen one hundredths feet (277.14') to a point;
- Thence N35°-00'-51"W, one hundred forty five and forty one hundredths feet (145.40') to a point;
- Thence N25°-52'-24"W, five hundred seventy six and ninety one one hundredths feet (576.91') to Fish & Wildlife monument #100;
- Thence N08°-32'-20"W, seven hundred four and sixty two one hundredths feet (704.62') to a point;
- Thence N22°-04'-06"E, one thousand one hundred seventy four and thirty seven one hundredths feet (1,174.37') to a point;
- Thence N16°-46'-23"E, three hundred seventy three and eighty nine one hundredths feet (373.89') to a point;

- Thence N59°-45'-06"E, five hundred sixty one and eight one hundredths feet (561.08') to a point;
- Thence N21°-19'-58"E, two hundred thirty six and eight one hundredths feet (236.08') to a point;
- Thence N21°-40'-10"W, ninety and eighty three one hundredths feet (90.83') to a point;
- Thence on a curved line with a radius to the right four hundred forty one and sixty four one hundredths feet (441.64') and a length of eight hundred one and thirty six one hundredths feet (801.36') to a point;
- Thence N39°-27'-48"E, one hundred seventy nine and seven one hundredths feet (179.07') to a point;
- Thence S48°-57'-28"E, fifty nine and thirty five one hundredths feet (59.35') to a point;
- Thence N41°-52'-52"E, five hundred twenty five and sixty and no one hundredths feet (525.60') to a point;
- Thence N31°-38'-38"E, eight hundred twenty six and seventy five one hundredths feet (826.75') to a point;
- Thence N29°-05'-04"E, one hundred eighty three and four one hundredths feet (183.04') to a point;
- Thence N04°-12'-38"E, three hundred four and six one hundredths feet (304.06') to a point;
- Thence N63°-14'-45"E, four hundred twenty seven and ninety four one hundredths feet (427. 94') to a point;
- Thence N57°-33'-02"E, eight hundred thirty seven and eighty three one hundredths feet (837.82') to a point;
- Thence N29°-00'-43"E, four hundred nineteen and twenty nine one hundredths feet (419.29') to a point;
- Thence N29°-04'-02"E, eight hundred ninety six and seventy one hundredths feet (896.70') to a point;
- Thence N52°-48'-53"E, two hundred thirty six and ninety three hundredths feet (236.93') to Fish & Wildlife monument #240;
- Thence northwesterly, ninety five feet ±, (95' ±) to a point by the sideline of the Nashua River, last 27 courses along parcel 1b;
- Thence by the Nashua River easterly six hundred ninety two feet ±, (692' ±) to a point at West Main Street;
- Thence along West Main Street, four thousand one hundred fifty two feet ±, (4,152' ±) to a point;
- Thence southeasterly, one hundred forty nine feet ±, (149' ±) to a point;
- Thence northeasterly, three hundred three feet ±, (303' ±) to a point;
- Thence northeasterly, two hundred twenty seven feet ±, (227' ±) to a point;
- Thence northeasterly, two hundred eighteen feet ±, (218' ±) to a point;
- Thence northeasterly, one hundred eighty six feet ±, (186' ±) to a point;
- Thence northeasterly, one hundred eighty two feet ±, (182' ±) to a point;
- Thence northeasterly, one hundred sixty feet ±, (160' ±) to a point;
- Thence northeasterly, one hundred one feet ±, (101' ±) to a point;

- Thence northeasterly, one hundred eight feet ±, (108' ±) to a point;
- Thence northeasterly, seventy four feet ±, (74' ±) to a point;
- Thence northeasterly, one hundred seventy five feet ±, (175' ±) to a point;
- Thence westerly, two hundred five feet ±, (205' ±) to a point ;
- Thence northwesterly, eighty two feet ±, (82' ±) to a point;
- Thence northeasterly, fifty feet ±, (50' ±) to a point;
- Thence southeasterly, seventy three feet ±, (73' ±) to a point;
- Thence easterly, one hundred eighty one feet ±, (181' ±) to a point;
- Thence northeasterly, three hundred eighty six feet ±, (386' ±) to a point;
- Thence southerly, four hundred eighteen feet ±, (418' ±) to a point;
- Thence easterly, three hundred eighty one feet ±, (381' ±) to a point;
- Thence northerly, seventy three feet ±, (73' ±) to a point;
- Thence easterly, ninety six feet ±, (96' ±) to a point ;
- Thence southerly, seventy five feet ±, (75' ±) to a point;
- Thence easterly, one hundred ten feet ±, (110' ±) to a point;
- Thence northeasterly, one hundred five feet ±, (105' ±) to a point;
- Thence easterly, one hundred sixty nine feet ±, (169' ±) to a point;
- Thence northerly, ninety one feet ±, (91' ±) to a point;
- Thence easterly, five hundred fifty five feet ±, (555' ±) to a point;
- Thence southeasterly, one hundred forty one feet ±, (141' ±) to a point at the shore of Plow Shop Pond;
- Thence southerly and easterly along Plow Shop Pond three thousand feet ±, (3000' ±) to a point;
- Thence easterly, eighty feet ±, (80' ±) to the sideline of the B&M Railroad.
- Thence along the sideline of the B&M Railroad, S10°-34'-05"W, five thousand two hundred fourteen and no one hundredths feet (5,214.00') to a point;
- Thence S07°-45'-19"E, fifty nine and forty five one hundredths feet (59.45') to a point;
- Thence S10°-38'-11"W, six hundred eighty four and fifty seven one hundredths feet (684.57') to a point;
- Thence S36°-04'-11"W, fifty five and thirty five one hundredths feet (55.35') to a point;
- Thence S10°-40'-11"W, two hundred forty one and fifty one hundredths feet (241.50') to a point;
- Thence S05°-15'-11"W, two hundred eleven and ninety five one hundredths feet (211.95') to a point;
- Thence S09°-51'-41"W, two hundred seventy and two one hundredths feet (270.02') to a point;
- Thence N82°-36'-49"W, one hundred three and fifteen one hundredths feet (103.15') to a point;
- Thence S30°-48'-11"W, one hundred ninety eight and thirty five one hundredths feet (198.35') to a point;
- Thence S13°-50'-49"W, one hundred thirty six and ninety seven one hundredths feet (136.97') to a point;
- Thence S55°-12'-49"E, one hundred eight and eighty two one hundredths feet (108.82')

to a point;

- Thence S02°-26'-11"W, one hundred thirteen and twenty six one hundredths feet (113.26') to a point;
- Thence N81°-42'-49"W, one hundred fifty eight and sixty four one hundredths feet (158.64') to a point;
- Thence S16°-09'-41"W, one hundred seventy one and fifty seven one hundredths feet (171.57') to a point;
- Thence S44°-09'-49"E, two hundred fifteen and forty eight one hundredths feet (215.48') to a point;
- Thence S10°-39'-41"W, one thousand one hundred twenty five and fifty seven one hundredths feet (1,125.57') to a point;
- Thence S13°-17'-41"W, forty and fifty three one hundredths feet (40.53') to a point;
- Thence S10°-40'-41"W, one thousand three hundred ten and fifty one one hundredths feet (1310.51') to a point;
- Thence S73°-14'-11"W, sixty four and thirty nine one hundredths feet (64.39') to a point;
- Thence S04°-00'-11"W, four hundred twenty and sixty one hundredths feet (420.60') to a point;
- Thence on a curved line with a radius to the right of two thousand nine hundred eighty three and fifty five one hundredths feet (2983.55') and a length of one thousand three hundred one and eighty two one one hundredths feet (1301.82') to a point;
- Thence N58°-12'-49"W, fifty and fifty three one hundredths feet (50.53') to a point;
- Thence S37°-15'-41"W, four hundred fifteen and thirty seven feet (415.37') to a point;
- Thence S47°-24'-11"W, three hundred twenty five and forty one hundredths feet (325.40') to a point;
- Thence S36°-55'-49"E, twenty eight and fifty one hundredths feet (28.50') to a point;
- Thence S53°-04'-11"W, one thousand three hundred eighty three and twenty one hundredths feet (1,383.20') to a point;
- Thence S38°-27'-57"W, six hundred thirteen and eighty nine one hundredths feet (613.89') to a point on the sideline of Rt. 2, last 28 courses being along sideline of the B&M Railroad;
- Thence along Rt. 2, on a curved line to the right with a radius of two thousand four hundred and twenty nine one hundredths feet (2,400.29') and a length of five hundred twenty four and ninety eight one hundredths feet (524.98') to a point;
- Thence still along Rt. 2, N79°-16'-58"W, nineteen and forty three one hundredths feet (19.43') to a point at the sideline of Rt. 2 and parcel 1d;
- Thence along parcel 1d in 8 courses, N10°-44'-19"E, fifty three and ninety nine one hundredths feet (53.99') to Fish & Wildlife monument #213;
- Thence N67°-07'-17"W, one hundred seventy one and eighty nine one hundredths feet (171.89') to a point;
- Thence N64°-22'-52"W, four hundred ninety six and thirty eight one hundredths feet (496.38') to a point;
- Thence on a curved line with a radius to the right of six hundred fifty three and no one hundredths feet (653.00') and a length of two hundred twenty two and fifty one one

hundredths feet (222.51') to a point;

- Thence N44°-51'-29"W, eight hundred ninety four and sixty one hundredths feet (894.60') to a point;
- Thence on a curved line with a radius to the left of two thousand three hundred seventy two and no one hundredths feet (2,372.00') and a length of four hundred forty eight and ninety five one hundredths feet (448.95') to a point;
- Thence in twenty courses, N55°-42'-09"W, four hundred ninety seven and ninety three feet (497.93') to a point;
- Thence on a curved line with a radius to the left of one thousand six hundred twenty two and no one hundredths feet (1,622.00') and a length of three hundred thirty and thirty five one hundredths feet (330.35') to a point on Parcel A;
- Thence, N67°-22'-18"W, one hundred eighty seven and twenty seven one hundredths feet (187.27') to a point at the corner of parcel A, the last 9 courses being along parcel 1D;
- Thence along parcel A, N59°-32'-33"E, nine hundred twenty four and thirty three one hundredths feet (924.33') to a point;
- Thence S86°-51'-39"E, three hundred five and ninety six one hundredths feet (305.96') to a point;
- Thence , N56°-55'-05"E, two hundred seventy seven and seventy six one hundredths feet (277.76') to a point;
- Thence N07°-24'-27"E, one hundred eighty two and twenty one hundredths feet (182.20') to a point;
- Thence N82°-50'-53"W, fifty six and seventy one hundredths feet (56.70) to a point;
- Thence on a curved line with a radius of one hundred and seventy three and thirteen one hundredths feet (173.13') and length of three hundred sixty three and forty two feet (363.42') to a point;
- Thence N37°-25'-24"E, seventy five and fifty eight one hundredths feet (75.58') to a point;
- Thence on a curved line with a radius to the left of one hundred and fourteen and twenty one one hundredths feet (114.21') and a length of eighty eight and three one hundredths feet (88.03') to a point;
- Thence N06°-44'-26"W, three hundred twenty three and seventy one one hundredths feet (323.71') to a point;
- Thence on a curved line with a radius to the right of five hundred twenty five and seventy three one hundredths (525.73') and a length of two hundred eight and twenty two one hundredths feet (208.22') to a point;
- Thence N15°-57'-06"E, three hundred ninety and ninety one hundredths feet (390.90') to a point;
- Thence on a curved line with a radius to the left of one hundred seventy two and forty three one hundredths feet (172.43') and a length of one hundred seventy five and seventy nine one hundredths feet (175.79') to a point;
- Thence N42°-26'-43"W, seventy and eighty seven one hundredths feet (70.87') to a point ;
- Thence N81°-50'-32"W, four hundred twenty six and seventy nine one hundredths feet (426.79') to a point;

- Thence N85°-44'-04"W, five hundred seventy seven and thirteen one hundredths feet (577.13') to a point;
- Thence S85°-48'-10"W, three hundred eighteen and sixty six one hundredths feet (318.66') to a point;
- Thence S85°-48'-10"W, two hundred eighty one and four one hundredths feet (281.04') to a point;
- Thence on a curved line with a radius to the right one thousand five hundred eighty four and forty nine one hundredths feet (1,584.49') and a length of two hundred fifty two and sixteen one hundredths feet (252.16') to a point;
- Thence N85°-04'-45"W, one hundred seventy nine and no one hundredths feet (179.00') to the corner of parcel B, ;
- Thence along parcel B, N85°-05'-13"W, three hundred twenty nine and eighty six one hundredths feet (329.86') to a point on parcel A;
- Thence N85°-12'-53"W, thirty three and eighty seven one hundredths feet (33.87') to a point;
- Thence on a curved line with a radius to the left of six hundred fifty one and eighteen one hundredths feet (651.18') and a length of two hundred seventy nine and eighteen one hundredths feet (279.18') to a point;
- Thence S70°-20'-54"W, three hundred ninety one and sixty three one hundredths feet (391.63') to a point;
- Thence on a curved line with a radius to the right eight hundred forty nine and ninety two one hundredths feet (849.92') and a length of four hundred seventy six and thirteen one hundredths feet (476.13') to a point;
- Thence N77°-33'-17"W, six hundred sixty two and fifteen one hundredths feet (662.15') to a point on the sideline of Jackson Road, last 13 courses being along Patton Rd.;
- Thence along Jackson Rd., S15°-09'-51"W, two thousand twenty four and twenty one hundredths feet (2,024.20') to a point;
- Thence S39°-56'-04"E, twenty six and fifty four one hundredths feet (26.54') to Fish & Wildlife monument #194, the last 7 courses being on parcel A;
- Thence S15°-02'-21"W, four hundred eighty two and sixty one one hundredths feet (482.61') to the point of beginning on the sideline of Rt. 2., last three courses being along Jackson Rd.

Said parcel excepting parcels C, D, F, G and J, contains 2,190 ± acres. Leased parcels A1, A3, A4, A7 through A15, A17, A20 through A31 are also excepted from this parcel.

PARCEL 2

A certain parcel of land located in the Town of Shirley, Middlesex County, MA., beginning on the southerly side of Front Street, beginning at a point with the NAD coordinates of N3024822.07, E619855.38;

- Thence S09°-32'-17"W, one hundred and twenty six and thirty one one hundredths feet (126.31') to a point;
- Thence along a curved line on the right with the radius of five hundred and twenty four and seventy six hundredths feet (524.76') two hundred and eighty nine and fifty four one hundredths feet (289.54') to a point;
- Thence S46°-52'-39"E, three hundred and ninety two and twenty one one hundredths feet (392.21') to a point;
- Thence S46°-52'-39"E, one hundred and sixty nine and eighty seven one hundredths feet (169.87') to a point;
- Thence S40°-40'-22"W, one hundred sixty nine and forty nine one hundredths feet (169.49') to a point;
- Thence S43°-07'-36"E, eighty nine and seventy two one hundredths feet (89.72') to a point;
- Thence S46°-52'-24"W, three hundred and ninety two and four one hundredths feet (392.04') to a point;
- Thence S13°-14'-25"W, one thousand forty eight and seventy nine one hundredths feet (1048.79') to a point;
- Thence S49°-29'-30"E, one hundred forty five and nine one hundredths feet (145.09') to a point;
- Thence S40°-11'-55"W, one hundred and seventy nine and three one hundredths feet (179.03') to Fish & Wildlife monument #228;
- Thence N49°-37'-00"W, two hundred twenty four and seventeen one hundredths feet (224.17') to a point;
- Thence N77°-50'-04"W, one hundred and seventy two and eighty seven one hundredths feet (172.87') to a point;
- Thence S41°-42'-46"W, six hundred and seventeen and ten one hundredths feet (617.10') to a point at parcel E, the last 14 courses being along parcel 1b;
- Thence along parcel E, northwesterly, three hundred and thirty three feet ±, (333' ±) to a point;
- Thence northeasterly, four hundred and forty five feet ±, (445' ±) to a point;
- Thence northwesterly, five hundred ninety eight feet ±, (598' ±) to a point at the land now or formerly of the Town of Shirley;
- Thence westerly, three hundred and seventy nine feet ±, (379' ±) to a point;
- Thence northerly, one hundred seventeen feet ±, (117' ±) to a point;
- Thence northwesterly, seven hundred and sixty feet ±, (760' ±) to a point;

- Thence northwesterly, one hundred and eighty four feet ±, (184' ±) to a point on the sideline of Front Street;
- Thence along Front Street, two thousand two hundred and seventy eight feet ±, (2278' ±) to the point of beginning;

Said parcel contains 89 acres ±.

PARCEL 3

A certain parcel of land located in the Town of Shirley, Middlesex County, MA., known as parcel 3, located at the intersection of Walker Rd. and Hazen Road, beginning at a point on the southerly sideline of Hazen Rd. with the NAD coordinates of N3033238.34, E622347.39;

- Thence N80°-50'-56"E, seven hundred thirty eight and ninety eight one hundredths feet (738.98') to a point;
- Thence N80°-45'-55"E, five hundred fifty nine and thirty seven one hundredths feet (559.37') to a point;
- Thence N36°-45'-10"E, one thousand thirty one and eighty three one hundredths feet (1,031.83') to a point;
- Thence N50°-36'-44"E, two hundred thirty seven and ninety two one hundredths feet (237.92') to a point,
- Thence S12°-31'-49"E, two hundred four and nine one hundredths feet (204.09') to a point;
- Thence S13°-27'-15"W, one hundred sixty eight and sixty one hundredths feet (168.60') to a point;
- Thence S00°-05'-33"W, five hundred four and fifty four one hundredths feet (504.54') to a point;
- Thence S14°-09'-00"W, one hundred twenty two and seventy four one hundredths feet (122.74') to a point;
- Thence S00°-25'-22"W, two hundred ninety four and forty seven one hundredths feet (294.47') to a point;
- Thence S46°-53'-37"E, two hundred thirty and twenty five one hundredths feet (230.25') to a point;
- Thence S07°-22'-33"E, two hundred thirty five and seventeen one hundredths feet (235.17') to a point;
- Thence S34°-53'-29"E, one hundred forty one and fifty six one hundredths feet (141.56') to a point;
- Thence N86°-20'-35"E, one hundred sixty one and fifty seven one hundredths feet (161.57') to a point;
- Thence S43°-36'-54"E, one hundred thirty five and thirty seven one hundredths feet (135.37') to a point;

- Thence S54°-58'-51"E, one hundred six and eighty two one hundredths feet (106.82') to a point;
- Thence S76°-36'-08"E, one hundred eighty and fifty three one hundredths feet (180.53') to a point;
- Thence S86°-08'-28"E, four hundred forty six and fifty one hundredths feet (446.50') to a point;
- Thence S47°-31'-24"E, two hundred forty six and two one hundredths feet (246.02') to a point;
- Thence S61°-10'-51"E, two hundred thirty nine and forty nine one hundredths feet (239.49') to a point;
- Thence S26°-34'-34"E, five hundred seventy three and one one hundredths feet (573.01') to a point;
- Thence S14°-41'-19"E, two hundred eighty nine and fifty two one hundredths feet (289.52') to a point;
- Thence S00°-07'-21"E, two hundred thirteen and two one hundredths feet (213.02') to a point known as Fish & Wildlife monument #173;
- Thence S12°-12'-18"W, two hundred forty six and fifty three one hundredths feet (246.53') to a point;
- Thence S41°-30'-13"W, three hundred fifty five and thirty five one hundredths feet (355.35') to a point;
- Thence S71°-53'-33"W, one hundred seventy three and sixty seven one hundredths feet (173.67') to a point;
- Thence N84°-05'-04"W, four hundred forty six and sixty seven one hundredths feet (446.67') to a point;
- Thence S52°-10'-12"W, two hundred fifty and five one hundredths feet (250.05') to a point;
- Thence S51°-55'-00"W, four hundred fourteen and ninety one hundredths feet (414.90') to a point;
- Thence S43°-20'-53"W, two hundred twenty eight and sixty nine one hundredths feet (228.69') to a point;
- Thence S08°-55'-53"W, five hundred eighty eight and fifty nine one hundredths feet (588.59') to a point ;on the sideline of Walker Rd., the last 26 courses being along parcel 1e;
- Thence N24°-30'-46"W, one hundred seventy seven and forty five one hundredths feet (177.58') to a point;
- Thence N53°-59'-12"W, one hundred twenty one and eighty nine one hundredths feet (121.89') to a point;
- Thence N83°-25'-45"W, one hundred five and eighty nine one hundredths feet (105.89') to a point;
- Thence N70°-04'-43"W, seventy seven and eighty one hundredths feet (77.80') to a point;
- Thence N56°-42'-42"W, four hundred thirty eight and ninety five one hundredths feet (438.95') to a point;
- Thence N51°-03'-12"W, eighty nine and fifty two one hundredths feet (89.52') to a point;

- Thence N45°-24'-01"W, one thousand three hundred ninety three and ninety six one hundredths feet (1,393.96') to a point;
- Thence N42°-13'-55"W, ninety five and twenty four one hundredths feet (95.24') to a point;
- Thence N39°-02'-42"W, five hundred and fifty and thirteen one hundredths feet (550.13') to a point;
- Thence N32°-35'-01"W, ninety and sixty three one hundredths feet (90.63') to a point;
- Thence N26°-37'-52"W, two hundred forty five and fifty four one hundredths feet (245.54') to a point;
- Thence N17°-06'-22"W, five hundred ninety and eighty one hundredths feet (590.80') to the sideline of Hazen Rd., the last 12 courses being along Walker Road;
- Thence N07°-41'-20"W, three hundred eighty two and seventy nine one hundredths feet (382.79') to a point;
- Thence N10°-44'-21"E, one hundred nine and eighteen one hundredths feet (109.18') to a point;
- Thence N27°-36'-08"E, four hundred forty and thirty seven one hundredths feet (440.37') to the point of beginning, the last three courses being along Hazen Road;

Said parcel contains 238 ± acres. Leased parcel A2 is excepted from this parcel.

PARCEL 4

A certain parcel of land located in the Town of Ayer, Middlesex County, MA., known as Parcel 4, located on the southerly side of Rt. 2A, at the intersection of the westerly side of the Boston and Maine Railroad, at a point with NAD coordinates of N3034857.92, E628820.65;

- Thence along the Boston and Maine Railroad, S30°-52'-54"E, two thousand ten and thirteen one hundredths feet (2,010.13') to a point;
- Thence still along the Boston and Maine Railroad, S27°-32'-24"E, one thousand eight hundred nineteen and forty three one hundredths feet (1,819.43') to a point at Bishop Road;
- Thence along Bishop Road, westerly, eighty three ± feet, (83'±) to a point;
- Thence still along Bishop Road, westerly, two hundred feet ±, (200' ±) to a point at the cemetery;
- Thence southerly, thirty feet ±, (30' ±) to a point;
- Thence southwesterly, two hundred and eighty nine feet ±, (289' ±) to a point;
- Thence southwesterly, nine hundred sixty eight feet ±, (968' ±) to a point, the last 3 courses being by the cemetery;
- Thence northerly, six hundred twenty seven feet ±, (627' ±) to a point;
- Thence westerly, one hundred eighty three feet ±, (183' ±) to a point;
- Thence westerly, five hundred eighty one feet ±, (581' ±) to a point;
- Thence westerly, sixty five feet ±, (65' ±) to a point at parcel 1E;
- Thence N03°-51'-40"W, four hundred six and ninety nine one hundredths feet (406.99') to

a point;

- Thence N83°-24'-45"W, one hundred seventy nine and four one hundredths feet (179.04') to a point;
- Thence N47°-18'-43"W, forty eight and forty seven one hundredths feet (48.47') to a point;
- Thence N79°-06'-55"W, eighty eight and sixty eight one hundredths feet (88.68') to a point;
- Thence N40°-43'-42"W, seventy and seventeen one hundredths feet (70.17') to a point;
- Thence N02°-30'-56"W, two hundred twenty nine and seventy nine one hundredths feet (229.79') to a point;
- Thence S44°-48'-18"W, seven hundred thirty three and fifty one hundredths feet (733.50') to a point;
- Thence along a line crossing MacPherson Road, S88°-36'-23"W, fifty-two and five one hundredths feet (52.05') to Fish & Wildlife monument #192;
- Thence N33°-57'-11"W, three hundred twenty seven and forty two one hundredths feet (327.42') to Fish & Wildlife monument #152;
- Thence N20°-13'-32"W, one hundred ninety nine and ten one hundredths feet (199.10') to a point;
- Thence N59°-03'-25"E, one hundred sixty nine and fifty seven one hundredths feet (169.57') to Fish & Wildlife monument #154;
- Thence S85°-10'-32"E, five hundred eighty four and eighty five one hundredths feet (584.85') to Fish & Wildlife monument #155;
- Thence N36°-54'-01"W, seventy one and eleven one hundredths feet (71.11') to a point;
- Thence N08°-40'-58"E, thirty one and eighty two one hundredths feet (31.82') to a point;
- Thence N77°-09'-39"E, one hundred and fifty six and thirty two one hundredths feet (156.32') to a point;
- Thence N01°-49'-53"E, one hundred forty four and ninety seven one hundredths feet (144.97') to a point;
- Thence N26°-38'-33"W, one thousand ninety one and forty two one hundredths feet (1,091.42') to Fish & Wildlife monument #160;
- Thence N51°-06'-38"W, eight hundred and three and fourteen one hundredths feet (803.14') to a point;
- Thence N72°-11'-52"W, one hundred and twenty eight and twenty two one hundredths feet (128.22') to a point;
- Thence N88°-10'-44"W, nine hundred fifty three and seventy two one hundredths feet (953.72') to a point;
- Thence N31°-43'-58"W, ninety five and seven one hundredths feet (95.07') to a point;
- Thence N04°-40'-47"E, four hundred forty four and seventy one one hundredths feet (444.71') to a point;
- Thence N25°-25'-55"W, eight hundred five and ninety four one hundredths feet (805.94') to a point;
- Thence N82°-36'-57"W, one hundred twenty and fifty one hundredths feet (120.50') to the Nashua River, the last 28 courses being by Lot 1E;

- Thence by the Nashua River one thousand three hundred and eighty five feet ±, (1,385'±) to Rt. 2A;
- Thence along a curved line to the right, six hundred and forty four feet ±, (644' ±) to a point;
- Thence S65°-23'-22"E, five hundred twenty nine and ninety six one hundredths feet (529.96') to a point;
- Thence S70°-37'-15"E, three hundred eighty three and eighty one one hundredths feet (383.81') to a point;
- Thence S65°-23'-22"E, six hundred fifty seven and thirty five one hundredths feet (657.35') to a point;
- Thence S62°-44'-53"E, eighty seven and nine one hundredths feet (87.09') to the point of beginning, the last 5 courses being along Route 2A;

Said parcel excepting parcel H contains 246± acres. Leased parcels A5 and A16 are also excepted from this parcel.

PARCEL 5

A certain parcel of land located in the Town of Ayer, Middlesex County, and in the Town of Harvard, Worcester County, MA., known as parcel 5, beginning on the easterly side of the Boston and Maine Railroad, at the property line of the Town of Harvard at a point with NAD coordinates of N3021031, E637040;

- Thence N06°-43'-19"W, sixty eight feet ±, (68' ±) to a point;
- Thence N10°-38'-11"E, six hundred fourteen and forty one hundredths feet (614.40') to a point;
- Thence S43°-40'-59"E, one hundred three and ten one hundredths feet (103.10') to a point;
- Thence N10°-38'-36"E, six hundred forty eight and eighty eight one hundredths feet (648.88') to a point;
- Thence N24°-13'-11"E, one thousand three hundred and eighty four and fifteen one hundredths feet (1,384.15') to a point;
- Thence N21°-57'-11"E, one thousand two hundred fifty nine and sixty five one hundredths feet (1,259.65') to a point;
- Thence N23°-06'-19'W, two hundred twenty nine and eighty one hundredths feet (229.80') to a point;
- Thence northerly, seven hundred and three feet ±, (703' ±) to Grove Pond, the last 10 courses being by the Boston and Maine Railroad;
- Thence easterly along Grove Pond three thousand and eighty feet ±, (3080' ±) to a point;
- Thence easterly, one hundred and thirty two feet ±, (132' ±) to a point;
- Thence S47°-21'-48"E, one hundred and eighty eight and ninety five one hundredths feet (188.95') to a point;
- Thence southeasterly, one hundred and nine feet ±, (109' ±) to a point;

- Thence easterly, four hundred fifty feet ±, (450' ±) to the property of Commonwealth of Massachusetts National Guard;
- Thence by the property of the Commonwealth of Massachusetts National Guard and a fence as it now stands in fourteen courses totaling four thousand four hundred and forty feet ±, (4,440' ±) to a point on the fence and the sideline of Barnum Road;
- Thence along the fence and Barnum Road in a northeasterly direction two thousand four hundred sixty eight feet ±, (2,468' ±) to a point on the town line;
- Thence southeasterly, seven hundred eighty four feet ±, (784'±) along said Town line to Cold Spring Brook;
- Thence southwesterly by Cold Spring Brood seven thousand three hundred feet ±, (7,300' ±) to a point at the land of the Town of Harvard;
- Thence northerly and westerly by the Town of Harvard to the point of beginning;

Said parcel, excepting parcel I contains one hundred and seventy two (173) acres ±. Leased parcel A6 is excepted from this parcel.

PARCEL 6

A certain parcel of land located in the Town of Ayer, Middlesex County, Ma., known as Parcel 6, beginning at a point on MacPherson Road, with the NAD coordinates of N3028202.6550, E625983.5776.

- Thence along MacPherson Road N11°-12'-27"W, fifty seven and 69/100 feet (57.69') to a point;
- Thence crossing MacPherson Road N82°-53'-32"E, two hundred five and 84/100 feet (205.84') to a point;
- Thence N07°-04'-49"W, nineteen and 48/100 feet (19.48') to a point;
- Thence N82°-53'-32"E, one hundred and 00/100 feet (100.00') to a point;
- Thence S07°-06'-28"E, one hundred and 00/100 feet (100.00') to a point;
- Thence S82°-53'-32"W, one hundred and 00/100 feet (100.00') to a point;
- Thence N07°-12'-49"W, twenty and 64/100 feet (20.64') to a point;
- Thence S83°-33'-18"W, two hundred one and 70/100 feet (201.70') to the point of beginning. Said last course crosses MacPherson Road.

Said parcel contains twenty one thousand nine hundred and sixty square feet ± (21,960 ± sq. ft.). Said parcel also contains a water supply well and pump station.

EXHIBIT "B"

ACCESS ROADS & STREETS

1. Barnum Rd From Barnum Gate to intersection of Saratoga, Patton, Dakota
2. Dakota from the intersection of Saratoga, Patton and Barnum to MacArthur
3. Sherman from Verbeck Gate to Givry
4. Pine from Hospital to Queenstown
5. Hospital from intersection of Pine and Grant to Shirley Gate
6. MacArthur from Verbeck Gate to Pine then again from No Name Street in front of Riggs Gym to Givry
7. Patch from Dakota to Patton
8. Patton from intersection of Dakota, Saratoga, and Barnum to Jackson
9. Mirror Lake Road from Patton to Sheridan
10. Queenstown from triangle below Givry to Patton
11. Queenstown from Dakota to Pine
12. No Name Street from Queenstown to Patch
13. Marne from Patton to Sheridan along dirt road extension of Sheridan to the boundary of Fish and Wildlife property
14. MacPherson from West Main to Bishop and along unnamed extensions to back gate of airfield and to sewer lift station
15. Filter Bed Road from sewer lift station across Bailey Bridge (as long as Bailey Bridge is erect) to west side of Nashua (for access to bridging site along Nashua) When bridge is gone from Walker Road along dirt road to bridging site

16. No Name access road from State Route 2A and main gate at airfield to bldg. 3813

17. Saratoga from intersection of Barnum, Patton, and Dakota to Carey to Market to Cook to Antietam

18. Antietam from Market to MacArthur

19. Buena Vista from Sherman to MacArthur

20. 10th Mountain Division Road from MacArthur to Queenstown

21. Givry from intersection of No Name Street and Queenstown to Hospital Road

22. Queenstown Extension from Givry to Patton

23. Lake George from Givry to Jackson

24. Jackson from State Rt. 2 interchange to Givry

25. Antietam from Sherman to MacArthur

26. No Name Street in front of Riggs Gym from MacArthur to Sherman

27. No Name Street from Queenstown to Quebec

Exhibit C: CERCLA 120(h) Notice

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Attachment **CERCLA Hazardous Substances at Transferable Sites**

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
SA 2	1450	Animal carcasses, classified materials, medical and veterinary wastes, expired drugs, photographs, and paper	Disposal	21 tons / yr	1970 - 1995	Unknown	Unknown	Unknown	PA 4/93
SA 3	1484	Paper	Disposal	318 lbs / hr	1971 - 1976	Unknown	Unknown	Unknown	PA 4/93
SA 10	NA	Building debris	Disposal	1 Hospital	Approx. (1965, 1975-1980)	Unknown	Unknown	Unknown	SI 1/95
SA 16	NA	2 inch metal chain, dark toned material, liquid, scattered material, debris	Disposal	2 truckloads	1952 - 1991 (3 official weeks in 1985)	Unknown	Unknown	Unknown	SI 1/95
SA 19	NA	1% industrial sources including vehicle washrack discharge, caustic radiator wash water, floor drains, heating plant boiler blowdown, swimming pool filter backwash. 99% household wastewater	Disposal	1.3mil G / day	1942 - present	Unknown	Unknown	Unknown	SI 11/2/95
SA 20	NA	1: Nitrogen 2: Nitrate	Disposal	1: 30.7mg/L 2: 42.5mg/L	1942 - present	Unknown	Unknown	Unknown	SI 11/2/95
SA 21	NA	1: Sludge, Leachate containing chloride, nitrogen, ammonia, nitrate, nitrite, elevated alkalinity, salts, elevated conductivity 2: coliform 3: cadmium and selenium	Disposal	1: Unknown 2: 32×10^{-6} / 100mL 3: 3 - 6 mg/kg.	1942 - present	1: Unknown 2: NA 3: 7440439 and NA	1: Unknown 2: NA 3. Not listed	1: Unknown 2: NA 3: NA	SI 11/2/95

BK 26317 PG 062

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg. #	Hazardous Substances / Environmental Concern	Disposal / Storage / Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action / Date NFAed
SA 22	1650	1. Flammable liquid 2. Compound Lacquer 3. Compound Paint 4. Corrosive alkaline liquid 5. Electrolyte/battery fluid 6. Flammable solid/lithium batteries 7. Arsenical compound 8. Mercury compound 9. Solvent 10. Solvent 11. Oil 12. Hazardous solid 13. PCBs 14. Hexachlorophene 15. Resarpine 16. Cyclophosphamide 17. Ferric dextran 18. Chlorambucil 19. Chlordane 20. Hexachlorocyclohexane 21. Hexachlorobenzene 22. Formaldehyde 23. 1,1,1 - trichloroethane 24. Toluene 25. Phenol 26. 3-(alpha-acetonylbenzyl)-4-hydroxycoumanin 27. Epinephrine	Storage	35,750 G (1992)	1980 - 1996	1. Unknown 2. Unknown 3. Unknown 4. Unknown 5. Unknown 6. Unknown 7. Unknown 8. NA 9. Unknown 10. Unknown 11. Unknown 12. Unknown 13. 1336363 14. 70304 15. 50555 16. 501180 17. Unknown 18. Unknown 19. 57749 20. 58899 21. 118741 22. 50000 23. 71556 24. 108883 25. 108952 26. Unknown 27. 51434	1. D001 2. D001, D008 3. D001, D007 4. D002 5. D002, D006 6. D003 7. D004, D010 8. D009 9. F001 10. F002 11. M001 12. M001 13. M002 14. U132 15. U200 16. U058 17. U139 18. U035 19. U036 20. U129 21. U127 22. U122 23. U226 24. U220 25. U188 26. P001 27. P042	1. Unknown 2. Unknown 3. Unknown 4. Unknown 5. Unknown 6. Unknown 7. Unknown 8. NA 9. Unknown 10. Unknown 11. Unknown 12. Unknown 13. NA 14. Phenol 2,2'-methylenebis[3,4,6-trichloro- 15. Yohimvan-16-carboxylic acid, 11, 17-dimethoxy-18-[(3, 4, 5-trimethoxybenzoyl)oxy-, methyl esther (3beta, 16beta, 17alpha, 18beta,20alpha)- 16. 2H-1,3,2-Oxazaphosphoran-2-amine,N,N-bis(2-chloroethyl)tetrahydro -,2oxide 17. Unknown 18. Unknown 19. Chlordane, alpha and gamma isomers 4, 7-Methano-1H-indine1, 2, 4, 5, 6, 7, 8, 8-octachloro-2, 3, 3a, 4, 7, 7a-hexahydro- 20. Cyclohexane, 1, 2, 3, 4, 5, 6-hexachloro-, (1alpha,2alpha,3beta,4alpha,5alpha,6beta)gamma-BHC 21. Benzene, hexachloro- 22. NA 23. Ethane, 1, 1, 1- trichloro- Methyl chloroform 24. Benzene, methyl- 25. Benzene, hydroxy- 26. Unknwon 27. 1,2-benzenediol, 4- [1-hydroxy-2-(methylamino)ethyl]-	PA / RCRA Closure 4/ 92

BK 2631 PG 063

PA = Preliminary As
NFA = No Further Action

SI = Site Investigation

Attachment . CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
SA 23	1650	Paper	Storage / Disposal	160 tons/yr	4/84 - 1985	Unknown	Unknown		PA 4/92
SA 24	3644	Explosives 1. PETN (pentaerythritoltetranitrate) 2. RDX (cyclotrimethylene trinitroamine) 3. C-4 (RDX, polyisobutylene) 4. Compounds B (RDX,TNT, Wax) 5. Octol (cyclotetramethylene, tetranitroamine) 6. White phosphorus (aluminum, magnesium, barium, nitrate, potassium, perchlorate) 7. TNT (trinitrotoluene)	Storage	2,000 lbs/yr	1979 - 1995	Unknown	Unknown	Unknown	SI 3/93
SA 29	1438	PCBs	Storage	2000 sq. ft. of storage space (14 PCB containing transformers in 400 sq ft)	1980 - 1995	1336363	M002	NA	SI 1/15/95
SA 30	NA	1. Alkaline cleaners 2. Methyl ethyl ketone 3. JP-4 4. Paint Thinners 5. Waste Oils 6. Fuels 7. Solvents 8. Naptha 9. Dry Cleaning Solution (PD-680) 10. Aircraft Cleaning Compounds 11. Lube oil 12. Waste Solvent	Storage	15 + drums	1975 - 1990	1. Unknown 2. 78933 3-12. Unknown	1. D002 2. U159, F005 3. D001 4. D001, D008, 5-12 Unknown	1. Unknown 2. 2-butanone 3-12. Unknown	SI 3/96
SA 31	NA	Fuel, JP-4 Waste Oil	Disposal	Unknown	1975 - 1986	Unknown	Unknown	Unknown	SI 1/15/95

PA = Preliminary Assessment SI = Site Investigation
NFA = No Further Action

BK 26317 PG 064

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
SA 35	254	Pesticides 1. Malathion 2. Diuron 3. VG Trol 4. Weeder 5. Drycleaning solvents 6. fertilizer	Storage and Release	Unknown	1978-1982 (pesticides) to present for others	1. 121755 2. 330541 3-6. Unknown	1. NA 2. NA 3-6. Unknown	1. NA 2. NA 3-6. Unknown	SI 11/95
SA 38	3713	Waste Electrolyte Cadmium	Storage / Disposal	106 G/mo	Discharge Approx.: 1942 - 1980 Storage: 1980 +	7440439	NA	NA	Removal Action (90 tons soil, 2 55G drums) 9/11/95
SA 43E	F 172	Gasoline	Storage / Release	5000 G UST	1942-1950s 9/3/92 removal	Unknown	Unknown	Unknown	SI 1/95
SA 43F	F 173	Gasoline	Storage / Release	5000 G UST	1942 - 1950s Tank Removed to construct PX in 1972.	Unknown	Unknown	Unknown	SI 1/95
SA 43K	F 178	Gasoline	Storage / Release	5000 G UST 140 tons soil removed	1942-1950s Removed 2/89	Unknown	Unknown	Unknown	SI 1/95
SA 43P	F 183	Gasoline	Storage / Release	5000 G UST	1942-1950s Tank removed prior to 1952.	Unknown	Unknown	Unknown	SI 1/95
SA 43Q	F 184	Gasoline	Storage / Release	5000 G UST	1942 - 1950s Removal dates unknown	Unknown	Unknown	Unknown	SI 1/95

PA = Preliminary As[illegible]
NFA = No Further Act[illegible]
SI = Site Investigation

BK 26317 PG 065

Attachment B. CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens

Site #	Bldg. #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
SA 43R	F 185	Gasoline	Storage / Release	5000 G UST	1942 - 1950s Removed 6/26/92	Unknown	Unknown	Unknown	PA 1/95
SA 47	3816	Heating Fuel	Storage / Release	500 G UST. 15 cy removed soil.	1970 - 1989. Removed 1/11/89 (Replaced with 500 G tank)	Unknown	Unknown	Unknown	Removal Action / SI 6/94
SA 48	202	Waste Oil	Storage / Release	1000 G UST. 80 G of sediment. 100 cy Contaminated soil removed.	1942 - 1989	Unknown	Unknown	Unknown	Removal Action / SI 1/95
SA 59	NA	Lead Paint Contaminated Grit	Release	Unknown # of barrels with lead content of 1275ppm	10/1/90	NA	D008	NA	SI 1/95
AREE 61C	2021	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: 5000G Gasoline USTs 3: Posibble Drywell 4: Cesspool 5: Grease pits	Storage / Disposal	1: Unknown 2: 2 -5000g USTs 3: 1-Drywell 4: 1-Cesspool 5: 2-Grease pits	1942 - 1975	Unknown	Unknown	Unknown	PA 10/95
AREE 61E	1401	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Historic Oil House, Gas Station, Vehicle Maintenance Building, Hazardous Waste Satellite accumulation area 3: Sand and gas trap 4: Oil Water Separators 5: Storm Drain discharge to a field	Storage / Disposal	1: Unknown 2: 1 ea. bldg 3: 1-S&G trap 4: 2-O/W separator 5: 1-SD	1965 - 1993	Unknown	Unknown	Unknown	SI 10/95

PA = Preliminary Assessment SI = Site Investigation
NFA = No Further Action

BK 2631 PG 066

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61T	622	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: 1000G UST	Storage / Disposal	1: Unknown 2:1-1000 gal UST	1952 (1965) - present	Unknown	Unknown	Unknown	PA 10/95
AREE 61U	Across from 694	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Motor Repair Shop, Vehicle Shed, Gasoline Pump Station 3: 5170G UST @ bldg 184 4: Dry well @ bldg 184 5: Cesspool @ bldg 2909 6: Drywell @ bldg 2913	Storage / Disposal	1: Unknown 2: 1 ea. bldg 3: 1-5170 gal UST 4: 1-Drywell 5: 1-Cesspool 6: 1-Drywell	1940s - (1965 - 1972)	Unknown	Unknown	Unknown	SI 11/95
AREE 61Y	3813, 3816, 3818	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Floor Drain w/ Oil water separator 3: Wash Rack w/ Oil water separator 4: Satellite accumulation point for hazardous wastes (Speedi dry, oil filters, magnesium dust, alkaline batteries) 5: Trench drains @ 3813 (UIS) 6: 250G waste oil UST @ 3813 7: 12000G Fuel Oil UST @ 3813 8: 1000G waste oil UST @ 3813(removed 1992) 9: 5000G Fuel Oil UST @ 3818 10: 250G Waste Oil AST @ 3818 11: Satellite Waste Accumulation Area with 55G drums of Speedi dry, and paints and sealants in a storage cabinet @ 3818 12: 500G Diesel UST @ 3816 13: 1000G #2 fuel oil USTs 14: 500G gasoline UST	Storage / Disposal	1: Unknown 2: 1-Floor drain 3: 1 4: 1 5: 2 6: 1 7: 1 8: 1 9: 1 10: 1 11: 1 12: 1 13: 3 14: 1	1941 - present	Unknown	Unknown	Unknown	PA 10/95

PA = Preliminary As

NFA = No Further Action

SI = Site Investigation

BK 2631 PG 067

Attachment L. CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg. #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61AA	3712	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Oil water separators	Storage / Disposal	1: Unknown 2: 2	1940's - 1991	Unknown	Unknown	Unknown	PA 10/95
AREE 61AC	207	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Hazardous waste accumulation area for lead chips 3: Floor Drain	Storage / Disposal	1: Unknown 2: Unknown (1 35G drum found during inspection) 3: 1	1990 - 1991 (Drum dated 1/20/93)	Unknown	Unknown	Unknown	PA 10/95
AREE 61AD	247	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Satellite accumulation point 55G drums of waste Speedi dry, Oil filters, and antifreeze 3: 1000G #2 fuel oil UST 4: 250G Waste oil AST	Storage / Disposal	1: Unknown 2: Unknown 3: 1 4: 1	Unknown	Unknown	Unknown	Unknown	PA 10/95
AREE 61AE	1672	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Satellite accumulation point of unknown substance(s) 3: Floor Drains 4: 1000G #2 fuel oil UST	Storage / Disposal	1: Unknown 2: Unknown 3: 3 4: 1	1941 - present	Unknown	Unknown	Unknown	PA 10/95
AREE 61AG	3809	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Satellite accumulation point of petroleum, oil, and lubricants 3: Waste rags, jet fuel, antifreeze, spent naptha	Storage / Disposal	1: Unknown 2: 2 containers of unknown size (equipment and tires), 3 - 55G drums (unused motor oil) 3: Unknown	WWII - Present	Unknown	Unknown	Unknown	PA 10/95

BK 26317 PG 068

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61AH	1453	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Satellite accumulation point and photo lab 3: Floor Drains and Grease Trap (tiled over) 4: Waste developing solution	Storage / Disposal	1-4: Unknown	1970s - present (photo lab)	Unknown	Unknown	Unknown	PA 10/95
AREE 61AK	12	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Print shop 3: Electrostatic solution 4: Blank roller solvent 5: Deglazing solvent stored in non-flammable cabinets	Storage / Disposal	1-5: Unknown	Unknown - 1993	Unknown	Unknown	Unknown	PA 10/95
AREE 61AL	3	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Waste accumulation area / duplicating shop 3: Magnetic tape with small % silver	Disposal / Storage	1-2: Unknown 3: Silver 5G pails (total unknown)	Unknown	Unknown	Unknown	Unknown	PA 10/95
AREE 61AO	1450	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Satellite accumulation point 3: Floor Drains and Grease trap tiled over 4: waste film developing solution from X ray machine	Disposal / Storage	1-3: Unknown 4: 60G / yr.	Unknown	Unknown	Unknown	Unknown	PA 10/95
AREE 61AR	171	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Hospital Equipment storage site and historic gas station 3: 5000G USTs 4: Drywell	Disposal / Storage	1-2: Unknown 3: 2 4: 1	Unknown	Unknown	Unknown	Unknown	PA 10/95

PA = Preliminary As[illegible] SI = Site Investigation
NFA = No Further Action

BK 26317 PG 069

Attachment . CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg. #	Hazardous Substances / Environmental Concern	Disposal / Storage / Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61AS	2020	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Historic Gas Station 3: 5170G Gasoline UST 4: bldg 172 Drywell 5: bldgs 2046, 2020 Drain discharge to cesspool 6: 5000G Fuel Oil @ 2020	Disposal / Storage	1: Unknown 2: 4 bldgs 3: 1 4: 1 5: 2 6: 1	1942 - Unknown	Unknown	Unknown	Unknown	SI 10/95
AREE 61AT	NA	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Historic Gas Station 3: 5000G UST @ 185 4: Drywell @ 185 5: Cesspool @ 2012 6: Vehicle Shed (2013)	Disposal / Storage	1: Unknown 2: 3 bldgs 3: 1 4: 1 5: 1 6: 1	1942 - 1950s	Unknown	Unknown	Unknown	SI 10/95
AREE 61AV	1417, 1419, 1420	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: POL Yard 3: Floor Drains @ 1420 4: Floor Drains @ 1417 5: 55G drums Waste Oil @ 1417 6: 4000G Kerosene Tank @ 1419 (63D) 7: 5000G UST @ 1419	Disposal / Storage	1: Unknown 2: 3 Bldgs (1417, 1419, 1420) 3: 3 4: 2 5: Unknown 6: 1 (removed) 7: 1 (possible)	1940's - present	Unknown	Unknown	Unknown	PA 10/95
AREE 61AW	3591	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: 5000G #2 fuel oil UST (63AT) 3: Floor Drains 4: Sand and Gas trap 5: 90 day hazardous waste storage building (actually stored hazardous material training equipment)	Disposal / Storage	1: Unknown 2: 1 3: unknown 4: 1 5: unknown	1965 - present	Unknown	Unknown	Unknown	PA 10/95

BK 26317 PG 070

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens

Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61AX	1410	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Oil water separators within storm water catch basins 3: Historic gas station (63AP) tanks removed by EA in 1988 a: 1500G Gasoline b: 2500G Gasoline	Disposal / Storage	1: Unknown 2: 4 3a: 3 3b: 1	1991-present	Unknown	Unknown	Unknown	PA 10/95
AREE 61AY	1405	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: 10,000G #2 fuel oil rail car ASTs 3: Storm drains in the storage area discharged to sump	Disposal / Storage	1: Unknown 2: 7* 3: 2 drains, 1 sump	1980 - 1990 *1 of the 7 tanks was removed in 1988	Unknown	Unknown	Unknown	PA 10/95
AREE 61BD	216	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Materials, equipment 3: coal 4: trash and debris	Disposal / Storage	1-4: Unknown	WWI to present	Unknown	Unknown	Unknown	SI 10/95
AREE 61BE	1677	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Containers filled with medical field equipment, Dollies, 50,000 ton Forklift, 5 ton trucks, graders, front-end loaders, dump trucks, misc. medical equipment	Disposal / Storage	1: Unknown 2: Unknown	Unknown - 1995	Unknown	Unknown	Unknown	PA 10/95
AREE 61BF	1457-1466 / 1469 - 1472	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: 55G drums of unknown waste 3: Dirt pile containing diesel product 4: small metal shed containing waste	Disposal / Storage	1: Unknown 2: 2 3: Unknown 4: Unknown	WWII - (Intel school 1954 - 1960) 1993	Unknown	Unknown	Unknown	PA 10/95

PA = Preliminary Ass
NFA = No Further A
SI = Site Investigation

BK 26317 PG 071

Attachment . CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concern for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal / Storage / Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 61BG	NA	1: Oil Water Separators, Hazardous Waste Accumulation Points, POL, Solvents 2: Asphalt and Concrete Debris, reinforcing bar, wire, brick	Disposal	1: Unknown 2: Unknown	mid 1980's - Unknown	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63A	219	1: Previously removed 1000G Waste Oil UST 2: Aroclor 1260 3: TPH (stockpile of removed soil)	Storage / Release	1: 1 (253 tons soil removed) 2: 12µg/g 3: 246ppm	Unknown - 1992	1, 3. Unknown 2. 11096825	1, 3. Unknown2. NA	1, 3. Unknown 2. POLYCHLORINATEDBIPHENYLS(PCBs)	Removal Action / SI 1/4/96
AREE 63B	242	1: Previously removed 1000G Waste Oil UST 2: TPH (stockpile of removed soil)	Storage / Release	1: 1 (54 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / SI 1/4/96
AREE 63D	1419	1: Previously removed 4000G Kerosene UST 2: TPH (stockpile of removed soil)	Storage / Release	1: 1 (400 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63F	1425	1: Previously removed 10,000 #4 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (476 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63G	1429	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (149 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63H	2419	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (315 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63I	2434	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (53 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63J	2452	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (134 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95

BK 26317 PG 072

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal / Storage / Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 63L	2686	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (321 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63M	3774	1: Previously removed 500G Waste Oil UST 2: TPH	Storage / Release	1: 1 (15cy soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63N	3774	1: Previously removed 1000G Waste Oil UST 2: TPH	Storage / Release	1: 1 (62cy soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AP	1429	1: Previously removed 1500G #2 Fuel Oil UST 2: Previously removed 2500G #2 Fuel Oil UST 3: TPH	Storage / Release	1: 3* 2: 1* 3: Unknown *Quantity of soil removed unknown	Unknown - 1988	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AQ	3809	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (49 tons soil removed) 2: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AR	Shirley Housin g Area	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (Unknown quantity of soil removed) 2: Unknown	Unknown - 1991	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AS	Shirley Housin g Area	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (Unknown quantity of soil removed) 2: Unknown	Unknown - 1991	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AT	3500	1: Previously removed 500G Waste Oil UST 2: TPH	Storage / Release	1: 1 (51 tons soil removed) 2: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95

PA = Preliminary Ass
NFA = No Further Ai

SI = Site Investigation

BK 26317 PG 073

Attachment . CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances/Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal / Storage / Release	Quantity	Dates	CASRN /	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 63AW	1404	1: Previously removed 10,000G Diesel UST 2: Previously removed 10,000G gasoline UST 3: TPH	Storage / Release	1: 2 (800 tons soil removed) 2: 1 (250 tons soil removed) 3: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AY	2601	1: Previously removed 1000G Waste Oil UST 2: TPH	Storage / Release	1: 1 (3cy soil removed) 2: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63AZ	2613	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (21.02cy soil removed) 2: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63BA	2613	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (31.16 cy soil removed) 2: Unknown	Unknown - 1989	Unknown	Unknown	Unknown	Removal Action / PA 10/95
AREE 63BF	2432	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (103 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 63BG	2447	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (65 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 63BH	2458	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (82cy soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 63BI	3713	1: Previously removed 1000G #2 Fuel Oil UST 2: TPH	Storage / Release	1: 1 (114 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 63BL	242	1: Previously removed 4000G Gasoline UST 2: TPH	Storage / Release	1: 4 (659 tons soil removed) 2: Unknown	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

BK 26317 PG 074

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concerns	Disposal, Storage, Release	Quantity	Date	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFA Act
AREE 63BN	1401	1. Previously removed 1000G Waste Oil UST	Storage / Release	1: 1 (188 tons soil removed)	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 63BO	219	1. Previously removed 5000G Diesel UST.	Storage / Release	1: 1 (119 tons of soil removed)	Unknown - 1992	Unknown	Unknown	Unknown	Removal Action/SI 1/4/96
AREE 66C	3657	1. PCB (Aroclor 1260)	Release	1: 13 - 55G drums of contaminated soil removed	Found to be leaking 5/ 1992	11096825	Not Listed	POLYCHLORINATED BIPHENYLS (PCBs)	Removal Action/SI 12/7/95
AREE 66D	3575	1. Electrolyte Oil containing PCB	Release	1: approx. 1lb	Unknown	1336363	Not Listed	Not Listed	SI 11/95
AREE 66E	NA	1. PCB	Release	1. Unknown (940ppm PCB in transformer)	1982 - 1990	1336363	Not Listed	Not Listed	SI 11/95
AREE 69H	NA	1. Water Treatment Chemicals	Storage	1. 90 G	8/15/88	Unknown	Unknown	Unknown	Removal Action/PA10/ 95
AREE 69I	3809	1. JP4 Fuel	Release	1. 20 G (70 G initial estimate)	4/9/89	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69J	3818	1. Helicopter Fuel	Release	1. 15 G	4/9/89	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69L	NA	1. Water Treatment Chemicals	Storage	1. 90 G	8/15/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69P	NA	1. BETZ-ENTEC338	Release	1. None	11/6/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69Q	1405	1. Fuel Oil	Release	1. 20 G	10/27/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69T	NA	1. Hydraulic Oil and Gasoline	Release	1. 30 G	1/6/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95

PA = Preliminary Ass
NFA = No Further Ac

SI = Site Investigation

BK 26317 PG 075

Attachment CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal, Storage, Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 69U	NA	1. JP5 Fuel	Release	1. None	3/16/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69V	2517	1. Diesel Fuel	Release	1. 20 G	10/20/87	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69Y	1404	1. Diesel Fuel	Release	1. 50 G	3/30/90	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AA	1404	1. Diesel Fuel	Release	1. 15 G	1/2/92	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AB	Ware-house 16	1. #2 Fuel Oil	Release	1. 10 G	2/9/88	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AG	3713	1. Hydraulic Oil	Release	1. 25 G	1/31/92	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AH	NA	1. Diesel or Kerosene Fuel	Release	1. 5 - 8 G	11/13/90	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AJ	2734	1. Heating Fuel	Release	1. 1 G	11/14/91	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AN	3713	1. Waste Oil	Release	1. Unknown (automotive oil change)	7/11/89	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AO	6	1. #2 Heating Fuel	Release	1. 30 G	1/28/92	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 69AQ	NA	1. Paint Thinner	Release	1. 1 - 3 G	6/1/90	Unknown	Unknown	Unknown	Removal Action/PA 10/95
AREE 70.1	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.2	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.3	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI

PA = Preliminary Assessment
NFA = No Further Action
SI = Site Investigation

BK 26317 PG 076

Attachment B: CERCLA Hazardous Substances at Transferable Sites

Table of Hazardous Substances / Environmental Concerns for Transfer Parcels at Fort Devens									
Site #	Bldg #	Hazardous Substances / Environmental Concern	Disposal/ Storage/ Release	Quantity	Dates	CASRN #	RCRA Waste #	Regulatory Synonym	Response Action/ Date NFAed
AREE 70.4	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.5	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.6	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.7	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.8	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.9	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.14	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.21	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI
AREE 70.25	NA	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	SI

BK 26317 PG 077

EXHIBIT D

THE CONSERVATION PARCELS

PARCEL 1

A certain parcel of land lying on the northwesterly side of Cold Spring Brook and southeasterly of Barnum Road and extending from the B & M property line to the westerly boundary of Parcel 5 as shown on the Plan, and containing approximately 30 acres.

PARCEL 2

A certain parcel of land lying north of Rte. 2 and south of Patton Road, containing approximately 70 acres of land containing the Mirror Lakes and the surrounding wetlands.

PARCEL 3

A certain parcel of land known as the ASP Bog located north of Patton Road, East of Patch Road and West of Marne Street and containing approximately 20 acres of land.

PARCEL 4

A certain parcel of land known as Esker located north of Patton Road and adjacent to the west side of Patch Road. Containing approximately 30 acres of land.

M.5-2

2003 "LEASE PARCEL A.21" DEED

EBS 03031 DCC

Devens 11

A.13, A.14, A.17, A.20
A.21, A.22, A.27, A.28
TT (131.4A)

Bowditch & Dewey
ATTORNEYS

311 Main Street, P.O. Box 15156
Worcester, MA 01615-0156
Telephone: (508) 791-3511
Facsimile: (508) 756-7636
www.bowditch.com

Bowditch & Dewey, LLP

Direct Telephone (508) 926-3418
Direct Facsimile (508) 929-3191
Email: Sfenton@Bowditch.Com

March 19, 2003

received
MAR 20 2003

Mr. Benjamin Goff
U.S. Army
Devens Reserve Forces Training Den
BRAC Environmental Office
30 Quebec Street, Box 100
Devens, MA 01432-4422

Re: Quitclaim Deed - Parcel A.13, A.14, A.17, A.20, A.21, A.22, A.27, and A.28

Dear Ben:

In reference to the above matter, enclosed herewith please find a recorded copy of the Quitclaim Deed.

Please contact me with any questions and/or comments you may have.

Sincerely,

Scott T. Fenton /dmw

Scott T. Fenton

STF/dmw
Enclosure

{J:\CLIENTS\rea\300639\0018\00346989.DOC;1}

RECORDED
03 MAR 18 AM 11:45
ANTHONY J. VIGLIOTTI
REGISTER

Inst 73770

Property - land located within the Devens Regional Enterprise Zone, Towns of Harvard and Ayer, Worcester County, MA.

Quitclaim Deed

Parcels A.13, A.14, A.17, A.20, A.21, A.22, A.27, and A.28

WHEREAS, pursuant to the Defense Base Realignment and Closure Act of 1990 (Public Law 101-510, as amended, and codified at 10 U.S.C. 2687, note) ("BRAC"), the United States of America, acting by and through the Department of the Army (referred to hereinafter as the "Army" or "Grantor") closed the military installation located at Fort Devens, Massachusetts ("Fort Devens"), and has made a final disposal decision with respect thereto; and

WHEREAS, pursuant to Chapter 498 of the Massachusetts Acts of 1993 as amended, the Massachusetts Development Finance Agency (referred to hereinafter as "MassDevelopment" or "Grantee"), successor in interest to the Government Land Bank under Chapter 289 of the Acts of 1998, notice of which was recorded on October 7, 1998, with the Worcester District Registry of Deeds in Book 20505, Page 279, and with the Middlesex County, Southern District, Registry of Deeds in Book 29188, Page 568, was granted the exclusive authority to oversee and implement the civilian reuse of Fort Devens in accordance with a locally approved reuse plan and bylaws and designated as the Local Redevelopment Authority under BRAC; and

WHEREAS, pursuant to a Memorandum of Agreement entered into between the Grantor and the Grantee on May 9, 1996 ("MOA"), as amended from time to time, the Grantor transferred certain portions of Fort Devens to the Grantee by quitclaim deed dated May 9, 1996, recorded with the Middlesex County, Southern District, Registry of Deeds in Book 26317, Page 003, and with the Worcester District Registry of Deeds in Book 17907, Page 001, and leased certain other portions of Fort Devens (the "Leased Parcels") to the Grantee through a Lease in Furtherance of Conveyance ("Lease"), a Notice of Lease dated May 9, 1996 (the "Notice of Lease"), was recorded with the Middlesex County, Southern District, Registry of Deeds in Book 26340, Page168, and with the Worcester District Registry of Deeds in Book 17922, Page 223, pending the

Return to Scott T. Fenton
Bowditch & Dewey LLP
311 Main Street
Worcester, MA 01608

completion of certain environmental clean-up activities on the Leased Parcels by the Grantor; and

WHEREAS, the terms of the MOA provide, among other things, that upon the completion of the environmental clean-up of any of the Leased Parcels pursuant to: applicable law, the approval of a Finding of Suitability of Transfer ("FOST") by the Grantor, the United States Environmental Protection Agency ("EPA") and the Massachusetts Department of Environmental Protection ("DEP") and in accordance with the Department of Defense policy guidance, the Grantor will convey said Leased Parcel(s) to the Grantee for consideration of less than one hundred dollars ($100.00);

WHEREAS, the FOSTs for Leased Parcels A.13, A.14, A.17, A.20, A.21, A.22, A.27, and A.28, said parcels being identified on a plan entitled "Plan of Land Conveyed to the Government Land Bank by the Secretary of the Army, Ayer, Harvard and Shirley MA," (the "Leased Parcel Plan") dated May 9, 1996, recorded with the Worcester District Registry of Deeds in Plan Book 703, Plan 112, and with the Middlesex County, Southern District, Registry of Deeds, as Plan 500 of 1996, were approved by the Grantor in accordance with the applicable Department of Defense policy guidelines, the EPA and DEP.

WHEREAS, the Grantee has requested and the Grantor has agreed to convey Leased Parcels A.13, A.14, A.17, A.20, A.21, A.22, A.27, and A.28 to the Grantor.

KNOW ALL MEN BY THESE PRESENTS: that the UNITED STATES OF AMERICA, acting by and through the DEPUTY ASSISTANT SECRETARY OF THE ARMY (Installations and Housing) (the "Grantor"), pursuant to a delegation of authority from the Secretary of the Army, under and pursuant to the Defense Base Realignment and Closure Act of 1990, Public Law 101-510, as amended, and codified at 10 U.S.C. § 2687 ("BRAC") and the Federal Property and Administrative Service Act of 1949, as amended, and codified at 40 U.S.C. § 484, for the utilization and disposal of excess and surplus

property at closed and realigned military installations, for consideration paid of less than $100.00 the receipt and sufficiency of which is hereby acknowledged, does hereby grant, remise, release, and forever quitclaim unto the Massachusetts Development Finance Agency (the "Grantee"), a Massachusetts body politic and corporate created by Chapter 23G of the Massachusetts General Laws, and successor in interest to the Government Land Bank under Chapter 289 of the Acts of 1998, notice of which was recorded with the Worcester District Registry of Deeds in Book 20505, Page 279, and with the Middlesex County, Southern District, Registry of Deeds in Book 29188, Page 568, having a principal place of business located at 75 Federal Street, 10th Floor, Boston, Massachusetts 02110, and designated as the Local Redevelopment Authority under BRAC, all its right, title, and interest in and to Leased Parcels A.13, A.14, A.17, A.20, A.21, A.22, A.27, and A.28 located in the Towns of Ayer and Harvard, Counties of Middlesex and Worcester, Commonwealth of Massachusetts (the "Property"), and shown on a plan entitled "Plan of Land Conveyed to the Government Land Bank by the Secretary of the Army, Ayer, Harvard and Shirley MA," (the "Leased Parcel Plan") dated May 9, 1996, recorded with the Worcester District Registry of Deeds in Plan Book 703, Plan 112, and more particularly described in Exhibit A, attached hereto and made a part hereof, and in the Notice of Lease. The Grantor and the Grantee hereby release any and all rights in the Property under said Notice of Lease, and under the Lease referenced therein, it being agreed that the Lease shall remain in full force and effect with regard to the other Leased Parcels not being conveyed hereunder.

The Property includes:

1. all buildings, facilities, utility systems, utilities, utility lines and poles, conduits, infrastructure, roadways, railroads, bridges, and improvements thereon and appurtenances thereto;

2. all easements, reservations, and other rights appurtenant thereto;

3. all hereditaments and tenements therein and reversions, remainders, issues, profits, and other rights belonging or related thereto; and

4. all mineral rights.

The legal description of the Property, attached hereto as Exhibit A, has been prepared by the Grantee and the Grantee shall be responsible for the accuracy of the description of the Property conveyed herein and shall indemnify and hold the Grantor harmless from any and all liability resulting from any inaccuracy in the description.

I. CERCLA COVENANTS AND NOTICE

Pursuant to Section 120(h)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 et seq. ("CERCLA"):

A. The Grantor hereby notifies the Grantee of the storage, release, and disposal of hazardous substances, as defined under Section 101 of CERCLA, on the Property. Available information regarding the type, quantity, and location of such hazardous substances and actions taken with regard to the Property is set forth in each Finding of Suitability to Transfer ("FOST"), attached hereto as Exhibit B. The information regarding the storage, release, and disposal of any hazardous substances on the Property indicates that there is no threat to human health and the environment.

B. The Grantor hereby covenants that:

1. all remedial action necessary to protect human health and the environment with respect to any such hazardous substances remaining on the Property has been taken prior to the date of conveyance hereunder; and

2. any additional remedial action found to be necessary with regard to such hazardous substances after the date of the conveyance that resulted from past activities of the Grantor shall be conducted by the Grantor except as otherwise provided under Section 120(h) of CERCLA. This covenant in Subsection B.2 shall not apply in any case in which the person or entity to whom the Property is transferred is held to be a potentially responsible party under CERCLA with respect to the release of any hazardous substances on the Property.

II. ACCESS RIGHTS RESERVED UNDER CERCLA

The Grantor hereby reserves, and the Grantee takes the Property subject to, a right of access on, over and through the Property as necessary to conduct any necessary investigation, response action, corrective action, or other activity necessary for the Grantor to fulfill its environmental responsibilities under this Deed or applicable law or regulation. In exercising the rights hereunder, the Grantor shall give the Grantee or its successors or assigns reasonable notice of actions to be taken on the Property pursuant to this reserved easement and shall, to the extent reasonable, consistent with the Federal Facilities Agreement (FFA) defined hereunder and applicable law and regulation, and at no additional cost to the United States, endeavor to minimize the disruption to the Grantee's, its successors', or assigns' use of the Property.

III. FEDERAL FACILITIES AGREEMENT

By accepting this deed, the Grantee acknowledges that the Grantor has provided the Grantee with a copy of the Federal Facilities Agreement (the "FFA") entered into between the Grantor and the EPA dated May 11, 1991, and the modification thereto, dated March 26, 1996. The Grantor shall provide the Grantee with a copy of any future amendments to the FFA.

A. The Grantor, EPA, The Commonwealth of Massachusetts, and their respective agents, employees, and contractors, shall have such access to, over and through the Property as may be necessary for any investigation, response, or corrective action pursuant to CERCLA or the FFA found to be necessary before or after the date of this deed on the Property or on other property comprising the Fort Devens National Priorities List (the "NPL") site. This reservation includes the right of access to, and use of, to the extent permitted by law, any available utilities at reasonable cost to the Grantor, EPA and DEP.

B. In exercising the rights hereunder, the Grantor, The Commonwealth of Massachusetts and the EPA shall give the Grantee or its successors or assigns reasonable notice of actions taken on the Property under the FFA and shall, to the extent reasonable, consistent with the FFA, and at no additional cost to the Grantor, The Commonwealth of Massachusetts and the EPA endeavor to minimize the disruption to the Grantee's, its successors' or assigns' use of the Property.

C. The Grantee agrees that notwithstanding any other provision of this deed, the Grantor assumes no liability to the Grantee, its successors or assigns, or any other person, should implementation of the FFA interfere with the use of the Property. The Grantee and its successors and assigns shall have no claim on account of any such interference against the Grantor or The Commonwealth of Massachusetts, EPA or any officer, agent, employee, or contractor thereof.

D. Prior to the determination by the Grantor, EPA and DEP that all remedial action is complete under CERCLA and the FFA on the Property, the Grantee, its successors and assigns, shall not undertake activities on the Property that would interfere with or impede the completion of the CERCLA clean-up on the Property and shall give prior written notice to the Grantor, the EPA, and The Commonwealth of Massachusetts, acting by and through the DEP of any construction, alterations, or similar work on the Property that may interfere with or impede said clean-up.

E. The Grantee, its successors and assigns shall comply with any institutional controls established or put in place by the Grantor, EPA or DEP relating to the Property which are required by any FOST, or Record of Decision ("ROD") or amendments thereto, related to the Property, which ROD shall be approved by the Grantor and EPA and issued by the Grantor pursuant to CERCLA or the FFA before or after the date of this deed. Additionally, the Grantee shall ensure that any leasehold it grants in the Property or any fee interest conveyance of any portion of the Property provides for legally-binding compliance with the institutional controls required by any such FOST or ROD.

F. For any portion of the Property subject to a response action under CERCLA or the FFA, prior to the conveyance of an interest therein, the Grantee shall include in all conveyances provisions for allowing the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to CERCLA or the FFA on said portion of the Property and shall notify the Grantor, EPA, and the DEP by certified mail, at least thirty (30) days prior to any such conveyance of an interest in said Property, which notice shall include a description of said provisions allowing for the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to CERCLA or the FFA.

G. Prior to the determination by the Grantor and EPA that all remedial action under CERCLA and the FFA is complete for the Fort Devens NPL site, the Grantee and all subsequent transferees of an interest in any portion of the Property will provide copies of the instrument evidencing such transaction to the DEP, the EPA, and the Grantor by certified mail, within fourteen (14) days after the effective date of such transaction.

H. The Grantee and all subsequent transferees shall include the provisions of this Section III in all subsequent leases, transfer, or conveyance documents relating to the

Property or any portion thereof that are entered into prior to a determination by the Grantor that all remedial action is complete at the Fort Devens NPL site.

IV. FINAL BASE-WIDE ENVIRONMENTAL BASELINE SURVEY AND FOST.

The Grantee has received the technical environmental reports, including the Final Base-Wide Environmental Baseline Survey prepared by Arthur D. Little, Inc. dated March 1996, (the "Base-Wide EBS"), and the individual FOSTs for the Property attached hereto as Exhibit B, prepared by, or on behalf of, the Grantor, the Grantee, and others, and agrees, to the best of the Grantor's knowledge, that said FOSTs accurately describe the environmental conditions of the Property. The Grantee has inspected the Property and accepts the physical condition and current level of known hazardous substances on the Property as disclosed in the individual FOSTs and/or the Base-Wide EBS and deems the Property to be safe for the Grantee's intended use. If, after conveyance of the Property to the Grantee, there is an actual or threatened release of a hazardous substance (as defined under Section 101 of CERCLA) on, under, from the Property, or in the event that a hazardous substance is discovered on or under the Property after the date of the conveyance hereof, whether or not such hazardous substance was set forth in the technical environmental reports, including the individual FOST's or the Base-Wide EBS, Grantee or its successor or assigns shall be responsible for such release or newly discovered hazardous substance unless the Grantee is able to demonstrate that such release or such newly discovered hazardous substance was due to Grantor's prior activities, ownership, use, or occupation of the Property, or the activities of the Grantor's contractors, employees, and/or agents. The Grantee, its successors and assigns, and as consideration for the conveyance, agree to release the Grantor from any liability or responsibility for any claims arising out of or in any way predicated on the release of any hazardous substance on the Property occurring after the conveyance, where such hazardous substances were placed on the Property by the Grantee, or its agents, employees, invitees, or contractors, after the conveyance.

V. "AS IS"

The Property and personal property located thereon is conveyed under this deed in an "as is", where is condition, without any representation or warranty whatsoever by the Grantor concerning the state of repair or condition of said Property, unless otherwise noted herein.

VI. WETLANDS AND FLOODPLAINS

A. General Provisions

The Property may contain wetlands protected under state, federal and local laws and regulations. Applicable laws and regulations restrict activities that involve draining wetlands or the discharge of fill materials into wetland areas, including, without limitation, the placement of fill materials; the building of any structure; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and dams and dikes. To fulfill the Grantor's commitment in the Fort Devens Disposal and Reuse Environmental Impact Statement Record of Decision, made in accordance with the National Environmental Policy Act of 1969, 42 U.S.C. §4321 et seq., this deed provides for protection of wetlands beyond what would otherwise specifically be required under federal and state law.

B. Wetlands Protection

To protect water quality, groundwater recharge, and wildlife habitat, the Grantee, its successors, and assigns shall restrict activities within and protect any wetlands on the Property herein conveyed; as provided for in Article VII.C. of the Devens By-Laws, dated November 18, 1994, and approved by the towns of Ayer, Harvard, and Shirley on December 7, 1994, as said Article VII.C. of the Devens By-Laws may be amended from time to time in accordance with applicable law, provided that any such amendment will

not affect the obligation of the Grantee and its successors and assigns hereunder to comply with Article VII.C. of the Devens By-Laws, in its form as of the date of this Deed, unless such amendment receives the written consent of the DEP.

C. Enforcement

The Grantee covenants for itself, its successors, and assigns that the Grantee, its successors and assigns shall include, and otherwise make legally binding, the restrictions in this Section VI in all subsequent lease, transfer, or conveyance documents relating to the Property, provided that the Property contains wetlands protected by applicable state or federal law. The restrictions and protections provided for in this Section VI shall run with the land. The restrictions in this Section VI benefit the lands retained by the Grantor that formerly comprised Fort Devens, as well as the public generally. The Grantor and/or The Commonwealth of Massachusetts shall have the right to enforce the wetlands restrictions provided for in this Section by appropriate legal proceedings and to obtain injunctive and other equitable relief against any violations, including, without limitation, relief requiring restoration of any of the Property to its condition prior to the time of the injury complained of, and shall be in addition to, and not in limitation of, any other rights and remedies available to the Grantor and The Commonwealth of Massachusetts.

VII. NOTICE OF THE PRESENCE OF ASBESTOS

A. The Grantee is hereby informed and does acknowledge that the buildings located on the Property may contain friable and non-friable asbestos or asbestos-containing materials ("ACM") as identified in the individual FOSTs, the Base-Wide EBS and the Area Requiring Environmental Evaluation 65 ("AREE 65") prepared for the Grantor by Arthur D. Little, Inc., dated May 1995.

B. The Grantee covenants and agrees that its use and occupancy of the Property will be in compliance with all applicable laws relating to asbestos, and that the Grantor

assumes no liability for any future remediation of asbestos or damages for personal injury, illness, disability, or death, to the Grantee, its successors or assigns, or to any other person, including members of the general public, arising from or incident to the purchase, transportation, removal, handling, use, disposition, or other activity causing or leading to contact of any kind whatsoever with asbestos or ACM on the Property, whether the Grantee, its successors or assigns have properly warned or failed to properly warn the individual(s) injured. The Grantee assumes no liability for damages or remediation for personal injury, illness, disability, death or property damage arising from (i) any exposure to asbestos or ACM that resulted prior to the Grantor's conveyance of such portion of the property to the Grantee pursuant to this Deed or any leases entered into between the Grantor and Grantee, or (ii) any disposal or mishandling of asbestos or ACM by the Grantor prior to the Grantor's lease or deed conveyance of the Property to the Grantee.

C. The Grantee agrees to be responsible for any future remediation of asbestos identified in the Base-Wide EBS, the respective FOSTs, or AREE 65 which is determined to be necessary on the Property after the date of the Lease. The Grantor assumes no liability for damages or remediation for personal injury, illness, disability, death or property damage arising from: (i) any exposure to asbestos or ACM that resulted due to the Grantee's failure to comply with any legal requirements applicable to asbestos on any portion of the Property, or (ii) any disposal of asbestos or ACM, after the date of lease or deed conveyance of the Property to the Grantee.

D. The Grantee further agrees to bear full responsibility for and discharge the Grantor, its officers, agents and employees, from and against all suits, claims, demands or actions, liabilities, judgments, costs and attorneys' fees to the extent arising out of, or in any manner predicated upon, exposure to asbestos, identified in the Base-Wide EBS, the respective FOSTs, or AREE 68 on any portion of the Property, which exposure occurs after the date of lease or deed conveyance of the Property to the Grantee, or any future remediation or abatement of asbestos on any portion of the Property or the need therefor.

E. The Grantee acknowledges that it has had the opportunity to inspect the property as to asbestos content and condition and any hazardous or environmental conditions related thereto. The failure of the Grantee to inspect or to be fully informed regarding the content or quantity of ACM as described in the EBS will not constitute grounds for any claim or demand against the Grantor, except as may be otherwise provided in this Deed.

VIII. NOTICE OF THE PRESENCE OF UNDERGROUND STORAGE TANKS

The Grantee is hereby informed and does acknowledge that USTs may have been located on the Property, as described in the Base-Wide EBS and/or respective FOSTs. The Grantee has further been informed by the Grantor that all USTs that have been removed from the Property were tested at the time of removal, and any contamination identified was removed or remediated prior to backfilling.

IX. NOTICE OF THE PRESENCE OF RADON

Available and relevant radon assessment data pertaining to the Property is in the Base-Wide EBS and/or the respective FOSTs, the receipt of which the Grantee hereby acknowledges.

X. NOTICE OF THE PROGRAMMATIC AGREEMENT

The Grantee agrees to comply with applicable provisions of the Programmatic Agreement among the Grantee, the Advisory Council on Historic Preservation, and the Massachusetts Historic Commission dated March 20, 1996, (the "Programmatic Agreement") which pertain or otherwise apply to the Property. The Programmatic Agreement regulates those activities that may affect structures, facilities, or cultural or archeological sites eligible for or listed on the National Register of Historic Places.

XI. NOTICE OF UNEXPLODED ORDANCE

The Grantor completed a comprehensive records search, and based on that search, has undertaken and completed statistical and physical testing of areas on the Property, if any, where the existence of unexploded ordnance ("UXO") was considered to be present. Based upon said search and testing, the Grantor represents that, to the best of its knowledge, no UXO is currently present on the Property. The Grantor and the Grantee acknowledge that, due to the former use of the Property as a part of an active military installation and notwithstanding the above records search and testing, UXO may still exist on the Property. Upon due notice, the Grantor agrees to remove any such remaining UXO discovered on the Property, as required under applicable law and regulation, as expeditiously and reasonably as possible, subject to the availability of funds.

XII. NOTICE OF THE PRESENCE OF LEAD-BASED PAINT

Notice of the Presence of Lead Based Paint and Covenant Against the Use of the Property for Residential Purposes. (See Exhibit C.)

A. The Grantee is hereby informed and does acknowledge that all buildings on the Property, which were constructed or rehabilitated prior to 1978, are presumed to contain lead-based paint as disclosed to the Grantee under Section 1611.d. of the Lease, the Base-Wide EBS and the Area Requiring Environmental Evaluation 68 ("AREE 68") prepared by the Grantor. Lead from paint, paint chips, and dust can pose health hazards if not managed properly. The provisions of this Section XII shall apply only to the extent the presence of lead-based paint was disclosed in either these deeds, the Base-Wide EBS, the individual FOSTs or AREE 68.

B. The Grantee agrees to be responsible for any future abatement and/or disposal of lead-based paint identified in these deeds, the Base-Wide EBS, the FOSTs or

AREE 68 which is determined to be necessary on the Property after the date of lease or deed conveyance of the Property to the Grantee.

C. The Grantor assumes no liability for damages or remediation for personal injury, illness, disability, death or property damage arising from: (i) any exposure to lead based paint hazards that resulted from the Grantee's failure to comply with any applicable federal, state or local legal requirements for lead based paint abatement that resulted from the Grantee's demolition of the buildings, or (ii) any disposal of lead based paint debris arising from the Grantee's use of the Property after the date of lease or deed conveyance of the Property to the Grantee.

D. The Grantee further agrees to bear full responsibility for and discharge the Grantor, its officers, agents and employees, from and against all suits, claims, demands, or actions, liabilities, judgments, costs and attorneys' fees to the extent arising out of, or in any manner predicated upon personal injury, death or property damage resulting from, related to, caused by or arising out of the Grantee's mishandling of the lead based paint or lead based paint hazards on the Property.

E. The Grantee shall provide any purchaser of any interest in Residential Real Property with a copy of the Lead-Paint Notice attached hereto as Exhibit C, or other such notice as may be required under state or federal law.

XIII. NON-WAIVER OF CERCLA CLAIMS

Nothing contained in this Deed shall affect the Grantor's responsibilities to conduct response actions or corrective actions that are required by the FFA, CERCLA or other applicable law, rules and regulations, or the Grantor's indemnification obligations under Section 330 of the National Defense Base Authorization Act of 1993, as amended.

XIV. NOTICE OF NON-DISCRIMINATION

With respect to activities related to the Property, the Grantee shall not discriminate against any person or persons or exclude them from participation in the Grantee's operations, programs or activities conducted on the Property because of race, color, religion, sex, age, handicap, or national origin.

XV. INDEMNIFICATION

A. The Grantor recognizes its obligation to hold harmless, defend, and indemnify the Grantee and any successor, assignee, transferee, lender, or lessee of the Grantee or its successors and assigns, as provided in Section 330 of the Department of Defense Authorization Act of 1993, as amended, and to otherwise meet its obligations under law, subject to the availability of appropriated funds.

B. The Grantee shall indemnify and hold the Grantor harmless from all claims, liability, loss, cost, environmental contamination, or damage arising out of or resulting from the activities of the Grantee, its agents, employees, or contractors on the Property prior to the date of this Deed, except where such claims, liability, loss, cost, environmental contamination, or damage is the result of the gross negligence or willful misconduct of the Grantor or its employees, agents, or contractors.

XVI. ANTI-DEFICIENCY ACT

The Grantor's obligation to pay or reimburse any money under this Deed is subject to the availability of appropriated funds to the Department of the Army, and nothing in this Deed shall be interpreted to require obligations or payments by the United States in violation of the Anti-Deficiency Act, 31 U.S.C. Section 1341.

IN WITNESS WHEREOF, the Grantor hereunder sets its hand and seal as of the 11th day of February, 2007.3

UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY

By: Joseph W. Whitaker
Joseph W. Whitaker
Deputy Assistant Secretary of the Army
(Installations and Housing) OASA (I&E)

COMMONWEALTH OF VIRGINIA
COUNTY OF ARLINGTON

I, the undersigned, a Notary Public in and for the Commonwealth of Virginia, County of Arlington, whose commission as such expires on the 30th day of November, 2006, do hereby certify that this day personally appeared before me in the Commonwealth of Virginia, County of Arlington, Joseph W. Whitaker, Deputy Assistant Secretary of the Army (I&E), whose name is signed to the foregoing instrument and acknowledged the foregoing instrument to be his free act and deed, dated this 11th day of February, 2003 and acknowledged the same for and behalf of the UNITED STATES OF AMERICA

Karen A. Cooper
Notary Public
My Commission Expires: 30 November 2006

KAREN A. COOPER NOTARY PUBLIC STATE OF VIRGINIA

Parcels A.13, A.14, A.17, A.20,
A.21, A.22, A.27 and A.28

ACCEPTANCE: The Massachusetts Development Finance Agency, a Massachusetts body politic and corporate created by Chapter 23G of the Massachusetts General Laws, successor in interest to the Government Land Bank under Chapter 289 of the Acts of 1998, as amended, by its duly qualified and authorized President, Michael P. Hogan, does hereby accept and approve this Quitclaim Deed and agrees to all of the terms and conditions thereof as of the 12th day of March, 2003.

MASSACHUSETTS DEVELOPMENT
FINANCE AGENCY

By: _____
Name: Michael P. Hogan
Title: President

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss March 12, 2003

Then personally appeared the above named Michael P. Hogan, President of the Massachusetts Development Finance Agency, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of said Agency, before me

_____
Notary Public:
My Commission expires: 8/6/2004

Exhibits:

A: Property Description
B. FOST's
C. Lead Paint Notice

Exhibit A

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

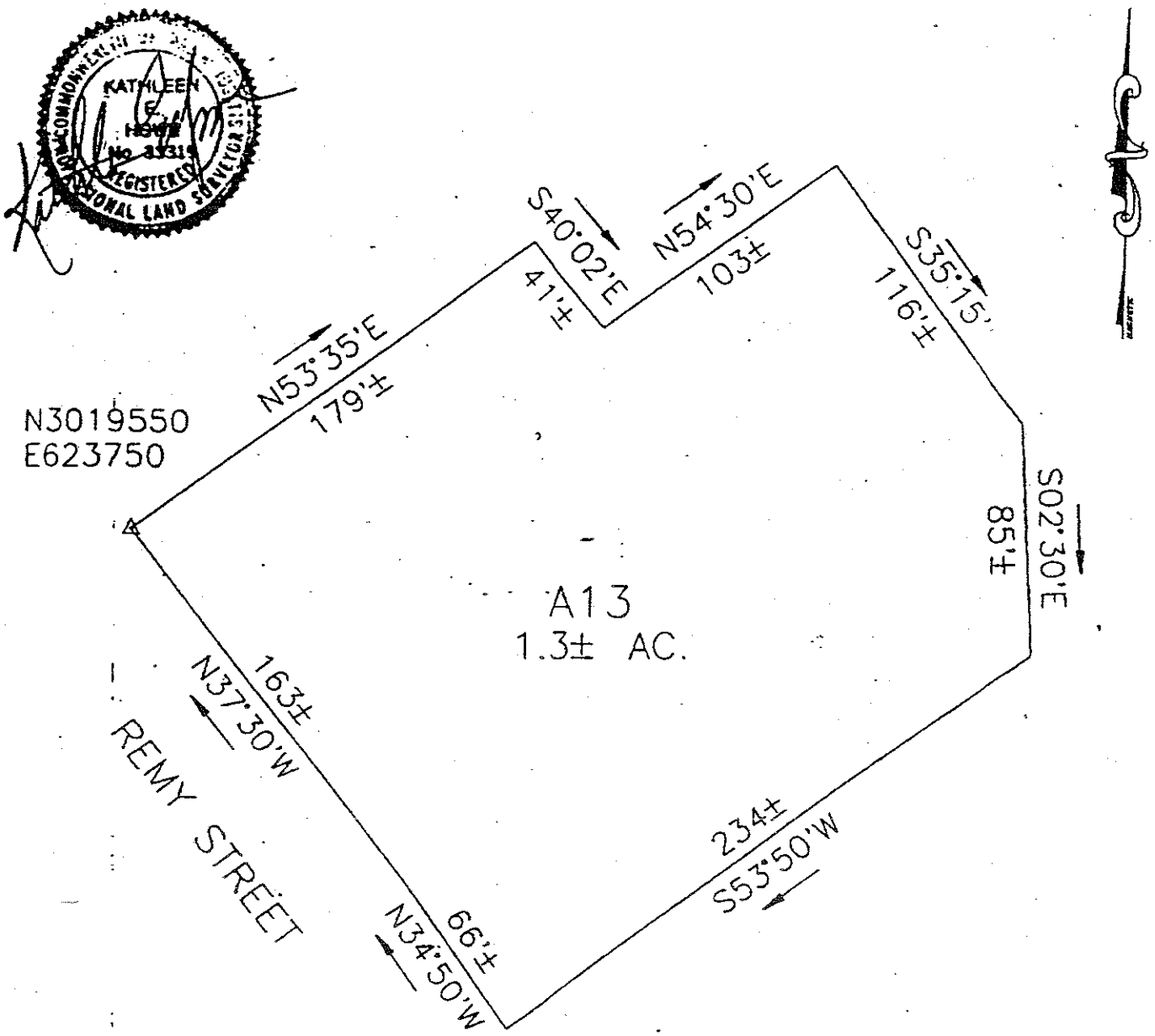
Legal Property Description of Parcel A.13

Beginning at a point with the NAD coordinates (± 50') N3019550, E623750.

- Thence N53° 35'E, one hundred and seventy nine feet ±, (179' ±) to a point;
- Thence S40° 02'E, forty one feet ±, (41' ±) to a point;
- Thence N54° 30'E, one hundred and three feet ±, (103' ±) to a point;
- Thence S35° 15'E, one hundred and sixteen feet ±, (116' ±) to a point;
- Thence S02° 30'E, eighty five feet ±, (85' ±) to a point;
- Thence S53° 50'W, two hundred and thirty four feet ±, (234' ±) to a point;
- Thence N34° 50'W, sixty six feet ±, (66' ±) to a point
- Thence N37° 30'W, one hundred sixty three feet ±, (163' ±) to the point of beginning.

Said parcel contains 58,650 square feet ±, or 1.3 acres ±. Said parcel also contains buildings 2289, 2290, and 2299.

EXHIBIT "A"



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

PLAN OF LEASED PARCEL A13 CONVEYED TO THE GOVERNMENT LAND BANK, HARVARD, MA

PREPARED FOR:

THE GOVERNMENT LAND BANK

DATE 05-09-1996

SCALE 1"=60'

EXHIBIT A

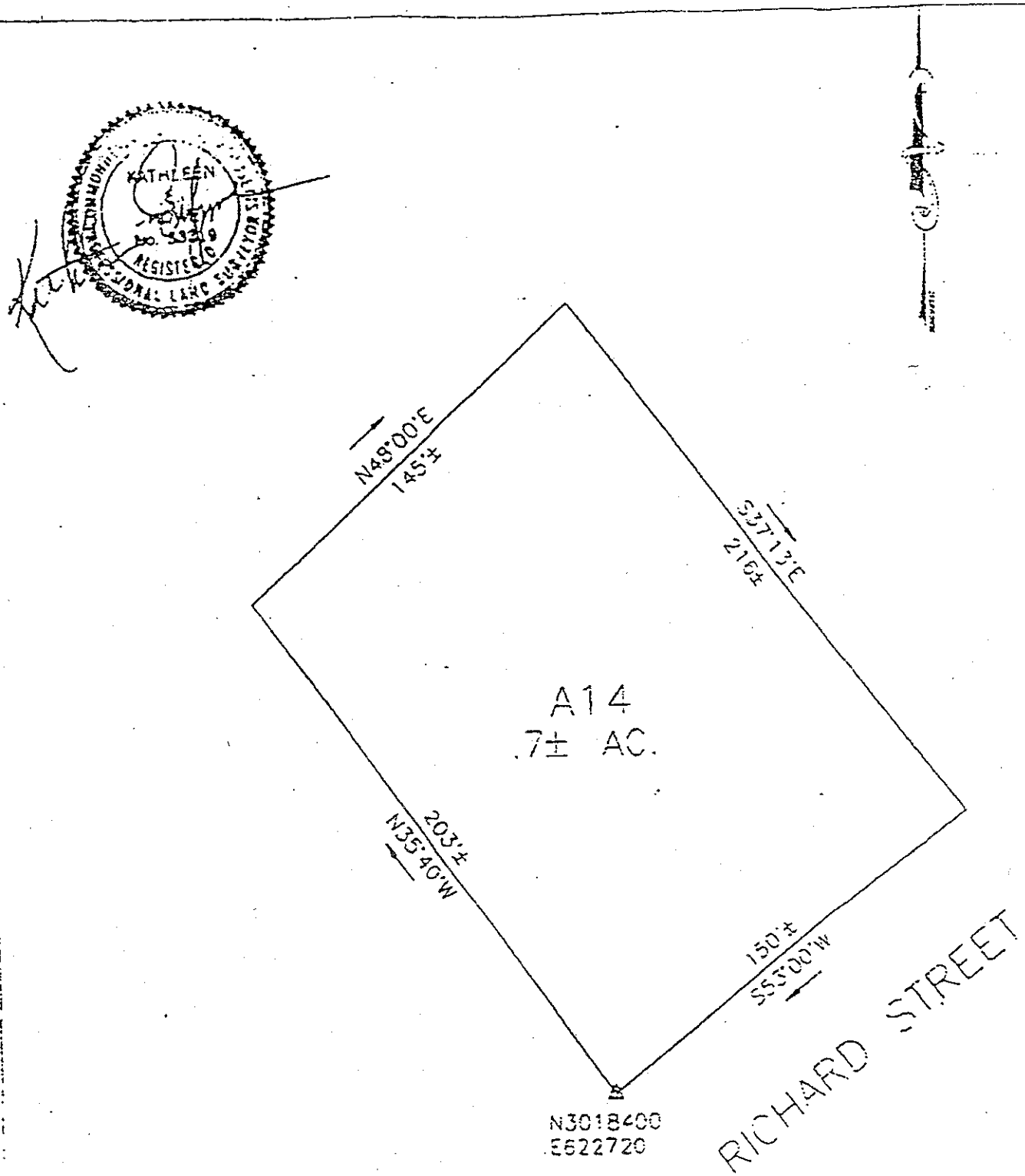
Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Legal Property Description of Parcel A.14
Beginning at a point with NAD coordinates (± 50') N3018400, E622720.

- Thence N35° 40'W, two hundred and three feet ±, (203' ±) to a point;
- Thence N48° 00'E, one hundred and forty five feet ±, (145' ±) to a point;
- Thence S37° 13'E, two hundred and sixteen feet ±, (216' ±) to a point;
- Thence S53° 00'W, one hundred and fifty feet ±, (150' ±) to the point of beginning.

Said parcel contains 30,800 square feet ±, or 0.7 acres ±. Said parcel also contains Buildings 2526 and 2527.

EXHIBIT "A"



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

EXHIBIT "A"

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS

PLAN OF LEASED PARC
CONVEYED TO THE GOV
LAND BANK, HARVAR

PREPARED FOR
THE GOVERNMENT LAND BAN

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Legal Property Description of Parcel A.17

Located on the north sideline of MacArthur Avenue and the east sideline of Pine Street, beginning at a point with NAD coordinates (± 50') N3022170, E625000.

- Thence along the sideline of Pine Street N37 24'W, two hundred and thirteen feet ±, (213' ±) to a point;
- Thence still alone Pine Street N28 11'W, three hundred and seventy three feet ±, (373' ±) to a point on the sideline of Pine Street;
- Thence N55 38'E, two hundred and sixty two feet ±, (262' ±) to a point;
- Thence N55 59'E, one hundred and fourteen feet ±, (114' ±) to a point;
- Thence S27 43'E, seven hundred and sixty feet ±, (766' ±) to a point on the sideline of MacArthur Avenue;
- Thence along the sideline of MacArthur Avenue N89 12'W, three hundred and eight feet ±, (308' ±) to the point of beginning.

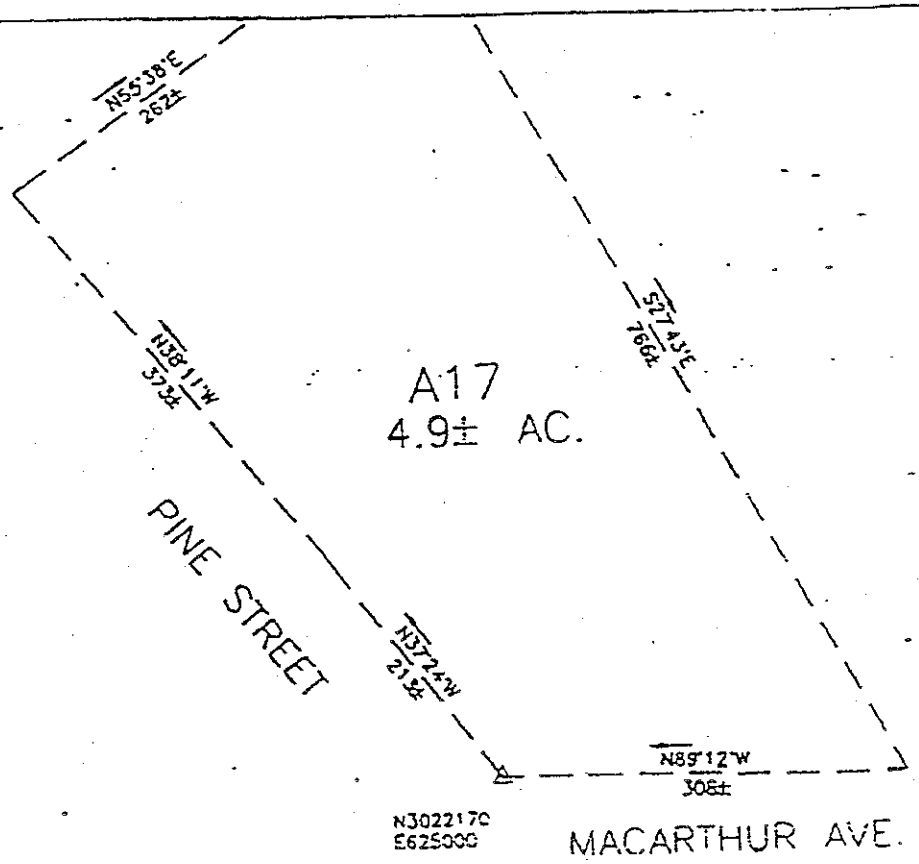
Said parcel contains 213,017 square feet ±, or 4.9 acres ±. Said parcel also contains Buildings 2024, 2025, and 2026.

EXHIBIT "A"

CIVIL ENGINEERS
&
LAND SURVEYORS

PREPARED FOR
THE GOVERNMENT LAND BANK

DATE 05-09-1996



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

CIVIL ENGINEERS
&
LAND SURVEYORS

HOWE SURVEYING
ASSOCIATES, INC.

PLAN OF LEASED PARCEL A17
CONVEYED TO THE GOVERNMENT
LAND BANK, HARVARD, MA

PREPARED FOR
THE GOVERNMENT LAND BANK

DATE 05-09-1996

SCALE 1"=150'

EXHIBIT "A"

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

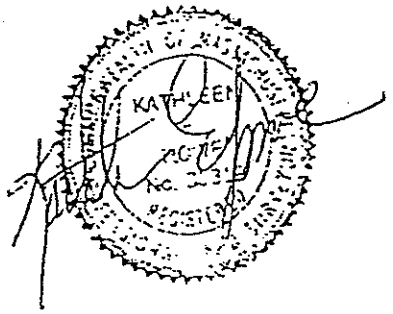
Legal Property Description of Parcel A.20

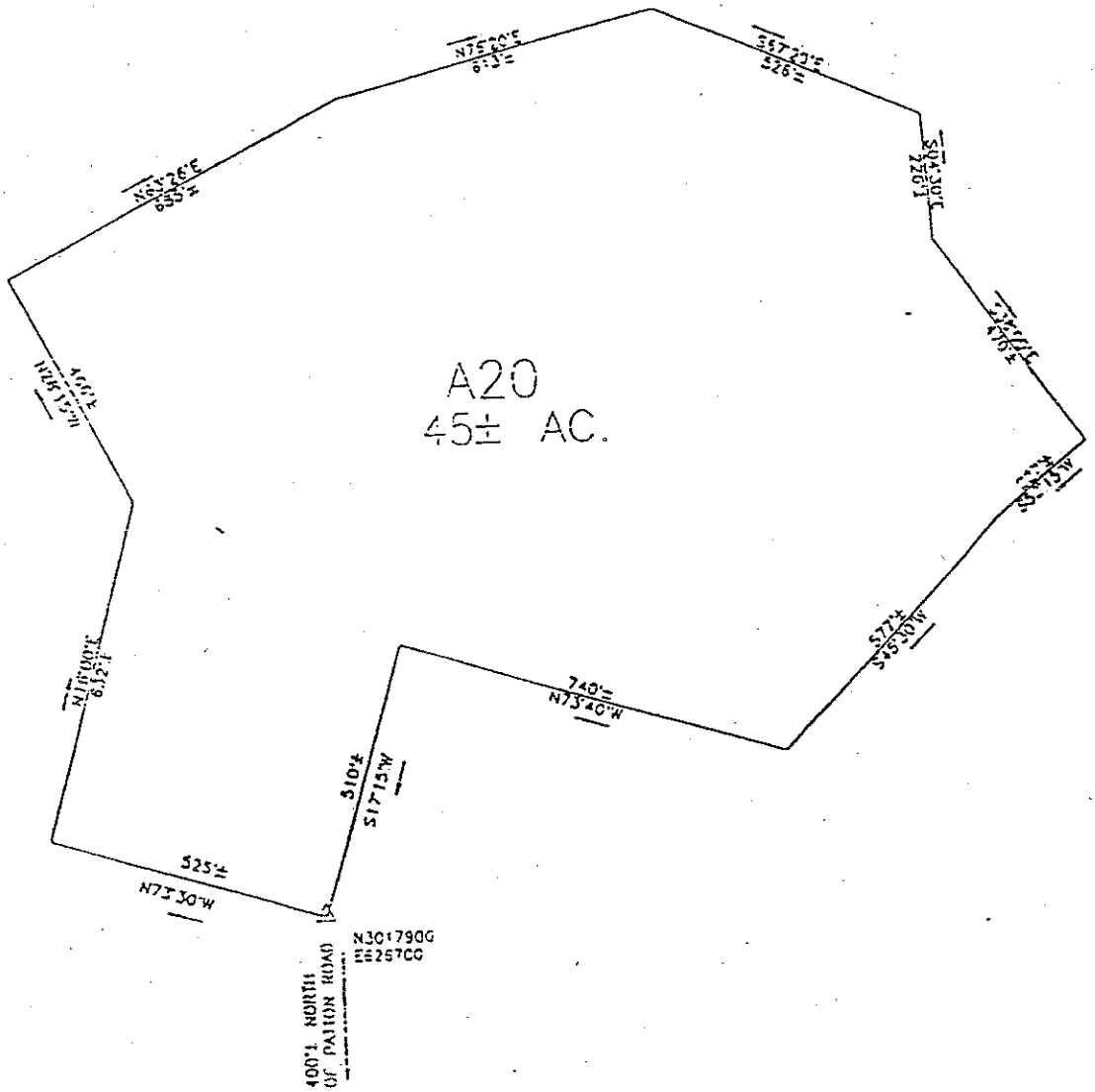
Located 400' ±north of Patton road, beginning with the NAD coordinates (± 50') N3017900, E626700.

- Thence N73° 30'W, five hundred and twenty five feet ±, (525' ±) to a point;
- Thence N16° 00'E, six hundred and thirty two feet ±, (632' ±) to a point;
- Thence N28° 15'W, four hundred and sixty six feet ±, (466' ±) to a point;
- Thence N63° 26'E, six hundred and eighty five feet ±, (685' ±) to a point;
- Thence N76° 20'E, six hundred and thirteen feet ±, (613' ±) to a point;
- Thence S67° 20'E, five hundred and twenty six feet ±, (526' ±) to a point;
- Thence S04° 30'E, two hundred and twenty six feet ±, (226' ±) to a point;
- Thence S38° 00'E, four hundred and seventy feet ±, (470' ±) to a point;
- Thence S52° 15'W, two hundred and twenty seven feet ±, (227' ±) to a point;
- Thence S45° 30'W, five hundred and seventy seven feet ±, (577' ±) to a point;
- Thence N73° 40'W, seven hundred and forty feet ±, (740' ±) to a point;
- Thence S17° 12'W, five hundred and ten feet ±, (510' ±) to the point of beginning.

Said parcel contains 45 acres ±. Said parcel also contains Buildings 3631 through 3645, 3647, 3648, 3653, and 3660.

EXHIBIT "A"





NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

EXHIBIT "A"

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

43 BUENA VISTA STREET
BUILDING F-13, SUITE 327
FORT DEVENS, MA 01433

73 PROVIDENCE STREET
WORCESTER, MA 01603
(508) 791-3137

PLAN OF LEASED PARCEL
CONVEYED TO THE GOVERN
LAND BANK, HARVARD,

PREPARED FOR:
THE GOVERNMENT LAND BANK

DATE: 05-09-1995

SCALE

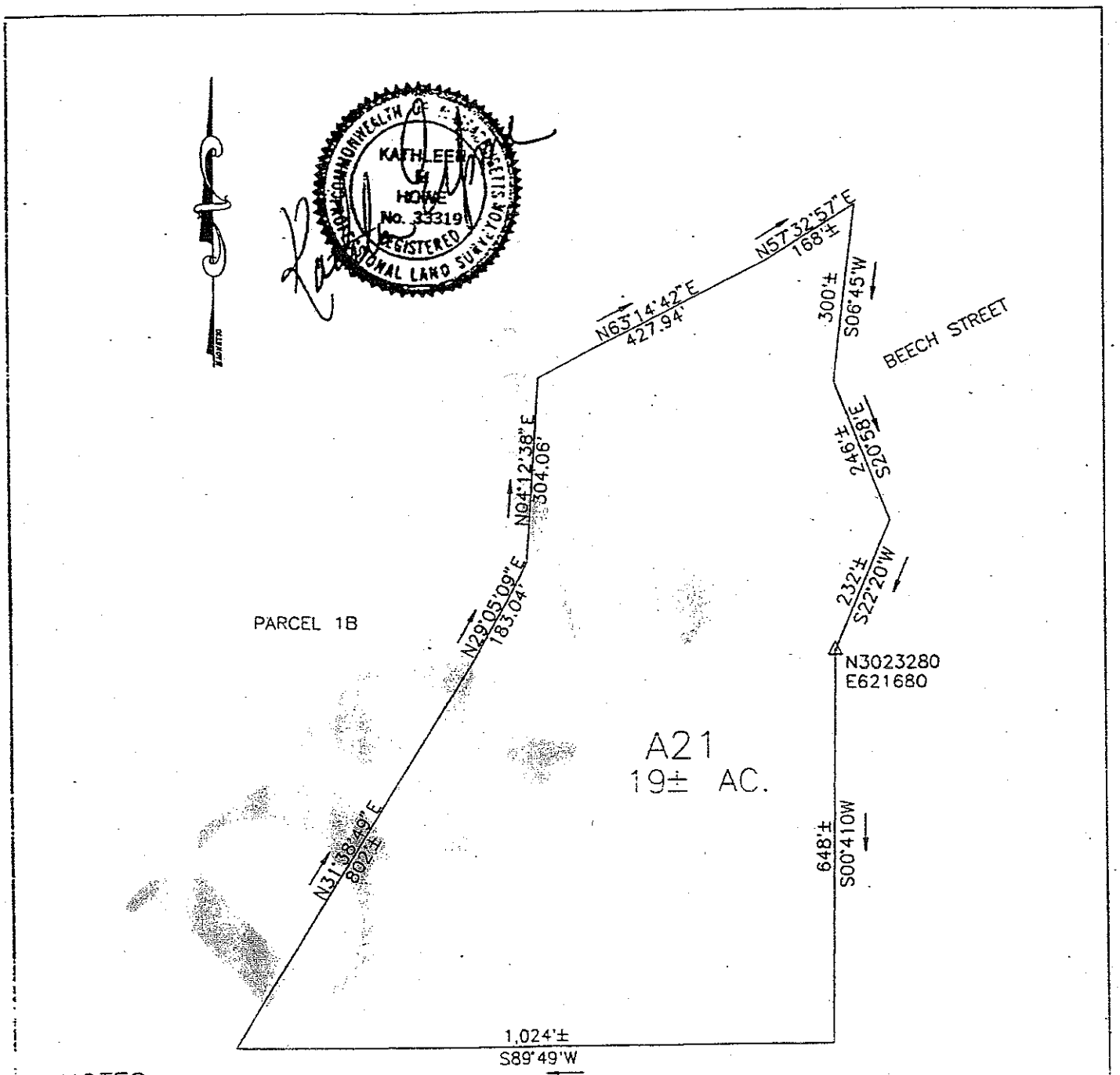
Legal Description UXO, Oak Hill Housing Area
Located in the Town of Harvard, Worcester County, MA west of Plum Street, beginning at a point with the NAD coordinates (± 50') N3023280, E621680.

- Thence S00° 41'W, six hundred and forty eight feet ±, (648' ±) to a point;
- Thence S89° 49'W, one thousand twenty four feet ±, (1024' ±) to a point;
- Thence along parcel 1B, N31° -38'-49"E, eight hundred two feet ±, (803' ±) to a point;
- Thence N29° -05'-9"E, one hundred eighty three and four one hundredths feet (183.04') to a point;
- Thence N04° -12'-38"E, three hundred four and six one hundredths feet (304.06') to a point;
- Thence N63° -14'-42"E, four hundred twenty seven and ninety four one hundredths feet (427.94') to a point;
- Thence N57° -32'-57"E, one hundred sixty eight feet ±, (168' ±) to a point, last 5 courses along parcel 1B;
- Thence S06° 45'W, three hundred feet ±, (300' ±) to a point at Beech Street;
- Thence S20° 58'E, two hundred and forty six feet ±, (246' ±) to a point;
- Thence S22° 20'W, two hundred and thirty two feet ±, (232' ±) to the point of beginning.

Said parcel contains 19 acres ±. Said parcel also contains Buildings 536, 537, 538, 539, 540, 541, 542, 543, 544, 822, and 823.

DRAFT

EXHIBIT "A"



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

EXHIBIT "A"

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

43 BUENA VISTA STREET
BUILDING F-1B, SUITE 207
FORT DEVENS, MA 01483
(508) 772-1800

73 PRINCETON STREET
NO. CHELMSFORD, MA. 01863
(508) 251-3138

PLAN OF LEASED PARCEL A21 CONVEYED TO THE GOVERNMENT LAND BANK, HARVARD, MA

PREPARED FOR:
THE GOVERNMENT LAND BANK

DATE: 05-09-1996 SCALE 1"=250'

Arthur D Little

p67073TEPS.EBS_Surv.a_parcel.parc_a21.fst 12/19/96

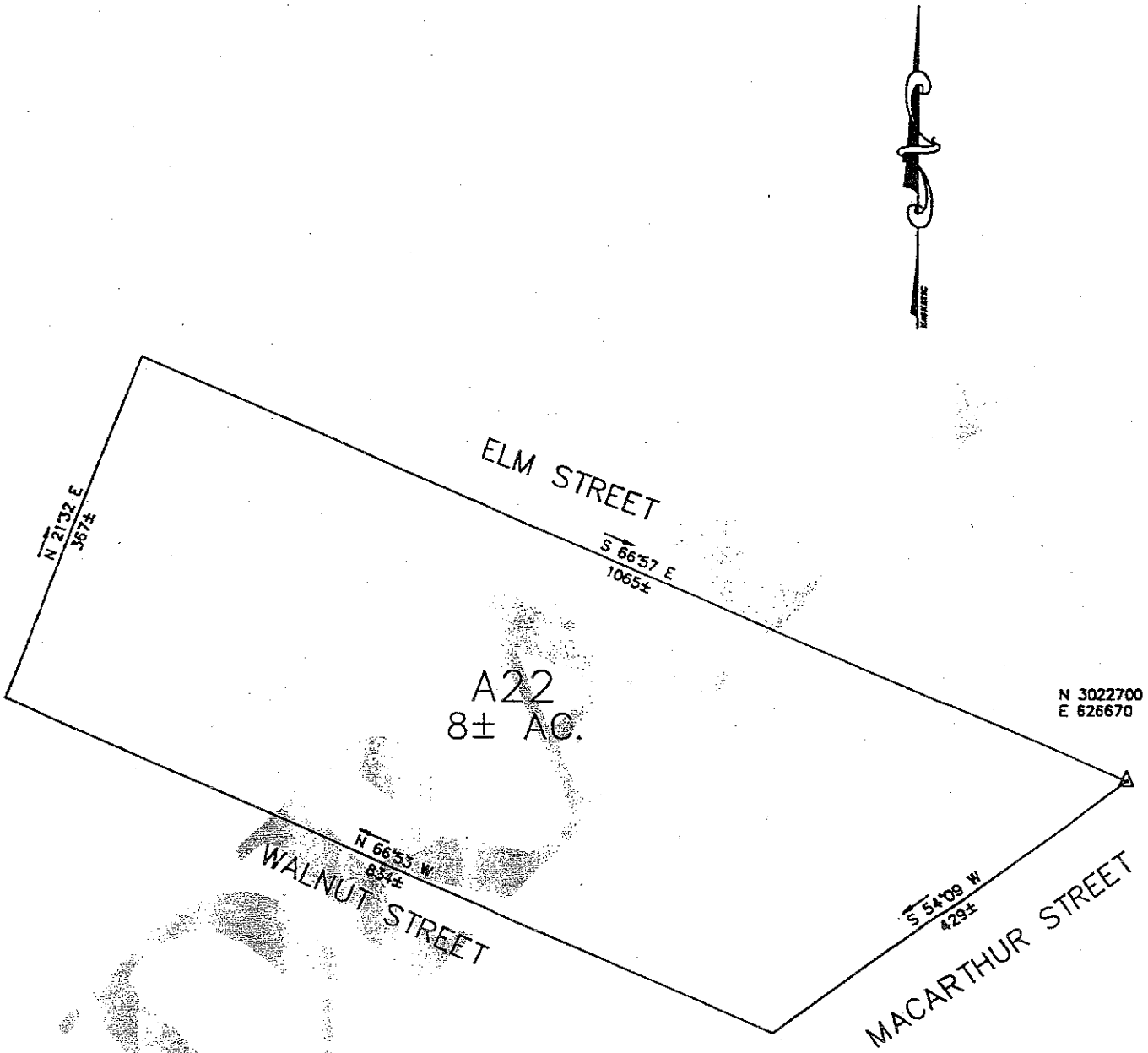
PARCEL # A22

A certain parcel of land located in the Town of Harvard, Worcester County, MA., known as parcel A22, located at the south sideline of Elm Street and the west sideline of MacArthur Ave., beginning at a point with the NAD coordinates (± 50') N3022700, E626670.

- Thence running along the west sideline of MacArthur Ave. S54° 09'W, four hundred and twenty nine feet ±, (429' ±) to the southerly sideline of Walnut Street;
- Thence along the southerly sideline of Walnut Street N66° 53'W, eight hundred and thirty four feet ±, (834' ±) to a point;
- Thence N21° 32'E, three hundred and sixty seven feet ±, (367' ±) to a point on the south side of Elm Street;
- Thence along the south side of Elm Street, S66° 57'E, one thousand and sixty five feet ±, (1065' ±) to the point of beginning;

Said parcel contains 8 acres ±. Said parcel also contains buildings 80, 81 and 82.

EXHIBIT "A"



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

PLAN OF LEASED PARCEL A22 CONVEYED TO THE GOVERNMENT LAND BANK, HARVARD, MA

PREPARED FOR:

THE GOVERNMENT LAND BANK

DATE: 05-09-1996

SCALE: 1"=150'

p67073TEPS.EBS_Surv.a_parcel.parc_a22.fst 12/19/96

8

Arthur D Little

EXHIBIT "A"

Attachment A: Legal Property Description and Plan of Lease Parcel

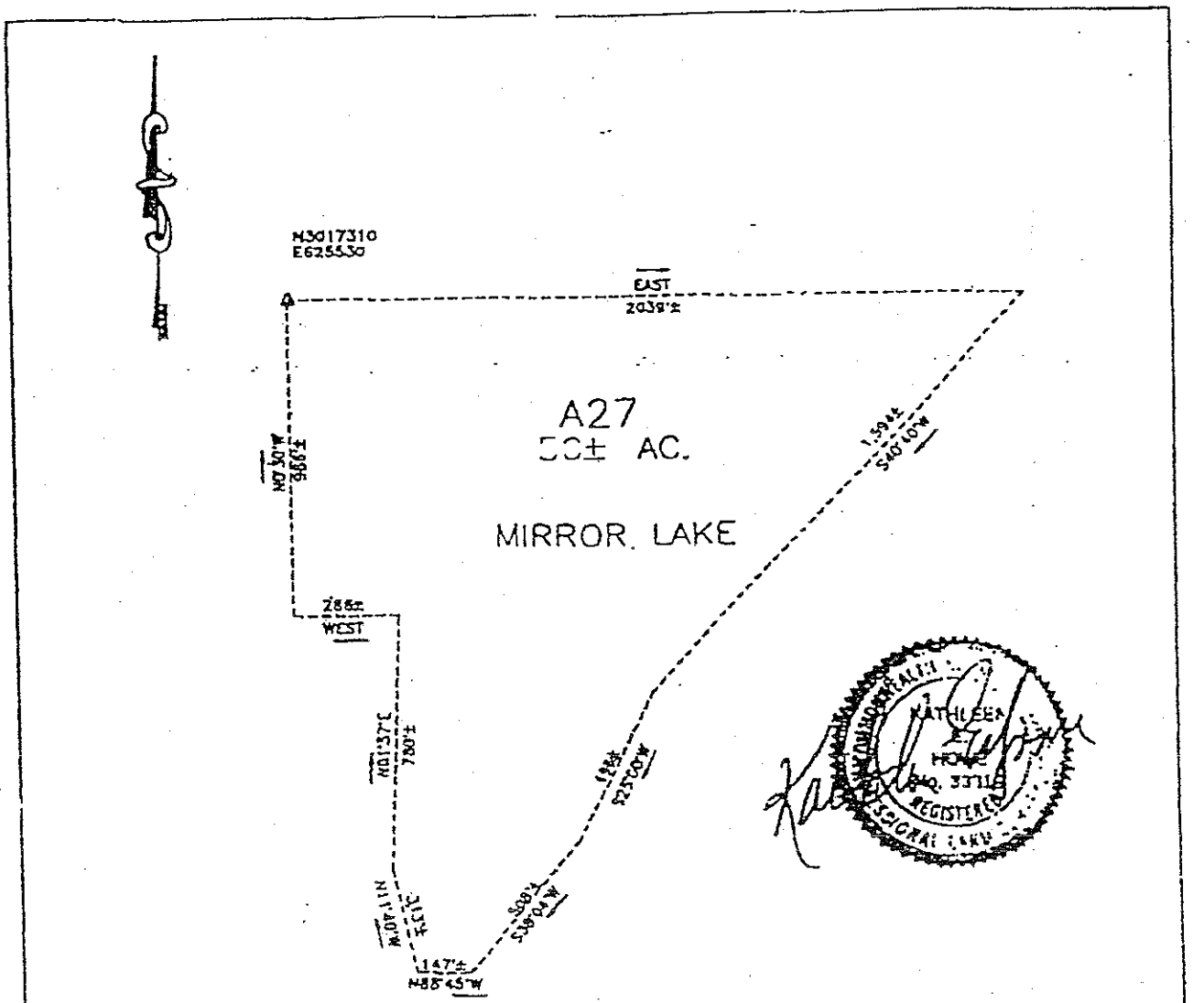
Legal Property Description of Parcel A.27

A certain parcel of land located in the Town of Harvard, Worcester County, MA, known as lease parcel A27, located east of Mirror Lake Road, beginning at a point with the NAD coordinates (±50') N3017310, E625530;

Thence east, two thousand and thirty nine feet ±, (2039'±) to a point;
Thence S40° -40'W, one thousand five hundred and ninety four feet ±, (1594' ±) to a point;
Thence S25°-00'W, four hundred and ninety six feet ±, (496'±) to a point;
Thence S38°-04'W, five hundred and eight feet ±, (508' ±) to a point;
Thence N88° - 45'W, one hundred and forty seven feet +, (147' ±) to a point;
Thence N11° - 40'W, three hundred and thirteen feet ±, (313' ±) to a point;
Thence N01° -57'E, seven hundred and eighty feet ±, (780' ±) to a point;
Thence west, two hundred and eighty six feet ±, (286 ±) to a point;
Thence N0° - 30'W, nine hundred and sixty six feet ±, (966' ±) to the point of beginning;

Said parcel contains 50± acres. Said parcel also contains Mirror Lake.

EXHIBIT "A"



NOTES:

1. ⊕ = LEGAL DESCRIPTION POINT OF BEGINNING.

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

PLAN OF LEASED PARCEL A27 CONVEYED TO THE GOVERNMENT LAND BANK, HARVARD, MA

EXHIBIT "A"

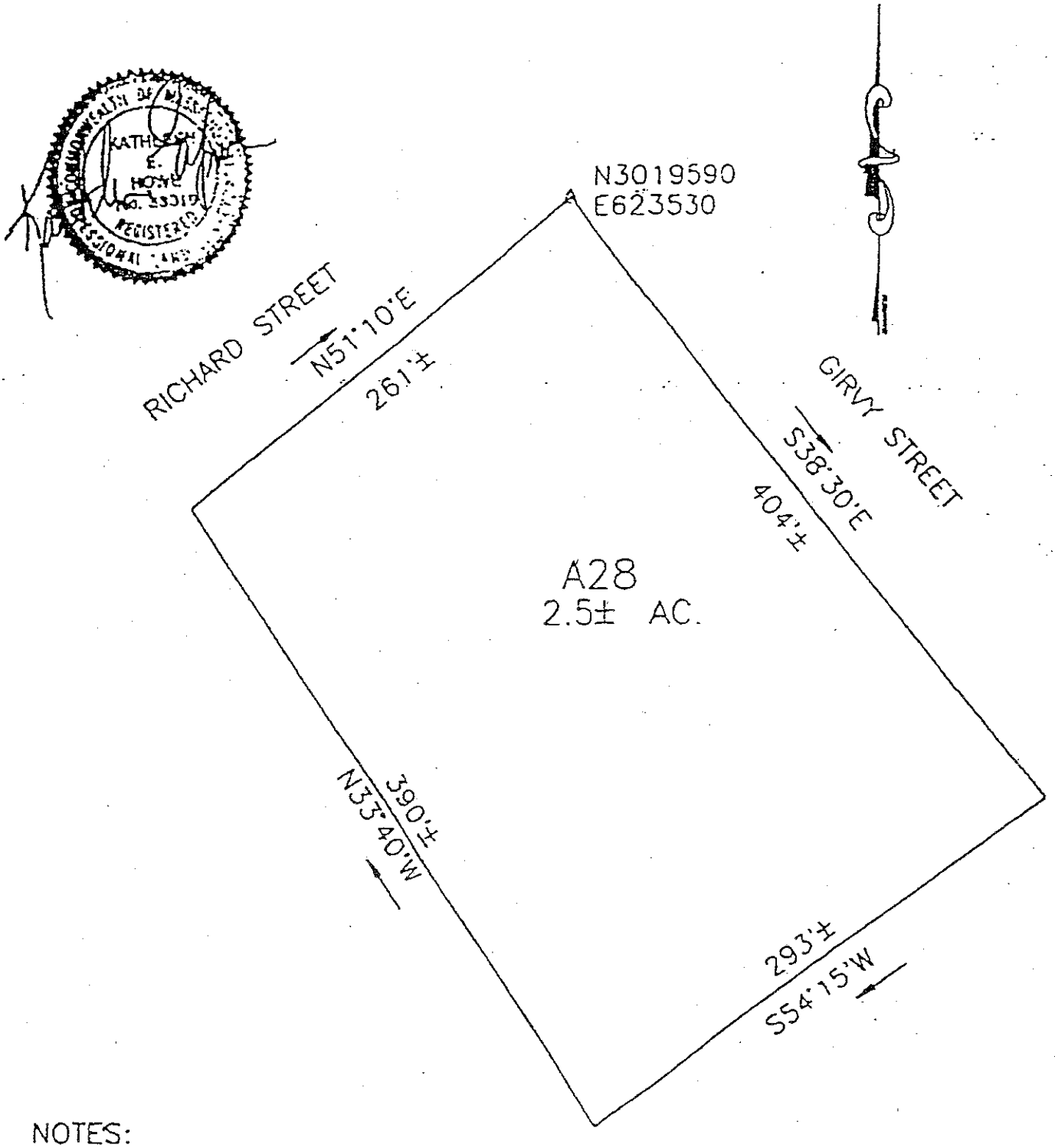
PARCEL # A28

A certain parcel of land located in the Town of Harvard, Worcester County, MA., known as lease parcel A28, beginning at a point with the NAD coordinates N3019590, E623530.

- Thence S38°-30'E, four hundred and four feet ±, (404' ±) to a point;
- Thence S54°-15'W, two hundred and ninety three feet ±, (293' ±) to a point;
- Thence N33°-40'W, three hundred and ninety feet ±, (390' ±) to a point;
- Thence N51°-10'E, two hundred and sixty one feet ±, (261' ±) to the point of beginning;

Said parcel contains 110,000 ± square feet, or 2.5 ± acres. Said parcel also contains buildings 2402, 2403, 2417, 2418 and 2419.

EXHIBIT "A"



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

CIVIL ENGINEERS
&
LAND SURVEYORS

EXHIBIT "A"

HOWE SURVEYING
ASSOCIATES, INC.

PLAN OF LEASED PARCEL
CONVEYED TO THE GOVERN
LAND BANK, HARVARD,

PREPARED FOR:
THE GOVERNMENT LAND BANK

Exhibit B

Finding of Suitability to Transfer

Fort Devens
Parcel A.14

Fort Devens, Massachusetts

January 1998

1.0 Purpose and Finding

a. The purpose of this Finding of Suitability to Transfer (FOST) is to document a decision made pursuant to Department of Defense (DoD) guidance set forth in a Deputy Secretary of Defense memorandum entitled "Finding of Suitability to Transfer for BRAC Property," dated June 1, 1994, that property is suitable to transfer.

b. Based on results detailed in the Basewide Environmental Baseline Survey (EBS), and the Final Closure Report for AREE 63BQ, I have determined that the proposed parcel, Parcel A.14, which includes Area Requiring Environmental Evaluation (AREE) 63BQ, is suitable for transfer to the Massdevelopment Agency (formerly known as the Massachusetts Government Land Bank) for use in accordance with the Fort Devens Basewide Reuse Plan (Plan). A legal property description and site plan of Parcel A.14 is included in Attachment A. The Massdevelopment Agency will be responsible for transferring the proposed transfer property to interested third parties to be used for purposes described in the Plan.

c. Future use of the proposed transfer parcel, as identified in the Plan, is for Innovation and Technology Business. Innovation and Technology parcels are designed to support businesses developing and expanding on innovative products and technologies. This use was analyzed in the Fort Devens Disposal/Reuse Environmental Impact Statement dated May, 1995 and the Record of Decision Document dated August, 1995.

2.0 Property Description

Parcel A.14 is located in the south-central portion of the Main Post. The parcel consists of 0.7 acres and contains Buildings 2526 and 2527. World War II barracks surround the parcel on all sides. Patton Road and the golf course are located further south-southeast. Parcel A.14 is illustrated in Figure 1.

Finding of Suitability to Transfer

Fort Devens
Parcel A.14

3.0 Environmental Condition of Property

An analysis of the environmental condition of the property proposed for transfer has been made by the U.S. Army Environmental Center in the form of a Basewide EBS. The EBS was conducted in accordance with the requirements of the DoD FOST guidance for conducting an EBS. Parcel A.14 includes AREE 63BQ. AREE 63BQ was a former 1,000-gallon No. 2 fuel oil underground storage tank (UST) located along the northern side of Building 2527, a former WWII barrack. The UST was removed in June 1995. The parcel was identified as leasable in the Basewide EBS due to the pending No Further Action (NFA) status of AREE 63BQ. The site underwent an Limited Removal Action under the Massachusetts Contingency Plan (MCP) in July 1995 and an Action Memorandum was issued in October 1995. A NFA Decision Document was signed for AREE 63BQ on August 7, 1997.

The UST removal resulted in an Immediate Response Action (IRA) under the MCP due to elevated readings of total petroleum hydrocarbons contamination (TPHC). Contaminated soil was excavated and test pits were completed to determine the extent of soil contamination. Due to the amount of soil contamination and the potential for groundwater contamination, the site was transferred from the MCP to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Program, therefore discontinuing the IRA under the MCP. Under this program, the site underwent a time-critical removal action to remove any remaining contaminated soil. Two rounds of groundwater samples taken from the site identified no groundwater contamination. Based on the results of the remedial activities, the site was recommended and approved for NFA. Table 1 identifies the type and quantity of hazardous substances stored, released and/or disposed of on the parcel and the site status of AREE 63BQ.

Although hazardous substances may remain on the proposed transferable parcel, all remedial action necessary to protect human health and the environment has been taken with respect to these substances. The Army will place the covenants required under CERCLA 120(h)(3) in the deed to the property proposed for transfer, warranting that all response action necessary to protect human health and the environment with respect to any such substances remaining on the property has been taken and any additional response action found necessary after the date of such transfer shall be conducted by the Army. The Army will also retain an easement in the property as required by CERCLA 120(h)(3), granting the United States access to the transferred property in any case in which response action or corrective action is found to be necessary after the date of such transfer.

Adjacent properties were found not to pose unacceptable risks to human health and the environment, as documented in the Basewide EBS, and have already been transferred to

the Massdevelopment Agency. As a result, those adjacent properties should not impact this transfer parcel.

3.1 Regulatory Comment

Regulatory agencies were notified at the initiation of the Basewide EBS, FOST, and Finding of Suitability to Lease. Regulatory comments received during the development of these documents were reviewed and incorporated as appropriate. All comments have been resolved.

3.2 Transfer Provisions

a. Hazardous substances or petroleum product notices, as provided in Section 3.0, will be given in the deed provisions (Attachment B).

b. Conditions will be included in the deed transfer, as required by Section IV of the DoD FOST policy, as follows:

1. The deed shall provide continued access for DoD and regulatory agencies to perform investigations as required on or adjacent to, the real property, to monitor the effectiveness of the clean-up as required, to perform five year reviews as required, and/or to take additional remedial or removal actions as required. At a minimum, access rights shall include all rights to exercise all responsibilities existing under the Federal Facilities Agreement (FFA).

2. The deed shall prohibit activities that could disrupt any remediation activities or jeopardize the protectiveness of those remedies such as the following: surface application of water that could impact the migration of contaminated ground water; subsurface drilling or use of ground water unless DoD determines that there will be no adverse impacts on the cleanup process; or, construction that would interfere with, negatively impact, or restrict access for cleanup work.

c. A notice will be given in the deed provisions for the potential presence of asbestos, lead-based paint, and radon within the proposed transfer parcel.

d. When the property is transferred, it will be transferred in accordance with Section 37 of the Fort Devens FFA as amended.

Finding of Suitability to Transfer

Fort Devens
Parcel A.14

4.0 Conclusion

Based on the above, the proposed property on the Main Post at Fort Devens is suitable to transfer for the intended use because the requirements of CERCLA 120(h)(3) and the DoD FOST policy have been met.

Patricia P. Hickerson

PATRICIA P. HICKERSON
Major General, United States Army
Deputy Chief of Staff for Personnel
and Installation Management

03 FEB 1998

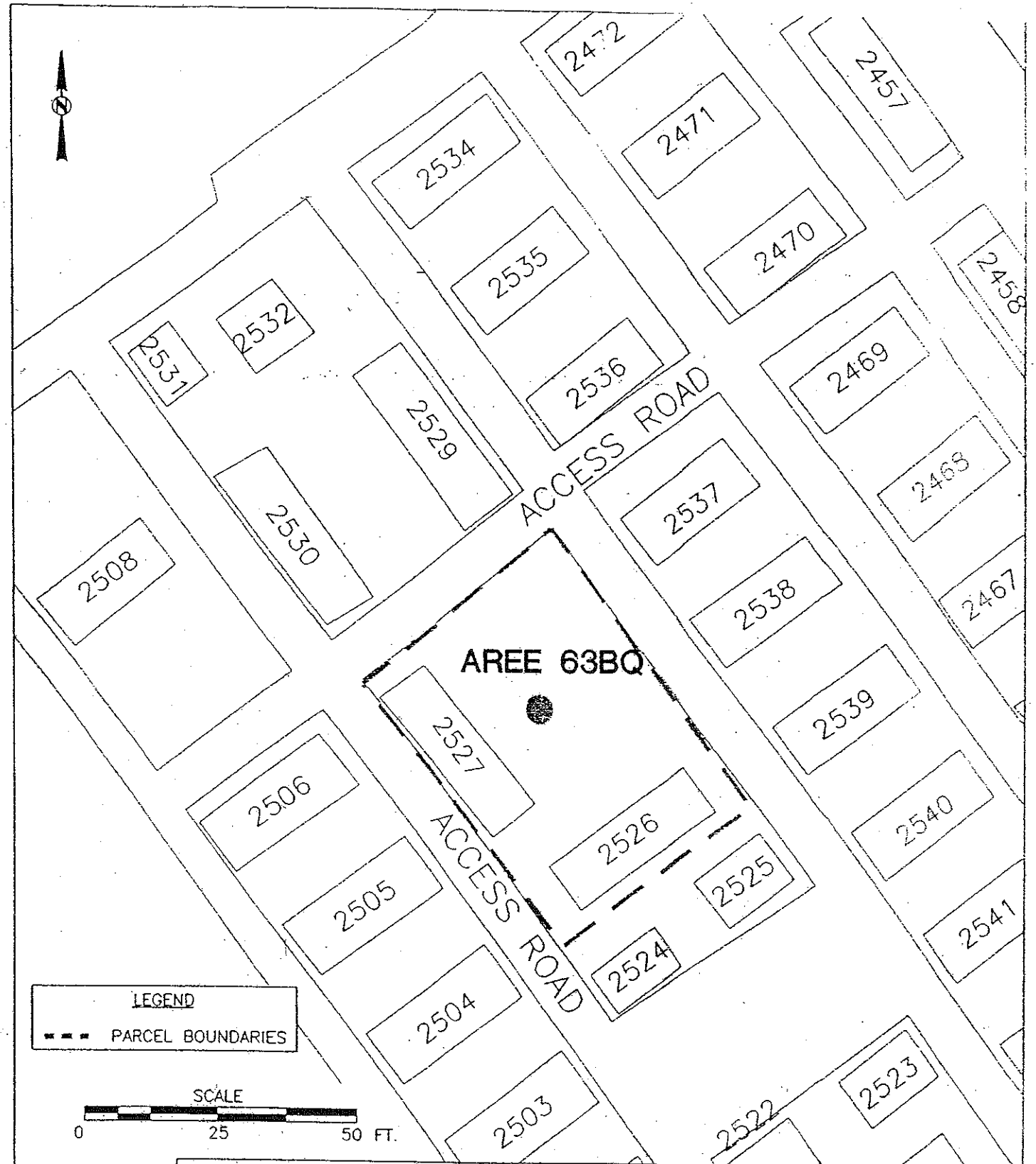
Finding of Suitability to Transfer

Fort Devens
Parcel A.14

Table 1

Site No./ Building No.	Hazardous Substances/ Environmental Concern	Disposal, Storage, Release	Quantity Released/ Removed or Concentration Detected	Dates	CASRN NO.	RCRA Waste No.	Regulatory Synonym	Site Status
AREE 63BQ	1. 1,000 gallon fuel oil UST 2. TPHC	Storage, Release	1. UST removed June 1995 2. >500 µg/g	1. UST removed June 1995 2. Contaminated soil removed 1995	Unknown	Unknown	Unknown	NFA DD 8/97

Notes:
CASRN = Chemical Abstracts Registration Number
DD = Decision Document
N/A = Not Applicable
NFA = No Further Action
µg/g = Micrograms per gram
RCRA = Resource Conservation, and Recovery Act
UST = Underground Storage Tank
AREE = Area Requiring Environmental Evaluation
TPHC = Total Petroleum Hydrocarbon Contamination



Arthur D Little		TITLE: FIGURE 1 PARCEL A.14	
APPROVALS	DATE		
DRAWN: MSB	10/97	PREPARED FOR: USAEC	SCALE: 1 IN. = 25 FT.
CHECKED			
QA/CONTROL		DATE: OCT. 1997	DWG. NO.: 67073-103
TECH REVIEW			
PROJ MNGR		SOURCE: ARTHUR D. LITTLE, INC.	SHEET 1 OF 1

Finding of Suitability to Transfer

Fort Devens
Parcel A.14

List of Attachments

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Attachment B: Department of Defense Finding of Suitability to Transfer Generic Deed Provisions

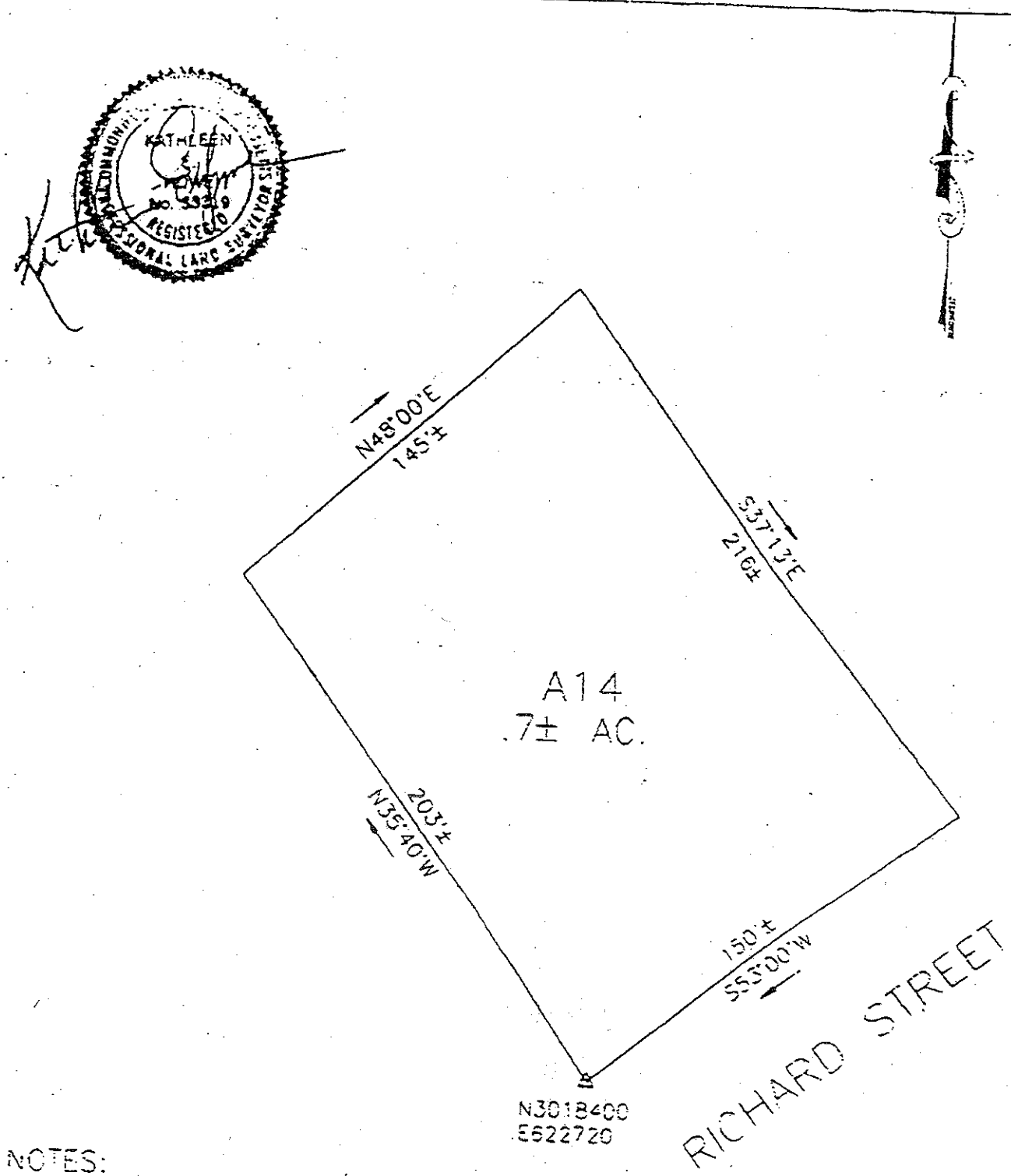
Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Legal Property Description of Parcel A.14

Beginning at a point with NAD coordinates (± 50') N3018400, E622720.

- Thence N35° 40'W, two hundred and three feet ±, (203' ±) to a point;
- Thence N48° 00'E, one hundred and forty five feet ±, (145' ±) to a point;
- Thence S37° 13'E, two hundred and sixteen feet ±, (216' ±) to a point;
- Thence S53° 00'W, one hundred and fifty feet ±, (150' ±) to the point of beginning.

Said parcel contains 30,800 square feet ±, or 0.7 acres ±. Said parcel also contains Buildings 2526 and 2527.



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

HOWE SURVEYING ASSOCIATES, INC.

CIVIL ENGINEERS & LAND SURVEYORS

43 BUENA VISTA STREET
BUILDING F-1A, SUITE 337

93 PRINCETON STREET
NO. CHELMSFORD

PLAN OF LEASED PARCEL A
CONVEYED TO THE GOVERNME
LAND BANK, HARVARD, MA

PREPARED FOR

THE GOVERNMENT LAND BANK

Attachment B: Department of Defense Finding of Suitability to Transfer Generic Deed Provisions

Fort Devens
Generic Deed Provisions

By accepting this Deed, the Grantee acknowledges that the Grantor has provided the Grantee with a copy of the Federal Facilities Agreement (FFA) between the Grantor and the U.S. Environmental Protection Agency (EPA), dated May 11, 1991, and the modification thereto. The Grantor shall provide the Grantee with a copy of any future amendments to the FFA.

The United States and the Commonwealth of Massachusetts, and their agents, employees, and contractors, shall have access to and over the Property as may be necessary for any investigation, response, or corrective action found to be necessary after the date of this deed on the Property or on other property comprising the Fort Devens National Priorities List (NPL) site. This reservation includes the right of access to and use of, to the extent permitted by law, any available utilities at reasonable cost to the United States.

In exercising the rights there under, the United States and the Commonwealth shall give the Grantee or its successors or assigns reasonable notice of actions taken on the Property under the FFA and shall, to the extent reasonable, consistent with the FFA, and at no additional cost to the United States, endeavor to minimize the disruption to the Grantee s, its successors , or assigns use of the Property.

The Grantee agrees that notwithstanding any other provision of the Deed, the United States assumes no liability to the Grantee, its successors, or assigns, or any other person should implementation of the FFA interfere with the use of the Property. The Grantee and its successors and assigns shall have no claim on account of any such interference against the United States or the Commonwealth or any officer, agent, employee, or contractor thereof.

Prior to the determination by the United States that all remedial action is complete for the Fort Devens NPL site, the Grantee shall not undertake activities on the Property in a way that adversely affect the completion of the Superfund cleanup at the Fort Devens site and shall give prior written notice to the Grantor, EPA, and the Commonwealth of any construction, alteration, or similar work on the Property that may adversely affect said cleanup.

For any portion of the Property subject to a response action, the Grantee shall notify the Grantor, EPA, and the Commonwealth by certified mail, at least sixty (60) days prior
to any conveyance of an interest in said property, and of the provisions allowing for the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to the FFA.

Prior to the determination by the United States that all remedial action is complete for the Fort Devens NPL site, the Grantee and all subsequent transferees of an interest in any portion of the Property action will provide copies of the instrument evidencing such transaction to the Commonwealth, the EPA, and the Grantor, by certified mail, within fourteen (14) days after the effective date of such transaction.

The Grantee and all subsequent transferees shall include these provisions in all subsequent lease, transfer, or conveyance documents relating to the Property that are entered into prior to a determination by the United States that all remedial action is complete at the Fort Devens NPL site.

Comment and Response Package

U.S. Army Environmental Center

United States Environmental Protection Agency/New England and Massachusetts Department of Environmental Protection Comments on the Draft Finding of Suitability to Transfer Parcel A.14

Fort Devens, Massachusetts

Prepared for:

U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND 21010

Prepared by:

ARTHUR D. LITTLE, INC.
25 ACORN PARK
CAMBRIDGE, MASSACHUSETTS 02140-2390

Requests for this document must be referred to:
Commander, U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland 21010

January 1998

AEC Form 45, 1 Feb 93 replaces THAMA Form 45 which is obsolete.

Comment and Response Package
United States Environmenta Protection Agency/New England and Massachusetts Department of Environment Protection Comments

Finding of Suitability to Transfer Parcel A.14

Program Manager, Robert Lambe — Date: 3/10/98

Task Manager, Richard Waterman — Date: 3/10/98

Submitted to:

U.S. Army Environmental Center (USAEC)
Aberdeen Proving Ground, Maryland

Revision No. 0
January, 1998

Arthur D. Little, Inc.
Acorn Park
Cambridge, Massachusetts
02140-2390

ADL Reference 67073-32

DAAA15-91-D-0016
Delivery Order 00005

Response to Comments

Comment responses to USEPA/New England comments on the Draft Finding of Suitability to Transfer (FOST) document for Parcel A.14

General Comment

1. In that these are public documents, it would be useful to include a map that shows the parcel location in question on a larger map of the former Fort Devens.

Response

1. Refer to the Basewide Environmental Baseline Survey (EBS) for a map of the parcel location as it relates to the former Fort Devens.

Comment responses to MADEP comments on the Draft Finding of Suitability to Transfer (FOST) document for Parcel A.14

MADEP concurs with the Army's recommendation to transfer Parcel A.14, and therefore has no specific comments the parcel.

US Army Corps of Engineers®

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

Fort Devens, Massachusetts

December 1998

1.0 Purpose and Finding

a. The purpose of this Finding of Suitability to Transfer (FOST) is to document a decision made pursuant to Department of Defense (DoD) guidance set forth in a Deputy Secretary of Defense memorandum, entitled "Finding of Suitability to Transfer for BRAC Property," dated June 1, 1994 determining that property is suitable to transfer.

b. Based on results detailed in the Basewide Environmental Baseline Survey (EBS), and the No Further Action Decision Document for AREE 63BE (signed in May 1998), I have determined that the proposed parcel, Parcel A.13, which includes Area Requiring Environmental Evaluation (AREE) 63BE, is suitable for transfer to MassDevelopment (formerly known as the Massachusetts Government Land Bank) for use in accordance with the Fort Devens Basewide Reuse Plan (Plan). A legal property description and site plan of Parcel A.13 is included in Attachment A. MassDevelopment will be responsible for transferring the proposed transfer property to interested third parties to be used for purposes described in the Plan.

c. Future use of the proposed transfer parcel, as identified in the Plan, is for Innovation and Technology Business. Innovation and Technology parcels are designed to support businesses developing and expanding on innovative products and technologies. This use was analyzed in the Fort Devens Disposal/Reuse Environmental Impact Statement dated May, 1995 and the Record of Decision Document dated August, 1995.

2.0 Property Description

Parcel A.13 is located in the south-central portion of the Main Post. The parcel consists of 1.3 acres and contains Buildings 2289, 2290, and 2299. Wooden World War II barracks surround the parcel to the north and west. The Devens Reserve Forces Training Area lies east of the parcel with Queenstown Street to the south. Parcel A.13 is illustrated in Figure 1.

PAGE 2/12 9787728015 MASSDEVELOPMENT/DEVENS

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

3.0 Environmental Condition of Property

An analysis of the environmental condition of the property proposed for transfer has been made by the U.S. Army Environmental Center (USAEC) in the form of a Basewide EBS. The EBS was conducted in accordance with the requirements of the DoD FOST guidance for conducting an EBS. Parcel A.13 includes AREE 63BE. The parcel was identified as leasable in the Basewide EBS due to the pending No Further Action (NFA) status of AREE 63BE. Additional sampling was conducted at the site following the issuance of the Basewide EBS and a draft No Further Action report was issued in May 1997. A NFA Decision Document was signed for AREE 63BE in May 1998.

A Phase III Site Investigation was conducted at AREE 63BE in September 1995 to determine the extent of petroleum contamination at the site. Residual soil contamination extended beyond the area of the initial remedial excavation. The most significantly contaminated soil from the AREE 63BE site was removed and a determination of no residual risk was declared for the site. Based on the results of the site investigation, the site was recommended and approved for NFA. Information in Table 1 identifies the type and quantity of hazardous substances stored, released and/or disposed of on the parcel and the site status of AREE 63BE.

Although hazardous substances may remain on the proposed transferable parcel, all remedial action necessary to protect human health and the environment has been taken with respect to these substances. The Army will place the covenants required under CERCLA 120(h)(3) in the deed to the property proposed for transfer, warranting that all response action necessary to protect human health and the environment with respect to any such substances remaining on the property has been taken and any additional response action found necessary after the date of such transfer shall be conducted by the Army. The Army will also retain an easement in the property as required by CERCLA 120(h)(3), granting the United States access to the transferred property in any case in which response action or corrective action is found to be necessary after the date of such transfer.

Adjacent properties were found not to pose unacceptable risks to human health and the environment, as documented in the Basewide EBS and were transferred to MassDevelopment. As a result, those adjacent properties should not impact this transfer parcel.

PAGE 3/12 9787728815

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

Table 1

Site No./ Building No.	Hazardous Substances/ Environmental Concern	Disposal, Storage, Release	Quantity Released/ Removed or Concentration Detected	Dates	CASRN NO.	RCRA Waste No.	Regulatory Synonym	Site Status
AREE 63BE/2290 (former World War II structure)	1. 1,000 gallon No. 2 fuel oil UST 2. TPH	Storage, Release	1. UST removed 1992, >2600 cubic yards of soil removed 2. below 2,500 µg/g	1. UST removed 1992 2. Contaminated soil removed 1995	N/A	NA	N/A	NFA DD 5/98

Notes:
CASRN = Chemical Abstracts Registration Number
DD = Decision Document
N/A = Not Applicable
TPH = Total Petroleum Hydrocarbons
NFA = No Further Action
µg/g = Micrograms per gram
RCRA = Resource Conservation, and Recovery Act
UST = Underground Storage Tank
AREE = Area Requiring Environmental Evaluation

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

3.1 Regulatory Comment

Regulatory agencies were notified at the initiation of the Basewide EBS, FOST, and Finding of Suitability to Lease (FOSL). Regulatory comments received during the development of these documents were reviewed and incorporated as appropriate. All comments have been resolved.

3.2 Transfer Provisions

a. Hazardous substances or petroleum product notices, as provided in Section 3.0, will be given in the deed provisions (Attachment B).

b. Conditions will be included in the deed transfer, as required by Section IV of the DoD FOST policy, as follows:

1. The deed shall provide continued access for DoD and regulatory agencies to perform investigations as required on or adjacent to, the real property, to monitor the effectiveness of the clean-up as required, to perform five year reviews as required, and/or to take additional remedial or removal actions as required. At a minimum, access rights shall include all rights to exercise all responsibilities existing under the Federal Facilities Agreement (FFA).

2. The deed shall prohibit activities that could disrupt any remediation activities or jeopardize the protectiveness of those remedies such as the following: surface application of water that could impact the migration of contaminated ground water; subsurface drilling or use of ground water unless DoD determines that there will be no adverse impacts on the cleanup process; or, construction that would interfere with, negatively impact, or restrict access for cleanup work.

c. A notice will be given in the deed provisions for the potential presence of asbestos, lead-based paint, and radon within the proposed transfer parcel.

d. When the property is transferred, it will be transferred in accordance with Section 37 of the Fort Devens FFA as amended.

Finding of Suitability to Transfer

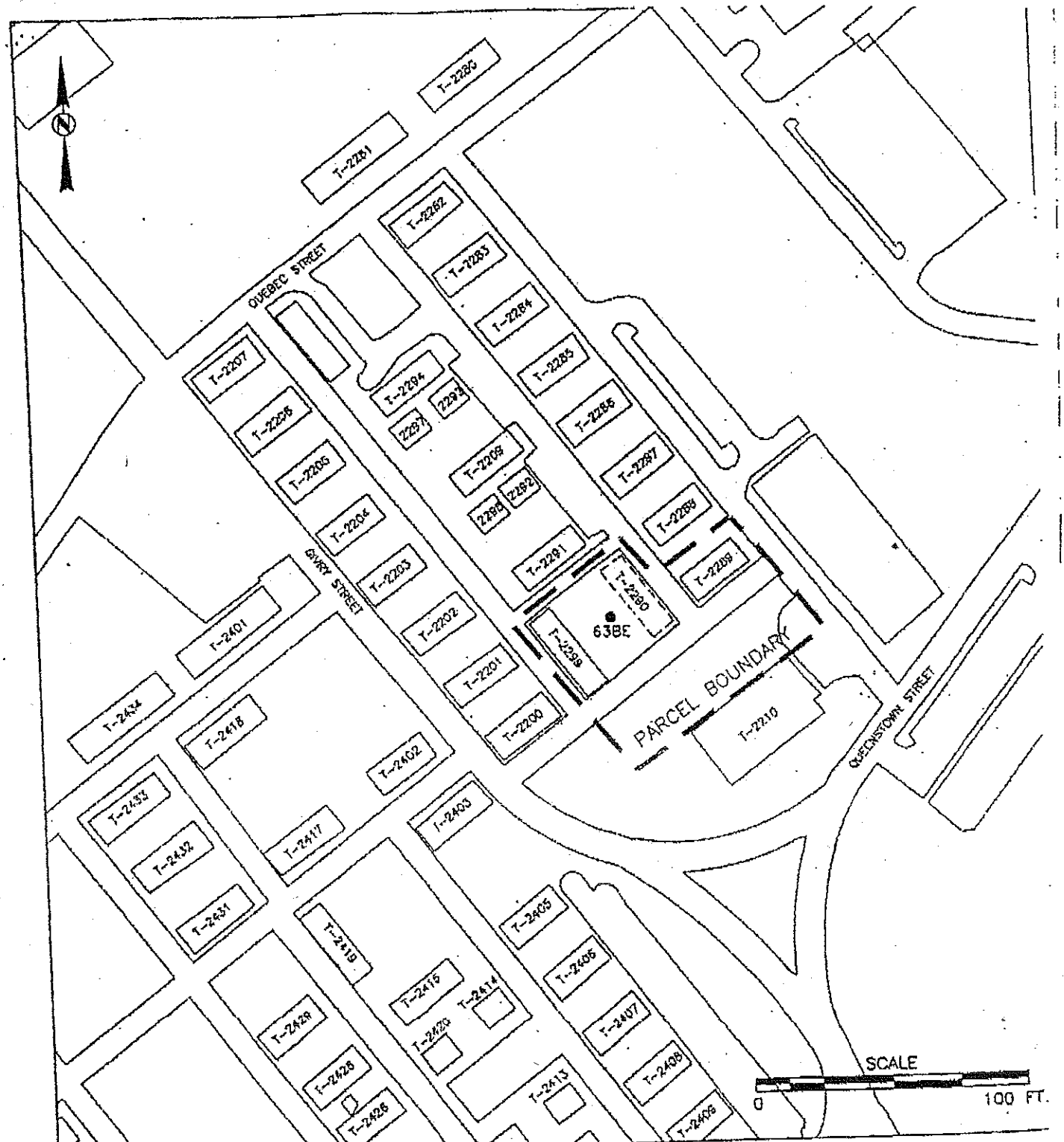
Fort Devens
Parcel A.13

4.0 Conclusion

Based on the above, the proposed property on the Main Post at Fort Devens is suitable to transfer for the intended use because the requirements of CERCLA 120(h)(3) and the DoD FOST policy have been met.

GEOFFREY D. MILLER
Major General, United States Army
Deputy Chief of Staff for Personnel
and Installation Management

1 MAR 1999



Arthur D Little		TITLE: FIGURE 1 PARCEL A.13	
APPROVALS	DATE		
DRAWN		PREPARED FOR: USAEC	SCALE: 1 IN. = 50 FT.
CHECKED			
QA/CONTROL		DATE: APR. 1998	DWG. NO.: 67073-111
TECH REVIEW			
PROJ MNGR		SOURCE: ARTHUR D. LITTLE, INC.	SHEET 1 OF 1

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

List of Attachments

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Attachment B: Department of Defense Finding of Suitability to Transfer Generic Deed Provisions

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

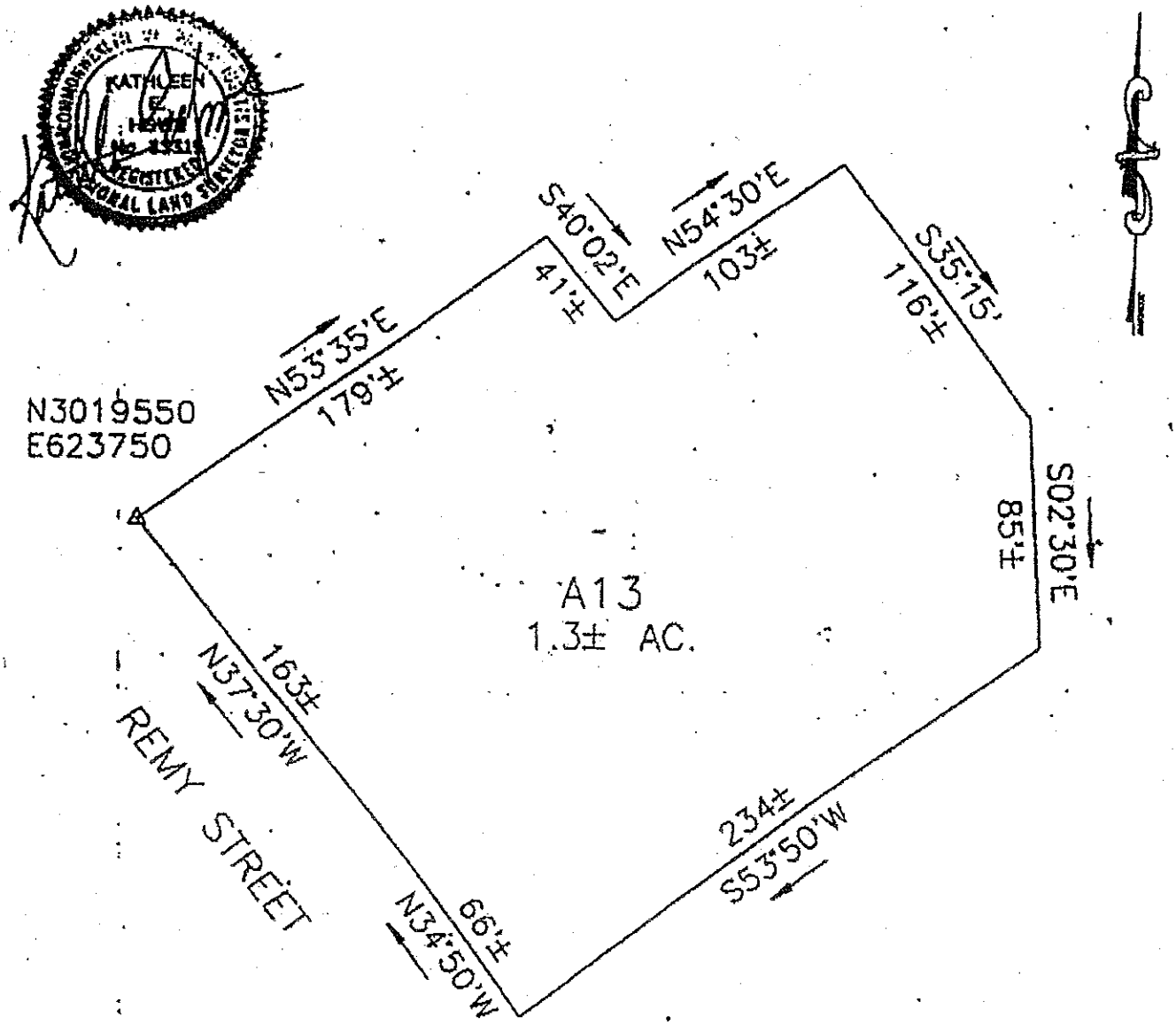
Attachment A: Legal Parcel Description and Plan of Transfer Parcel

Legal Property Description of Parcel A.13

Beginning at a point with the NAD coordinates (± 50') N3019550, E623750.

- Thence N53° 35'E, one hundred and seventy nine feet ±, (179' ±) to a point;
- Thence S40° 02'E, forty one feet ±, (41' ±) to a point;
- Thence N54° 30'E, one hundred and three feet ±, (103' ±) to a point;
- Thence S35° 15'E, one hundred and sixteen feet ±, (116' ±) to a point;
- Thence S02° 30'E, eighty five feet ±, (85' ±) to a point;
- Thence S53° 50'W, two hundred and thirty four feet ±, (234' ±) to a point;
- Thence N34° 50'W, sixty six feet ±, (66' ±) to a point
- Thence N37° 30'W, one hundred sixty three feet ±, (163' ±) to the point of beginning.

Said parcel contains 58,650 square feet ±, or 1.3 acres ±. Said parcel also contains buildings 2289, 2290, and 2299.



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

hsa

CIVIL ENGINEERS & LAND SURVEYORS

HOWE SURVEYING ASSOCIATES, INC.

PLAN OF LEASED PARCEL A13 CONVEYED TO THE GOVERNMENT LAND BANK, HARVARD, MA

PREPARED FOR:

THE GOVERNMENT LAND BANK

DATE 03-09-1996

SCALE 1"=60'

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

Attachment B: **Department of Defense Finding of Suitability to Transfer Generic Deed Provisions**

By accepting this Deed, the Grantee acknowledges that the Grantor has provided the Grantee with a copy of the Federal Facilities Agreement (FFA) between the Grantor and the U.S. Environmental Protection Agency (EPA), dated May 11, 1991, and the modification thereto. The Grantor shall provide the Grantee with a copy of any future amendments to the FFA.

The United States and the Commonwealth of Massachusetts, and their agents, employees, and contractors, shall have access to and over the Property as may be necessary for any investigation, response, or corrective action found to be necessary after the date of this deed on the Property or on other property comprising the Fort Devens National Priorities List (NPL) site. This reservation includes the right of access to and use of, to the extent permitted by law, any available utilities at reasonable cost to the United States.

In exercising the rights there under, the United States and the Commonwealth shall give the Grantee or its successors or assigns reasonable notice of actions taken on the Property under the FFA and shall, to the extent reasonable, consistent with the FFA, and at no additional cost to the United States, endeavor to minimize the disruption to the Grantee s, its successors , or assigns use of the Property.

The Grantee agrees that notwithstanding any other provision of the Deed, the United States assumes no liability to the Grantee, its successors, or assigns, or any other person should implementation of the FFA interfere with the use of the Property. The Grantee and its successors and assigns shall have no claim on account of any such interference against the United States or the Commonwealth or any officer, agent, employee, or contractor thereof.

Prior to the determination by the United States that all remedial action is complete for the Fort Devens NPL site, the Grantee shall not undertake activities on the Property in a way that adversely affect the completion of the Superfund cleanup at the Fort Devens site and shall give prior written notice to the Grantor, EPA, and the Commonwealth of any construction, alteration, or similar work on the Property that may adversely affect said cleanup.

Finding of Suitability to Transfer

Fort Devens
Parcel A.13

For any portion of the Property subject to a response action, the Grantee shall notify the Grantor, EPA, and the Commonwealth by certified mail, at least sixty (60) days prior to any conveyance of an interest in said property, and of the provisions allowing for the continued operation of any monitoring wells, treatment facilities, or other response activities undertaken pursuant to the FFA.

Prior to the determination by the United States that all remedial action is complete for the Fort Devens NPL site, the Grantee and all subsequent transferees of an interest in any portion of the Property action will provide copies of the instrument evidencing such transaction to the Commonwealth, the EPA, and the Grantor, by certified mail, within fourteen (14) days after the effective date of such transaction.

The Grantee and all subsequent transferees shall include these provisions in all subsequent lease, transfer, or conveyance documents relating to the Property that are entered into prior to a determination by the United States that all remedial action is complete at the Fort Devens NPL site.

M.5-3

2011 GRANT of ENVIRONMENTAL RESTRICTION
(Includes 2001 Supplemental Deed Notice as Exhibit B to LUCIP)

2011 00130428
Bk: 48291 Pg: 138
Page: 1 of 70 12/19/2011 02:09 PM WD

Total Pages: 70

Impact Area, Off Spruce St, Plum St, Oak St, Beech St + Maple Street, Harvard, MA

GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT
42 U.S.C. § 9601, *et seq.*; M.G.L. C. 21E, § 6

[Note: This instrument is established as an institutional control for a federal Superfund site, a portion of a former federal facility, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, as set forth below, and contains a GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT running to the MASSACHUSETTS DEPARTMENT of ENVIRONMENTAL PROTECTION]

This GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT (this "Environmental Restriction and Easement") is made as of this 20th day of October, 2011, by Massachusetts Development Finance Agency, a body corporate and politic, having its principal office at 160 Federal Street, Boston, Massachusetts and maintaining a Devens Office at the Devens Commerce Center, 33 Andrews Parkway, Devens, Massachusetts ("Grantor").

WITNESSETH

WHEREAS, Grantor is the owner in fee simple of certain land (the "Property") located in Town of Harvard, Worcester County, Massachusetts, with the buildings and improvements thereon, pursuant to a deed from the United States of America acting by and through the Secretary of the Army (the "Army") and recorded with the Worcester District Registry of Deeds in **Book 29378, Page 064** (the "Army Deed");

WHEREAS, a portion of said Property known as the "Impact Area", which is more particularly bounded and described in Exhibit A, attached hereto and made a part hereof ("Impact Area") is subject to this Grant. The Impact Area is shown on a plan entitled "Plan of Impact Area, Grant of Environmental Restriction and Easement, Grant Road Housing Area, OakStreet" prepared for Massachusetts Development Finance Agency prepared by WSP – Sells dated April 11, 2011 and recorded with the Worcester District Registry of Deeds in **Plan Book 890, Plan 108**, a copy of which is attached hereto as Exhibit A-1 (the "Plan"). The Plan shows existing utilities within the Impact Area;

After recording, return to:
Jennifer L. Davis
Massachusetts Department of Environmental Protection
Office of General Counsel
One Winter Street, Boston, MA 02108

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WHEREAS, the Impact Area is subject to covenants, restrictions, easements and other rights and obligations under the terms and conditions of this instrument;

WHEREAS, the Impact Area is part of a federal Superfund Site, known as the Fort Devens Superfund Site (the "Site"). The U.S. Environmental Protection Agency, an agency established under the laws of the United States, having its New England regional office at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109 ("EPA"), pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. § 9605, placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on November 21, 1989, 54 Fed. Reg. 48184, due to a release of hazardous substances, as that term is defined by the Section 104 of CERCLA, 42 U.S.C. § 9604;

WHEREAS, EPA regulates activities at disposal sites pursuant to CERCLA and the National Contingency Plan, 40 C.F.R. 300.400, *et seq.*, as amended (the "NCP");

WHEREAS, as set forth in the Army Deed, the Property was formerly part of an active Army military installation, known as Fort Devens. Fort Devens was used as a training camp and induction center for military personnel from 1917 until 1996. The Impact Area and other portions of the Property were, at one time, used as a firing range. In accordance with CERCLA and the NCP, the Army performed a removal action of unexploded ordnance ("UXO") from the Property during the period April 22, 1996 to July 26, 1996. The Army Deed indicates that, as a result of historic operations, UXO may be found on the Property. Section XVIII of the Army Deed states that based on information available to the Army at the time, no UXO was believed to be present. Subsequent to the execution of the Army Deed in 2003, UXO was identified at the Property including the Impact Area. To expedite development of the Property, Grantor voluntary conducted site investigations and removal actions to identify and remove munitions and explosives of concern ("MEC"), including UXO, at the Property. As the result of such investigations, UXO and other MEC were removed from the Property, including the Impact Area;

WHEREAS, the investigations and removal actions have used the best available technology, and the efforts have removed all identified UXO from the top 18 inches of soil and to greater depths within the Impact Area where extensive removal actions occurred at two identified target locations. There is nevertheless the possibility that MEC or UXO remains on the Property, including the Impact Area;

WHEREAS, in a document entitled, "Record of Decision, Grant Housing Areas and 37-MM Impact Area, Former Fort Devens Army Installation, Devens, Massachusetts," dated September 2009 (the "ROD"), said ROD being on file at the United States Environmental Protection Agency, Region I ("EPA") Record Center located at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109, the Army, with the approval of EPA and the concurrence of MassDEP (as defined below), has selected certain response actions (the "Selected Remedy") for the Site in accordance with CERCLA, 42 U.S.C. §§ 9601, *et seq.*, and the NCP, 40 C.F.R. §§ 300.1 *et seq.*;

WHEREAS, the Selected Remedy is based, in part, upon the restriction of human access to and contact with undiscovered UXO; and the restriction of certain uses and activities occurring in, on, through, over or under the Impact Area;

WHEREAS, pursuant to CERCLA Section 120(h)(3)(A)(ii), the Army Deed contained a covenant warranting that (a) all remedial action necessary to protect human health and the environment with respect to any hazardous substances including UXO remaining on the Impact Area had been taken; and (b) any additional remedial action found to be necessary after the date of the Army Deed would be conducted by the United States;

WHEREAS, Section VII of the Army Deed reserved for the Army a right of access to the Impact Area if needed to fulfill the obligations identified in the previous paragraph, which right is not affected or diminished in any way by this Grant of Environmental Restriction and Easement;

WHEREAS, Section VIII D of the Army Deed requires that the property owner comply with any institutional controls established or put in place by the Army relating to the property which are required by any ROD, or amendments thereto, related to the property, which ROD was approved by the Army and EPA and issued by the Army pursuant to CERCLA or the Federal Facilities Agreement ("FFA") before or after the date of the Army Deed.

WHEREAS, the Army established certain other restrictions on the Impact Area in the Army Deed;

WHEREAS, the Massachusetts Department of Environmental Protection, a duly constituted agency organized under the laws of the Commonwealth of Massachusetts, having its head office at One Winter Street, in Boston, Massachusetts 02108 ("MassDEP" or "Grantee"), pursuant to Sections 3(a) and 6 of Chapter 21E, is authorized to take all action appropriate to secure to the Commonwealth the benefits of CERCLA; and pursuant to said Section 6, is authorized to acquire an interest in real property if necessary to carry out the purposes of CERCLA and Chapter 21E, subject to the approval of the Commissioner of MassDEP;

WHEREAS, MassDEP has indicated a willingness to hold the within Grant pursuant to the aforesaid authority in furtherance of the response action assurances required by Section 120(h)(3) of CERCLA; and

WHEREAS, EPA has approved a plan entitled "Land Use Control and Implementation Plan" prepared by the Army and Grantor and dated January 2011, as the same may be amended from time to time (as so amended, the "LUCIP"). The LUCIP is on file at the EPA Record Center located at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109, and a current copy of which is attached hereto as Exhibit B. Pursuant to the LUCIP, and subject to the terms and conditions of this Environmental Restriction and Easement, a fence and signage are to be installed and maintained around the perimeter of the Impact Area, and a vegetative barrier is to be installed and maintained to screen said fence, in the locations shown on the Plan.

NOW, THEREFORE, in accordance with the provisions of M.G.L. c. 21E, § 6, the MASSACHUSETTS DEVELOPMENT FINANCE AGENCY hereby grants to the MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION ("Grantee" or

"MassDEP"), such grant being a gift, and in connection with federal regulatory requirements for establishing institutional controls required in the ROD, with QUITCLAIM COVENANTS, an ENVIRONMENTAL RESTRICTION AND EASEMENT ("Restriction") in, on, through, over and under the Impact Area, said Impact Area being more particularly bounded and described as aforesaid.

Said Environmental Restriction and Easement is subject to the following terms and conditions:

1. Purpose. It is the purpose of this instrument to establish covenants and restrictions and to convey to the Grantee real property rights involving access and enforcement, all of which shall run with the land, to protect human health and the environment by reducing the risk of exposure to hazardous material, including UXO.

2. Applicability. The restrictions set forth in Paragraph (3) ("Restricted Uses and Activities") shall not apply:

a. to any response action undertaken by EPA or MassDEP, or its respective agents, representatives, contractors, subcontractors or employees, pursuant to CERCLA or Chapter 21E and its respective implementing regulations; or

b. to any response action undertaken by the Army, or its agents, representatives, contractors, subcontractors or employees, in accordance with and pursuant to the FFA and consistent with the ROD, and any approval by EPA and/or MassDEP required thereunder.

3. Restricted Uses and Activities. Except as provided in Paragraph (4) and (5) of this Grant, Grantor shall not perform, suffer, permit or cause any person to perform any of the following activities in, on, upon, through, over or under the Impact Area, or any of the following uses to be made of the Impact Area:

a. Excavation, removal, or disturbance of any soil, or other ground intrusive work;

b. Industrial, commercial, residential, agricultural or recreational use or development of any kind; and

c. Any other action or inaction which, in the written opinion of the Army, and/or the EPA and/or MassDEP, is reasonably likely to create a significant risk of harm to health, safety, public welfare or the environment.

4. Permitted Uses and Activities. Grantor expressly reserves the right to perform, suffer, allow or to cause appropriately trained personnel to perform any of the following activities in, on, through, over or under the Restricted Area:

a. Surface inspections of the Impact Area for the presence of UXO and the removal of such UXO discovered during such inspections in accordance with the LUCIP;

b. Installation and maintenance of a fence, signage and vegetative cover to limit public access to the Impact Area; and

c. Emergency excavation as described in Paragraph 5, below

5. Emergency Excavation. Notwithstanding the requirements of Paragraph 3, Grantor shall be permitted to excavate, remove or disturb any soil or perform other ground intrusive work within the Impact Area to conduct emergency repairs or replacements of existing utility lines in accordance with an emergency excavation plan on file with the Devens Fire Department, subject to Grantor's compliance with the following:

a. Grantor shall limit the actual disturbance involved in such activities to the minimum reasonably necessary; and

b. Grantor shall develop and submit to MassDEP, the Army and EPA a site-specific health and safety plan prepared under the direction of a qualified professional, and otherwise implement all measures reasonably necessary to limit actual or potential risk to health, safety, public welfare or the environment, including such measures set forth in the LUCIP.

6. Easement. Grantor hereby grants an easement for the term of this Grant to MassDEP and its authorized agents, contractors, subcontractor, and employees:

a. an easement to pass and repass over the Impact Area and such other portions of the Property necessary to access the same for purposes of inspecting the Impact Area to insure compliance with the terms of this Environmental Restriction and Easement.

b. an easement in, on, upon, through, over and under the Impact Area for the following purposes:

i. conducting and/or participating in five-year reviews of the remedial action taken pursuant to the ROD, as identified *supra*, in accordance with Section 121(c) of CERCLA;

ii. verifying any data or information submitted to the Army, EPA, or MassDEP;

iii. conducting investigations relating to contamination at or near the Impact Area;

iv. surveying;

v. obtaining samples;

vi. determining whether additional restrictions are necessary; and

vii. conducting other investigations and/or remediation activities consistent with CERCLA, the NCP, Chapter 21E and/or other applicable State or federal environmental statutes and regulations.

7. Construction and Severability.

a. This instrument shall be liberally construed in favor of the Grantee to effect the purpose of this instrument and the policies and purposes of CERCLA and/or Chapter 21E. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

b. If any court or other tribunal determines that any provision of this instrument is invalid or unenforceable, such provision shall be deemed automatically modified to conform to the requirements for validity and enforceability as determined by such court or tribunal. In the event the provision invalidated is of such a nature, that it cannot be so modified, the provision shall be deemed deleted from this instrument as though it had never been included. In either case, the remaining provisions of this instrument shall remain in full force and effect.

8. Enforcement.

a. Grantor expressly acknowledges that a violation of the terms of this instrument could result in the following:

i. the assessment of penalties and other action by MassDEP to enforce the terms of this Environmental Restriction and Easement, pursuant to M.G.L. c. 21E; and/or

ii. upon a determination by a court of competent jurisdiction, the issuance of criminal and civil penalties, and/or equitable remedies which could include the issuance of an order to modify or remove any improvements constructed in violation of the terms of this Environmental Restriction and Easement.

b. All reasonable costs and expenses of Grantee, including but not limited to, attorney's fees, incurred in any such enforcement action shall be borne by Grantor (or, to the extent the Grantor no longer owns the Impact Area, a successor owner), to the extent not inconsistent with CERCLA, Chapter 21E and/or any other applicable law.

c. All rights and remedies available hereunder shall be in addition to, but not in lieu of, any and all rights and remedies at law or in equity, including CERCLA or Chapter 21E, which rights and remedies Grantee fully reserves. Enforcement of the terms of this instruments shall be at the discretion of Grantee, and any forbearance, delay or omission to exercise its rights under this instrument by Grantee shall not be deemed to be a waiver by Grantee of such term or any subsequent breach of the same or any other term, or of any other the rights of Grantee under this instrument.

9. Provisions to Run with the Land. This Environmental Restriction and Easement establishes certain rights, liabilities, agreements and obligations for the Impact Area, or any portion thereof, which shall run with the Impact Area, or any portion thereof, in perpetuity.

Grantor hereby covenants for itself and its executors, administrators, heirs, successors and assigns, to stand seized and hold title to the Impact Area, or any portion thereof, subject to this Environmental Restriction and Easement.

The rights granted to MassDEP, its successors and assigns, do not provide, however, that a violation of this Environmental Restriction and Easement shall result in a forfeiture or reversion of Grantor's title to the Impact Area.

10. Concurrence Presumed. It is agreed that:

a. Grantor and all parties claiming by, through or under Grantor shall be deemed to be in accord with the provisions of this document; and

b. all such parties and any party claiming by, through or under them, and their respective agents, contractors, sub-contractors and employees, also agree that the Environmental Restriction and Easement herein established shall not be violated and that their respective interests in the Impact Area shall be subject to the provisions herein set forth.

11. Incorporation into Deeds, Mortgages, Leases and Instruments of Transfer. Grantor hereby agrees to incorporate this Environmental Restriction and Easement, in full or by reference, into all future deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer by which an interest in and/or a right to use the Impact Area, or any portion thereof, is conveyed.

12. Amendment and Release.

a. This instrument may be amended by Grantor only with the prior, written approval of Grantee. All amendments shall include Grantee's signed approval and shall become effective upon recordation with the appropriate registry of deeds.

b. Grantor hereby agrees to record and/or register any approved amendment to and/or release of this instrument with the appropriate registry of deeds within (30) days of the date of having received from Grantee any such amendment or release and shall provide Grantee with a certified Registry copy of the amendment and/or release. Grantor shall pay any and all recording fees, land transfer taxes and other such transactional costs associated with any such amendment or release.

13. No Dedication Intended. Nothing herein shall be construed to be a gift or dedication of the Impact Area to MassDEP, EPA or to the general public for any purpose whatsoever.

14. Term. This Environmental Restriction shall run with the land in perpetuity and is intended to conform to the exception for "other restrictions held by any governmental body" set forth in clause (c) of the first paragraph of M.G.L. c. 184, § 26, as amended.

15. Rights Reserved.

a. It is expressly agreed that acceptance of this instrument by Grantee or its assignees shall not operate to bar, diminish, or in any way affect any legal or equitable right of Grantee, its successors or assigns, to issue any future order or take response action with respect to the Impact Area or in any way affect any other claim, action, suit, cause of action, or demand which Grantee, its successors or assigns, may otherwise possess with respect thereto.

b. Nothing in this instrument shall limit or otherwise affect the rights of MassDEP to obtain access to, or restrict the use of, the Impact Area pursuant to CERCLA, Chapter 21E, or any other applicable statue or regulation.

16. Notice. Whenever, under the terms of this instrument, written notice is required to be given or a document is required to be sent to MassDEP or Grantor, as the case may be, it shall be directed to the respective addresses specified below, or such other addresses as may otherwise be directed in writing by such party:

As to MassDEP: Bureau of Waste Site Cleanup, Department of Environmental Protection, One Winter Street, Boston, MA 02108, Attention: Superfund Federal Facilities, Section Chief

As to Grantor: Massachusetts Development and Finance Agency, 160 Federal Street, Boston, MA 02110, Attention: President & CEO, with a copy to Massachusetts Development and Finance Agency, Devens Commerce Center, 33 Andrews Parkway, Devens, Massachusetts 01434, Attention: EVP, Devens Operations

17. Army Deed. This Grant incorporates by reference the provisions set forth in Section III of the Army Deed.

18. Successors. This Grant, including without limitation all easements, rights, covenants, obligations and restrictions inuring to the benefit of Grantee, herein contained, shall be run to the benefit of, and may be enforced by, a successor of Grantee. Grantor's liability hereunder shall be limited to matters arising during Grantor's ownership of the Impact Area, and in the event that Grantor (or any successor owner) shall convey or dispose of the Impact Area to another party, such party shall thereupon be and become "Grantor" hereunder and shall be deemed to have fully assumed and be liable for all obligations of Grantor under this Grant which first arise after the date of conveyance.

19. Authority. The President and Chief Executive Officer for the Massachusetts Development Finance Agency, Marty Jones, hereby certifies that he has the authority to execute this instrument on behalf of, and that this instrument is binding upon, the Massachusetts Development Finance Agency, and that he has been so authorized.

20. Effective Date. This Restriction shall become effective upon its recordation and/or registration with the appropriate Registry of Deeds and/or Land Registration Office.

As this instrument is granted to an agency of the Commonwealth of Massachusetts, no Massachusetts deed excise tax stamps are affixed hereto, none being required by M.G.L. Chapter 64D, Section 1.

***

Witness the execution hereof under seal as of the date first written above.

GRANTOR:

MASSACHUSETTS DEVELOPMENT
FINANCE AGENCY

By: _____
Martha L. Jones
President and Chief Executive Officer

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss

On this 20th day of October, 2011, before me, the undersigned Notary Public, personally appeared the above-named **Martha L. Jones**, proved to me by satisfactory evidence of identification, being (check whichever applies): □ driver's license or other state or federal governmental document bearing a photographic image, □ oath or affirmation of a credible witness known to me who knows the above signatory, or X my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing to be signed by her voluntarily for its stated purpose as President and Chief Executive Officer for the Massachusetts Development Finance Agency.

_____
Notary Public
My Commission Expires:

LEE S. SMITH
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
May 11, 2018

In accordance with M.G.L. c. 21E, § 6, as amended, the Commissioner of the Department of Environmental Protection hereby approves the Grant (as to form, only).

_____
Kenneth L. Kimmell
Commissioner
Department of Environmental Protection
Date: 12/13/11

ASSISTANT SECRETARY'S CERTIFICATE

I, Lee S. Smith, duly appointed Assistant Secretary of Massachusetts Development Finance Agency, a body politic and corporate formed under Massachusetts General Laws Chapter 23G (the "Corporation"), do hereby certify that:

1. Martha L. Jones, a/k/a Marty Jones, is the President and Chief Executive Officer of the Corporation and, pursuant to the Corporation's Transaction Approval Guidelines, she is duly authorized, singly, to execute and deliver any and all documents and instruments in connection with the Grant of Environmental Restriction and Easement ("GERE") and Land Use Control Implementation Plan ("LUCIP") for the Impact Area within the Grant Road Housing Area, Devens Regional Enterprise Zone.

IN WITNESS WHEREOF, I have duly executed this Certificate solely in the above-named capacity on October 20, 2011.

Lee S. Smith
Assistant Secretary of
Massachusetts Development
Finance Agency

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss.

On this 20th day of October, 2011, before me, the undersigned notary public, personally appeared Lee S. Smith, proved to me through satisfactory evidence of identification, which was my personal knowledge of the identity of the principal, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose, as Assistant Secretary of Massachusetts Development Finance Agency, a public instrumentality of The Commonwealth of Massachusetts.

(official signature and seal of notary)
My commission expires:

LORRAINE T. LUONGO
Notary Public
Commonwealth of Massachusetts
My Commission Expires
September 2, 2016

Exhibit A to Grant of Environmental Restriction and Easement
Legal Description - Impact Area

A certain impact area located on Parcel 1 of land owned by the Massachusetts Development Finance Agency (as successor to the Government Land Bank) and located in the Devens Regional Enterprise Zone, County of Worcester, Massachusetts situated westerly of Maple Street and northerly of Oak Street shown as "IMPACT AREA" on a plan entitled "Plan of Impact Area, Grant of Environmental Restriction and Easement, Grant Road Housing Area, OakStreet" prepared for Massachusetts Development Finance Agency prepared by WSP – Sells dated April 11, 2011 and recorded with the Worcester District Registry of Deeds in **Plan Book 890, Plan 108** (a copy of which is attached hereto as Exhibit A-1), and more particularly described as follows:

Beginning at the southeasterly corner of the Impact Area herein described near Maple Street; thence,

N 74-47-07 W one hundred fifty eight and seventeen hundredths feet (158.17') to a stone bound with drill hole set, thence;

N 01-35-43 E one hundred forty six and ninety two hundredths feet (146.92') to a stone bound with drill hole set, thence;

N 65-00-20 W one hundred sixty eight and seventy five hundredths feet (168.75') to a stone bound with drill hole set, thence;

N 70-38-16 W one hundred ninety three and twenty six hundredths (193.26') to a stone bound with drill hole set, thence;

N 02-55-38 E two hundred eighty eight and fourteen hundredths feet (288.14') to a stone bound with drill hole set, thence;

S 64-11-20 E two hundred sixty two and ninety three hundredths feet (262.93') to a stone bound with drill hole set, thence;

S 58-07-40 E ninety four and one hundredths feet (94.01') to a stone bound with drill hole set, thence;

S 33-46-52 E one hundred seventy one and twenty hundredths feet (171.20') to a stone bound with drill hole set, thence;

S 22-09-34 E one hundred fifty and seventy six hundredths feet (150.76') to a stone bound with drill hole set, thence;

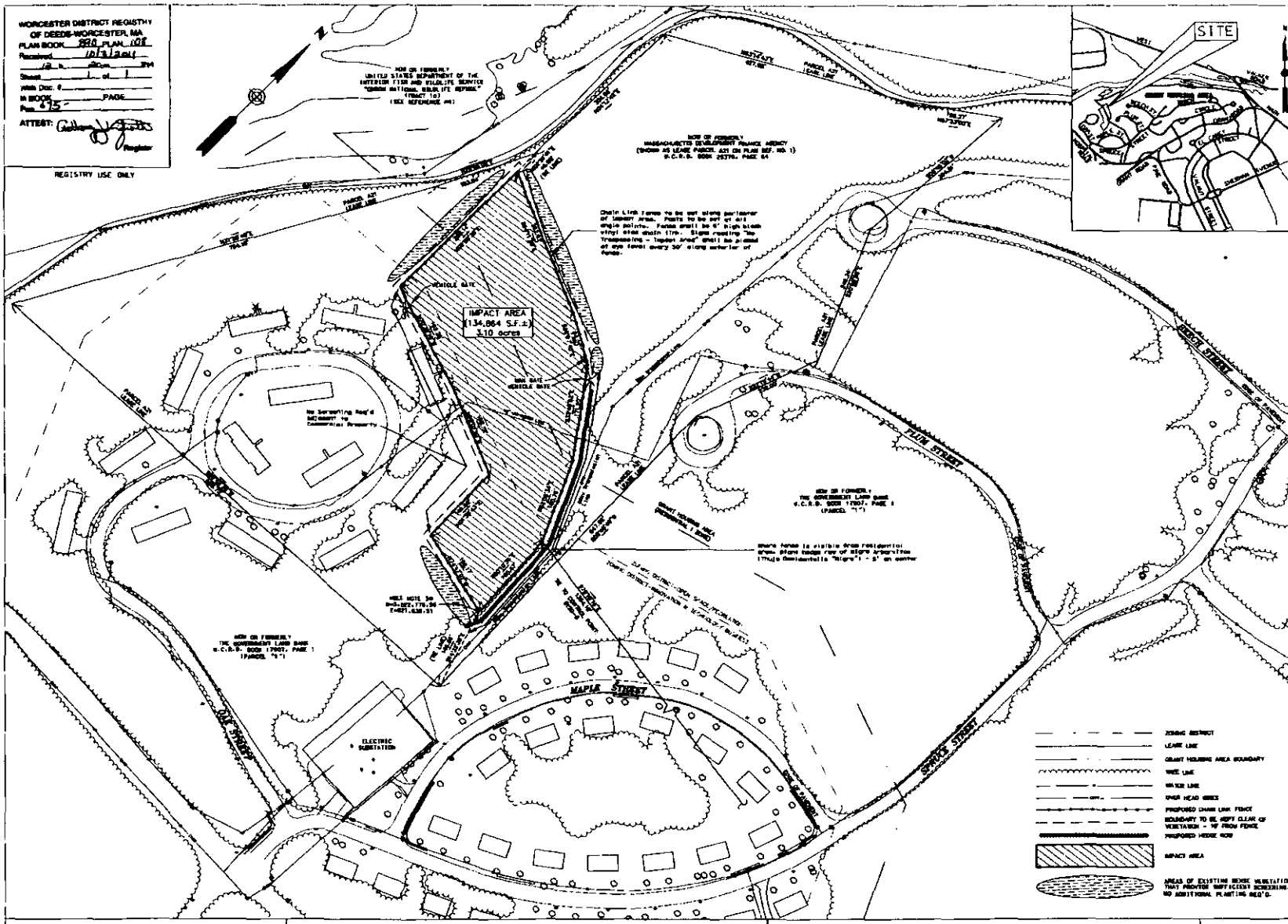
S 00-01-36 E one hundred sixty five and forty seven hundredths feet (165.47') to the point of beginning.

The above described "IMPACT AREA" contains 134,864 square feet or 3.10 Acres, more or less, according to said plan.

Exhibit A-1 to Grant of Environmental Restriction Bk: 48291 Pg: 150

WORCESTER DISTRICT REGISTRY OF DEEDS-WORCESTER, MA
PLAN BOOK 890 PLAN 108
Received 10/3/2011
at 12 h. 00 m. PM
Sheet 1 of 1
With Doc. #
IN BOOK PAGE
Fee 475
ATTEST: Register

REGISTRY USE ONLY



NOTES:

1. THIS PLAN WAS PREPARED FROM AN ON-THE-GROUND FIELD SURVEY CONDUCTED BY CHAS. H. SELLS, INC. ON JANUARY 29, 2008 THROUGH FEBRUARY 5, 2008.
2. BEARINGS BASED ON THE MASS. STATE PLANE COORDINATE SYSTEM & CONTROL SURVEY BY CHAS. H. SELLS, INC. APRIL 2006; LAST REVISED JULY 2007.
3. ALL COORDINATES SHOWN HEREON ARE IN RELATIONSHIP TO THE DEVENS, MA FIDUCIAL NETWORK AND GEOGRAPHIC INFORMATION SYSTEM (GIS). REFERENCE IS MADE TO THE CONTROL SURVEY AND REPORT ENTITLED, "SURVEY CONTROL REPORT FOR DEVENS-MASSACHUSETTS" PREPARED FOR MASSACHUSETTS DEVELOPMENT FINANCE AGENCY, BY CHAS. H. SELLS, INC DATED APRIL 8, 2002 AND LAST REVISED JULY 11, 2007. ALL COORDINATES ARE ON THE MASSACHUSETTS MAINLAND STATE PLANE SYSTEM (1983 1993).
4. THE PURPOSE OF THIS PLAN IS TO DEMONSTRATE THE LIMITS OF THE ONE ACRE IMPACT AREA AND TO ACCOMPANY A GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT (GERE) TO THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION.
5. THIS PLAN SUPERCEDES THE PREVIOUS PLAN OF IMPACT AREA, GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT, GRANT ROAD HOUSING AREA, OAK STREET, DATED 06/21/11, PREPARED FOR THE MASSACHUSETTS DEVELOPMENT FINANCE AGENCY, RECORDED AT THE WORCESTER DISTRICT REGISTRY OF DEEDS - WORCESTER, MA IN PLAN BOOK 890, PLAN 108.

REFERENCES:

1. PLAN OF LAND CONVEYED TO THE GOVERNMENT LAND BANK BY THE SECRETARY OF THE ARMY, AYER, HARVARD & SHIRLEY, MA. DATED MAY 10, 1996, PREPARED BY HOSE SURVEYING ASSOC.
   a) RECORDED IN N.S.D.E.D. PLAN 407 OF 1996
   b) RECORDED IN W.D.E.D. PL. BK. 763 PL. 117
2. THE CURRENT OWNER OF RECORD IS THE MASSACHUSETTS DEVELOPMENT FINANCE AGENCY IN DEED BOOK 26376, PAGE 64 IN WORCESTER SOUTH REGISTRY OF DEEDS.
3. GENERAL PUBLIC DAY DECLARATION PLAN DATED MAY 28, 1996, PREPARED BY HOSE SURVEYING ASSOC. AND RECORDED AT THE MASSDEVELOPMENT ENGINEERING OFFICE LOCATED AT 33 ANDREWS PARKWAY DEVENS, MA W.D.E.D. PL. BOOK 763 PLAN 112.
4. UNITED STATES DEPARTMENT OF THE INTERIOR-FISH AND WILDLIFE SERVICE. "1993 REVERSE MILITARY RESERVATION. TRANSFER TRACTS (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17)". DATED NOVEMBER 3, 1995. PREPARED BY MARK E. MILLER, PLS REGIONAL LAND SURVEYOR FOR UNITED STATES DEPARTMENT OF THE INTERIOR-FISH AND WILDLIFE. FILED AT THE UNITED STATES DEPARTMENT OF THE INTERIOR-FISH AND WILDLIFE REGION 5 OFFICE IN HADLEY, MA.

CERTIFICATION :

TO THE BEST OF MY PROFESSIONAL KNOWLEDGE INFORMATION AND BELIEF

"I HEREBY CERTIFY THAT THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIPS, AND THE LINES OF THE STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED, AND THAT NO NEW LINES FOR DIVISION OF OWNERSHIP OR FOR NEW WAYS ARE SHOWN."
"I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS." THE CERTIFICATION SHOWN HEREON IS INTENDED TO MEET REGISTRY OF DEEDS REQUIREMENTS AND IS NOT A CERTIFICATION O THE TITLE OR OWNERSHIP OF THE LAND SHOWN.

Darren J. Hardy
DARREN J. HARDY, P.L.S.
REG. NO. 48385
WSP SELLS, INC.

DATE

GRAPHIC SCALE
(IN FEET)
1 inch = 60 ft.

WSP · SELLS
Transportation & Infrastructure
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www.wspsells.com

REV	DATE	DESCRIPTION	BY
REV. 5	-	-	-
REV. 4	-	-	-
REV. 3	-	-	-
REV. 2	-	-	-
REV. 1	-	-	-

FIELD: ST. JO
OFFICE: DJH
DRAWN BY: SLS
CHECKED BY: DJH
PROJECT #: 01396.041

HARVARD (DEVENS), MASSACHUSETTS

TITLE: Plan of Impact Area
Grant of Environmental Restriction and Easement
Grant Road Housing Area, Oak Street

PREPARED FOR: (OWNER) MASSACHUSETTS DEVELOPMENT FINANCE AGENCY
100 FEDERAL ST., 7TH FLOOR
BOSTON, MA 02110

DATE: 09/22/11 SCALE: 1" = 80' DWG. 01396.041-3.DGN SHEET# 1 OF 1

Exhibit B to Grant of Environmental Restriction and Easement
Copy of LUCIP

LAND USE CONTROL IMPLEMENTATION PLAN

GRANT HOUSING AREA AND 37-mm IMPACT AREA
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

PREPARED BY:

Army Base Realignment and Closure Division
U.S. Army Garrison Fort Devens

May 2011

B3853900.31

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1.0 Introduction and Purpose

This Land Use Control Implementation Plan (LUCIP) is implemented pursuant to the Record of Decision dated September 2009 (ROD) signed by the United States Department of the Army (Army) and the United States Environmental Protection Agency (EPA). The ROD selected Land Use Controls (LUCs) as the remedy for two portions of the Former Fort Devens Army Installation (now Devens, Massachusetts). The two areas are known as Grant Housing Area (Grant HA) and the 37-millimeter Impact Area (Impact Area). This LUCIP describes the plan for implementation of LUCs at the Grant HA and the Impact Area. The Grant HA and the Impact Area are sometimes collectively referred to as the "Property".

1.1 Site Background

Between 1917 and the 1930s, the Grant HA and the Impact Area were used by the Army as a firing range. From the early 1960s until the closure of Fort Devens in March 1996, the Grant HA was used for military housing purposes. **Figure 1** depicts the Grant HA with a narrative description. **Figure 2** depicts the Impact Area. **Figure 3** shows the two areas in relation to Devens as a whole. **Figure 4** shows the two areas in relation to each other.

The Grant HA and Impact Area were conveyed to the predecessor of the current site owner, the Massachusetts Development Finance Agency (MassDevelopment), pursuant to two deeds from the Army, one in 1996 and one in 2003. Both deeds indicate that, as a result of historic operations of the Grant HA and Impact Area as an active military installation, there exists a possibility that unexploded ordnance (UXO) may exist. The deeds further state that based on a comprehensive records search and statistical and physical testing, the Army does not believe that UXO is present on the Property.

In preparation for the development of the Grant HA for new residential construction, the Army, under the oversight of EPA and with the review and comment of the Massachusetts Department of Environmental Protection (DEP) began an investigation of the Property to identify and address an array of possible contaminants, including UXO and other munitions and explosives of concern (MEC), at the Property. As a result of a voluntary effort to accelerate the redevelopment of the Property for residential use, MassDevelopment contracted with a private company to investigate and, as necessary, remediate UXO and other MEC at the Property.

MassDevelopment's contractor performed digital geophysical mapping and UXO removal at the Property, reviewed the reports, studies, maps, and other materials generated by the Army and/or its contractors with respect to UXO and other MEC at the Property, and conducted extensive field investigations and removal. Details and conclusions from those investigations and removal actions are contained in the reports listed in **Exhibit A** hereto (Reports), including a Focused Feasibility Study (FFS) commissioned by the Army under the supervision of the EPA and the ROD. The Reports are available for review at the New England regional office of the EPA, the Army (BRAC Office, Devens), DEP, and the public libraries for the Town of Ayer, Massachusetts, the Town of Harvard, Massachusetts, and the Town of Shirley, Massachusetts.

Pursuant to the FFS, the Army under the supervision of the EPA and with the involvement of DEP assessed the potential likelihood that UXO and other MEC is on the Property in light of the previous investigation and removal actions, and evaluated various additional remedial alternatives to protect the public, including residents and workers, from any potential UXO and other MEC on the Property. The various alternatives that were evaluated and the selected remedy are described in the ROD. The ROD reached the following conclusions: (a) the investigation and removal actions have occurred using the best available technology; (b) while not 100% conclusive, these efforts have removed all identified UXO from the top 18 inches of soil throughout the Grant HA and the Impact Area and to greater depths within the Impact Area; (c) UXO in the Grant HA is unlikely at depths greater than 18 inches due to the angle of penetration of projectiles into the ground surface along the range, the effect of local soil composition (i.e., sand and gravel deposits) on limiting penetration depths, and up to 90 years for frost heaves to have brought items to the surface; (d) UXO in the Impact Area may be buried at depths deeper than the frost line, but that any potential associated with frost heaves bringing UXO to the surface is considered minimal; (e) the probability of encountering UXO in the Grant HA is low; (f) although there remains a risk of exposure to remnant UXO with an explosive safety hazard, the remaining hazard of encountering UXO in the Grant HA or the Impact Area would be primarily associated with construction work during future development (e.g., utility or foundation installation or other deeper excavation activities); and (g) the implementation of LUCs is the appropriate remedy to provide additional protection to residents and workers in the event that they encounter UXO at the Property.

Although the ROD left the details of the LUCs to this LUCIP, LUCs for the Grant HA require the following affirmative measures:

- Affirmative measures to include public education via ongoing periodic distribution of educational materials and development of a web-based visual and audio media. Education and outreach materials will be distributed to property owners, residents, as well as any construction and/or utility contractors conducting ground intrusive activities on the property. The intent is to provide education to current residents, including tenants and owners, potential residents, the public and construction/utility contractors of the potential presence of UXO, how to identify UXO, and what actions to take if suspect UXO is encountered.

- Deed Notice: MassDevelopment will insert a Deed Notice into any deeds in which MassDevelopment conveys property located in the GHA. Then all subsequent deeds conveying property (no matter who conveys) will be required to convey in full the Deed Notice. The notice will provide a source of additional information on UXO investigations and removal actions conducted at the Grant HA, the conclusion of the ROD that the property with the LUCs is suitable for the proposed future use, that there is no evidence of additional UXO present at the site, but that the possibility does remain that UXO could be discovered in the future.

The intent of these measures is to educate current residents, including tenants and owners, potential residents, the public and construction contractors to the potential presence of UXO, locations where UXO are more likely to be encountered, how to identify UXO, how to minimize the potential of encountering UXO, and what actions to take if suspect UXO is encountered. The ROD further concludes that, subject to compliance with the LUCs, the Grant HA is suitable for unrestricted future use, including use for residential purposes.

For the Impact Area, LUCs are addressed through the following institutional controls, access restrictions, affirmative measures, and prohibitive directives:

- Institutional controls are to be implemented through a Grant of Environmental Restrictions and Easements (GERE).

- Access controls to include the use of signage and either fencing and/or vegetative barrier to restrict public access to the area.

- Affirmative measures to include public education via ongoing periodic distribution of educational materials, development of a web-based visual and audio media, and signage at the site. Education and outreach materials will be distributed to affected public and construction and/or utility contractors. The intent is to provide ongoing

education to the public and construction contractors of the potential presence of UXO, how to identify UXO, and what actions to take if suspect UXO is encountered.

- Prohibitive directives to include restrictions on all ground intrusive activities.

- Annual site inspections of the site to evaluate access controls, monitor for the presence of surficial and near surface UXO, and evaluate the overall effectiveness of the LUCs.

1.2 Definition of Land Use Controls

Land Use Controls in regard to real property are broadly interpreted to mean:

> *any restriction or control, arising from the need to protect human health and the environment, that limits use of and/or exposure to any portion of that property, including water resources. This term encompasses 'institutional controls,' such as those involving real estate interests, governmental permitting, zoning, public advisories, deed notices, and other 'legal' restrictions. The term may also include restrictions on access, whether achieved by means of engineered barriers such as a fence or concrete pad, or by 'human' means, such as the presence of security guards. Additionally, the term may involve both affirmative measures to achieve the desired restriction (e.g., night lighting of an area) and prohibitive directives (e.g., no drilling of drinking water wells).*[1]

The LUCs for a property will provide a blueprint for how the property should be used in order to maintain the level of protection intended by the remedial alternative.

1.3 Land Affected

A plan and narrative description of the Grant HA is included as **Figure 1**. A plan of the Impact Area is included as **Figure 2**. A plan showing the Grant HA and Impact Area in relation to Devens is included as **Figure 3**, and a plan showing the Grant HA and Impact Area in relation to one another is included as **Figure 4**.

2.0 Land Use Controls for Grant HA

Land Use Controls at the Grant HA are addressed through the following affirmative measures:

---

[1] Memorandum - Land Use Control Policy, April 13, 1998, SUBJECT: Assuring Land Use Controls at Federal Facilities FROM: Jon D. Johnston, Chief, Federal Facilities Branch *www.epa.gov/region4/waste/fedfac/landusec.htm.*

a. Deed Notice. MassDevelopment, the current owner of the Grant HA, has agreed to insert a Supplemental Deed Notice into any deeds by which MassDevelopment conveys all or part of the property located in the Grant HA. The deed notice will require that the grantors of all subsequent instruments conveying an interest in the property be required to insert the deed notice in such subsequent instruments. A copy of the draft Supplemental Deed Notice is attached to this LUCIP as **Exhibit B**.

b. Ongoing Distribution of Educational Materials

1) The Army will cause the operator of the electric utilities at Devens to include, at least annually, an educational insert in electric utility bill mailings to occupants of the Grant HA who receive an electric bill. The insert will also be included in the first bills to any new customer resident in the Grant HA. In addition, within thirty (30) days after issuance of the first building permit for a residential dwelling in the Grant HA, the Army will cause the insert to be posted in an 11" x 17" permanent laminated format on a kiosk or a community bulletin board located in a central public space at the Grant HA (or, if a central public space does not yet exist, the kiosk or bulletin board shall be located in the area where the construction activity is occurring in Grant HA, provided that the Army shall relocate such kiosk or bulletin board once a central public space has been created). The insert, and postings on any such kiosk or bulletin board, will identify the historical military use of Devens, the potential presence of UXO, locations where UXO are more likely to be encountered (Impact Area vs. Grant HA), how to identify UXO, how to minimize the potential of encountering UXO, what actions to take if suspect UXO is encountered and opportunities for further education (including websites and training). A sample narrative of the insert is attached to this LUCIP as **Exhibit C**.

2) The Army will cause educational information to be displayed on a community website regarding the historical military use of Devens, the likelihood of remaining UXO, locations where UXO are more likely to be encountered (Impact Area vs. Grant HA), how to identify UXO, how to minimize the potential of encountering UXO, and what actions to take if suspect UXO is encountered. A sample list of educational materials is attached to this LUCIP as **Exhibit D**.

3) Land use controls related information in the insert and on the websites may be updated from time to time to reflect new developments or changes in information. Changes in substantive content will be submitted for approval by the Army (or its designee) to the EPA, DEP, Army (if submitted by its designee), MassDevelopment and the Devens Enterprise Commission (DEC) at least 30 days in advance. No notification will be required to fix typographical or grammatical errors or administrative data that do not change the meaning of the information provided.

c. Construction Activities

1) The Army (or its designee) will distribute to all construction and/or utility personnel at the time of application for a building permit a current copy of the Devens Soils Management Policy containing a protocol and procedures to follow if UXO is found or suspected. A copy of the current Devens Soils Management Policy is attached to this LUCIP as **Exhibit E**.

2) In addition, all construction and utility personnel intending to conduct ground intrusive activities within the Grant HA that require a building permit shall, prior to commencing such activities, be required to attend an awareness briefing conducted by the Army (or its designee) designed to instruct personnel how to visually recognize UXO and the steps to follow should suspect UXO be encountered. The awareness briefings are currently conducted by the Devens Fire Department. This awareness briefing will also be made available to any occupant of the Grant HA who requests it.

3) Both the Devens Soils Management Policy and the awareness briefing may be updated from time to time to reflect new developments or changes in information. Changes in substantive content will be submitted for approval to the EPA, DEP, MassDevelopment, DEC (or successor municipal authority) and the Army at least 30 days in advance. No notification will be required to fix typographical or grammatical errors or administrative data that do not change the meaning of the information provided.

The intent of the LUCs for the Grant HA is to educate residents, including tenants and owners, potential residents, the public and construction contractors to the potential presence of UXO, locations where UXO are more likely to be encountered, how to identify UXO, how to minimize the potential of encountering UXO, and what actions to take if suspect UXO is encountered.

3.0 Land Use Controls for the Impact Area

For the Impact Area, LUCs are addressed through the following institutional controls, access restrictions, affirmative measures, and prohibitive directives:

a. Institutional Controls. MassDevelopment, as the current owner of the Impact Area, has agreed to grant to the DEP a GERE in the form attached to this LUCIP as **Exhibit F**. The GERE includes restrictions on public access to, and ground intrusive activities within, the Impact Area. The GERE will be finalized and recorded as soon as practicable after this LUCIP is approved, and a copy of the recorded GERE will be submitted to EPA and DEP prior to any subsequent transfer of the Impact Area.

b. Ongoing Distribution of Educational Materials. The Army (or its designee) will maintain educational information on a community website regarding the historical military use of Devens, the potential presence of UXO, locations where UXO are more likely to be encountered (Impact Area vs. Grant HA), how to identify UXO, how to minimize the potential of encountering UXO, and what actions to take if suspect UXO is encountered. A sample list of educational materials is attached to this LUCIP as **Exhibit D**.

c. Access controls. The Army, in consultation with MassDevelopment (or successor owner of the Impact Area), will (i) install and maintain a fence around the perimeter of the Impact Area to restrict public access, and (ii) install and maintain a vegetative barrier to screen the fence and which at maturity will provide an approximate ten (10) foot clear area in front of the fence. The fence shall consist of a six (6) foot high, black-clad chain link fence without barb wire. The vegetative barrier shall consist of dense evergreen shrubs or similar plantings appropriate for location including the climate, topography, soil condition and exposure to sunlight. No changes shall be made to the fence or vegetative barrier, (1) which are not appropriate for a residential area; and (2) without first consulting MassDevelopment (or the successor owner of the Impact Area).

d. Signage. The Army, in consultation with MassDevelopment (or successor owner of the Impact Area) will install and maintain signage on the fencing described in clause c., above. The signage shall state "No Trespassing – Impact Area", shall have dimensions of approximately 12 inches by 18 inches, and shall be placed at eye level at 50 foot intervals on the exterior side of such fencing. No changes shall be made to the signage without first consulting MassDevelopment (or the successor owner of the Impact Area).

e. Ground Intrusive Activities. The GERE prohibits ground intrusive activities in the Impact Area. There are three exceptions to this prohibition: (a) surface inspections with removal of identified UXO; (b) installation and maintenance of fence, vegetation and signage; and (c) emergency excavation, which can include excavation required to respond to an emergency, including repairing/replacing existing utility lines. Emergency excavation must be made pursuant to a pre-approved emergency excavation plan which may be obtained from the Devens Fire Department. In addition, all personnel permitted to conduct ground intrusive activities within the Impact Area shall, prior to commencing such activities, be required to attend an awareness briefing by the Army (or its designee) designed to instruct personnel how to visually recognize UXO and the steps to follow should suspect UXO be encountered. These materials and awareness training can be identical to the training for the Grant HA.

The intent of the LUCs for the Impact Area is to minimize the potential that the public will come into contact with UXO, to educate the public about the potential presence of UXO, and to

educate personnel working in the Impact Area as to the potential presence of UXO, how to identify UXO, and what actions to take if suspect UXO is encountered.

4.0 LUC Responsibilities

The Army is responsible for implementing, maintaining, and reporting on the LUCs. Although the Army may now or in the future delegate some or all of its duties as indicated in this LUCIP through a third party by contract or through other means, the Army shall retain ultimate responsibility for the remedy integrity. It is anticipated that MassDevelopment, the DEC, or their successors will perform some of the duties required under this LUCIP, but this effort is, and shall at all times be, voluntary. Should MassDevelopment, the DEC, or their successors cease performing these duties, the Army shall implement the LUCs or propose modifications to this LUCIP that provide an equivalent level of protection as determined by EPA and DEP, in consultation with MassDevelopment or its successor municipal authority.

5.0 Implementation Actions

Upon concurrence in this LUCIP by EPA and DEP in accordance with their respective legal authorities, the Army will undertake implementation actions to confirm compliance with LUC objectives. The Army will notify the EPA and DEP of any changes in LUC management responsibility.

The following LUC implementation actions will be undertaken by the Army to ensure that the LUC objectives are met and maintained.

5.1 Distribution of LUCIP

Within 30 days of receiving EPA approval and DEP concurrence of this LUCIP, in accordance with their respective legal authorities, the Army will undertake the following specific actions:

- Send a copy of this LUCIP to the Town of Ayer, Massachusetts for its records;
- Send a copy of this LUCIP to the Town of Harvard, Massachusetts for its records;
- Send a copy of this LUCIP to the Town of Shirley, Massachusetts for its records;
- Send a copy of this LUCIP to the DEC for its records;
- Send a copy of this LUCIP to MassDevelopment to be kept in its files at 33 Andrews Parkway; and
- Place a copy of this LUCIP in the central Army repository and the public libraries for the Towns of Ayer, Harvard, and Shirley, Massachusetts.

5.2 Deed Notices and Educational Materials

The Army shall do the following:

The Army (or its designee) will verify that the Supplemental Deed Notice is included in all future deeds conveying interests in the Grant HA.

The Army will cause the Devens Fire Department to continue to provide contractor awareness briefings (and to make such briefings available to any occupant of the Grant HA who requests a briefing), until such time as the Devens Fire Department shall elect to discontinue the same, in which event, the Army shall arrange for suitable alternative briefing. The Army will verify and ensure that these briefings continue beginning when this LUCIP is finalized.

The Army (or its designee), in consultation with MassDevelopment (or the successor utility provider), will develop a draft of the electric bill insert by the date noted in Exhibit H, LUC Implementation Schedule, which insert shall be based upon the narrative attached to this LUCIP as Exhibit C and include photographs of typical UXO.

The Army (or its designee), in consultation with MassDevelopment and the DEC, will complete development of the webpages to host the supplemental educational materials by the date indicated in Exhibit H, LUC Implementation Schedule. The materials shall include those materials listed on Exhibit D.

5.3 Construction of Barriers and Signage

Signage, fencing and barriers will be constructed on the schedule set forth in Exhibit H of this LUCIP. Construction activities will be performed so as to not disturb residents and occupants of neighboring areas.

5.4 Reviews

The Army (or its designee) will conduct annual reviews to confirm the overall effectiveness of, and compliance with the established LUCs in the Grant HA and the Impact Area. Such annual review shall include interviews with personnel of MassDevelopment and DEC (or successor municipal authority) as to the discovery, reporting and disposal of UXO in the Grant HA and the

Impact during the prior year. In addition, the annual review with respect to the Impact Area will include a physical inspection to evaluate access controls (including integrity of fencing, condition of signage and vegetation, and visual evidence of unauthorized access) and monitor for the presence of surface and near surface UXO. Such UXO monitoring within the Impact Area will involve a meandering path survey utilizing typical instrument and field procedures of a "mag and flag" approach. The main objective for performing this UXO monitoring is to ensure that any MEC that may still be present in the subsurface does not come to the surface via frost heave action and/or erosion. The reviews shall also include interviews with MassDevelopment (or the then current owner of the Impact Area) to determine if any utility repair or emergency work was conducted in the Impact Area during the prior year. The annual review of the LUCs at Grant HA shall include verification that the website, utility bill inserts, UXO awareness training, inclusion of the Supplemental Deed Notice in deeds conveying the Grant HA (or portions thereof) and other requirements set forth in this LUCIP are being properly implemented. If deemed necessary, the annual review of the LUCs at the Grant HA may also include a physical inspection. The Army shall utilize the checklist attached to this LUCIP as **Exhibit G** in the course of conducting its annual review. MassDevelopment will have an opportunity to review and comment on each annual review prior to submission as set forth in Section 5.5 below.

Furthermore, a review/inspection of the effectiveness of the LUCs will also be conducted by the Army, with the cooperation of MassDevelopment and the DEC, as part of the Comprehensive Five-Year review process conducted at Devens under Section 121 of CERCLA, as amended by SARA of 1986. Public meetings will be held by the Army coincident with these five-year reviews to help keep the public informed of site status, including its general condition, presence of UXO, and effectiveness of the remedial action.

5.5 Reporting and Notification

An annual LUC compliance report will be provided by the Army to EPA, DEP, MassDevelopment and the DEC. If any deficiency(ies) should be found during the annual inspection, a written explanation will be prepared indicating the deficiency and what efforts or measures have or will be undertaken to correct the deficiency and a schedule to correct the same. The correction and enforcement of such deficiencies shall follow the requirements under Section 7.0 Enforcement. If there is to be a delegation of performance of duties by the Army as

permitted by Section 4.0 above, the Army will promptly notify EPA, DEP, MassDevelopment and DEC of such delegation.

Annual reports will be submitted by the Army to the Base Realignment and Closure (BRAC) distribution list, which includes EPA, DEP, MassDevelopment, the DEC, and the Towns of Ayer, Harvard, and Shirley, Massachusetts. A link to the annual report will be provided on the community website described in Sections 2.0 and 3.0 above. The annual report will include a summary of the review and any physical site inspections, identification of deviations from this LUCIP, corrective actions necessary due to implementation issues or as a result of changes in site conditions or land use, and proposed changes to inspection and reporting frequency. The annual report will also include a summary of any UXO discovered during the reporting period (including the location of discovered UXO, the type of UXO (if known) and information on the activity conducted that led to the find and the name and affiliation of the individual that reported the discovery), as well as safety procedures followed and the ultimate disposition of any such discovered UXO. The annual report will also address whether the use restrictions and controls referenced in this LUCIP were communicated in the deed(s) and other legal instruments, whether the owners and state and local agencies were notified of the use restrictions and controls affecting the Grant HA and Impact Area, and whether use of these areas has conformed to such restrictions and controls.

In the event that UXO is discovered (by intrusive construction activity or other encounter) within an area addressed by this LUCIP and is reported to the Army or its designee (e.g., currently Devens Emergency Dispatch Center.) The Army will then implement the following actions:

- Provide notification of the discovery of UXO to the agencies listed in Section 9.2.
- Determine whether local emergency responders (e.g., Devens Fire Department and Massachusetts State Police (Bomb Squad)) will address the UXO discovery by removal or destruction.
- If the local emergency responders do not address the UXO, the Army will deploy an Explosive Ordnance Disposal (EOD) Unit be to remove or destroy the UXO.

6.0 LUC Changes

The Army shall not modify or terminate Land Use Controls, implementation actions, or modify restrictions regarding land use without approval by EPA and the MassDEP and the concurrence of MassDevelopment and the DEC (or successor municipal authority); provided that Army determines, in its sole discretion, that the requirement for such concurrence shall not place the Army in violation of its legal obligations to the EPA. The Army shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs. This LUCIP may be amended only in accordance with Section VII of the Federal Facilities Agreement (FFA). No changes shall be made without the prior approval of EPA and DEP, and the concurrence of MassDevelopment and the DEC (or successor municipal authority); provided that Army determines, in its sole discretion, that the requirement for such concurrence shall not place the Army in violation of its legal obligations to the EPA. In the latter case, Army shall take reasonable steps to consult with MassDevelopment and the DEC (or successor municipal authority) to minimize the impacts of the changes to these parties.

7.0 Enforcement

Should the LUCs reflected in this LUCIP cease to provide an appropriate level of protection, the Army shall propose modifications through an Explanation of Significant Differences (ESD) or a ROD amendment. If the Army determines that the LUCs are not being complied with, its actions may range from informal resolutions with the owner or violator, to the institution of judicial action. Any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs will be addressed by the Army as soon as practicable, but in no case will the process be initiated later than 10 days after the Army becomes aware of the breach. The Army will notify EPA and MassDEP as soon a practicable but no longer as ten days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. The Army will notify EPA and MassDEP regarding how the Army has addressed or will address the breach within 10 days of sending EPA and MassDEP notification of the breach. Should the Army become aware that a user of the Grant HA or Impact Area has violated any LUC requirement where a local agency may have independent jurisdiction (local regulations and

permits), the Army will also notify the agencies and MassDevelopment of such violations and work cooperatively with them to re-establish owner/user compliance with the LUC. Without limiting the authority of the EPA and DEP under applicable law, DEP shall have the authority to enforce the GERE against the then current owner of the Impact Area.

8.0 Duration of LUCs

LUCs will be maintained until such time that the hazard associated with potential remnant UXO in the soil is at levels to allow for unrestricted use and exposure without the use of LUCs. If LUCs relating to the GERE or Supplemental Deed Notice are no longer needed, as determined in an ESD or ROD amendment, DEP and MassDevelopment may provide to the owner releases for recordation with the deed (if applicable) pertaining to their property and will also advise the DEC (or successor municipal authority) of that action. At that time, land use controls and associated responsibilities contained in the Supplemental Deed Notice and GERE will be discontinued. In addition, the then current owner of the affected property may also apply to the Army for removal or modification of the deed restrictions contained in the quitclaim deeds referred to in Section 1.1.

9.0 Approvals; Notices

9.1 Approvals.

Changes to the LUCIP can only be approved through the process set forth in Section 6.0. Where the approval of a party (hereafter, the "approval party") is required under this LUCIP for non-substantive changes that may be made without amendment of this LUCIP as provided herein, the Army (or its designee) shall give the approval party notice thereof, along with any information to be included in such notice pursuant to the terms of this LUCIP. If the approval party fails to respond to the request for approval within thirty (30) days after said request is made, the Army (or its designee) will send the approval party a second request. If the approval party fails to respond to such second request within ten (10) days after said second request is made, the approval party will be deemed to have approved such request.

9.2 Notices.

All notices, responses, requests, approvals and other communications required or permitted under this LUCIP between or among MassDevelopment, DEC, EPA, DEP and/or the Army shall be in writing and shall be sent by postage pre-paid certified or registered mail (return receipt requested) or by recognized overnight courier (such as DHL, Federal Express, UPS), with delivery charges prepaid, to the following respective addresses:

***If to MassDevelopment*:**

Massachusetts Development Finance Agency, 160 Federal Street, Boston, MA 02110, Attn: President & CEO

with copies to:

Massachusetts Development Finance Agency, 33 Andrews Parkway, Devens, Massachusetts 01434, Attn: EVP, Devens Operations

and

Massachusetts Development Finance Agency, 160 Federal Street, Boston, MA 02110, Attn: EVP Real Estate

and

Massachusetts Development Finance Agency, 160 Federal Street, Boston, MA 02110, Attn: General Counsel

***If to the DEC*:**

Devens Enterprise Commission, 33 Andrews Parkway, Devens, Massachusetts 01434, Attn: Land Use Administrator/Director

***If to the Army*:**

Department of the Army, Fort Devens, BRAC Division, 30 Quebec Street, Room 100, Devens, MA 01432-4479, Attn: BRAC Environmental Coordinator

If to EPA:

U.S. Environmental Protection Agency, Region I, 5 Post Office Square, Federal Facilities Superfund Section, Suite 100 (HBT), Mail Code OSRR07-3, Boston, MA 02109-3912, Attn: Remedial Project Manager

If to DEP:

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup, One Winter Street, Boston, MA 02108, Attn: Superfund Federal Facilities, Section Chief

A party may change its address for notice by notice to the other parties in accordance with this Section. Notices shall be deemed given when delivered (or, if delivery is refused, when so refused).

end of page

Figures

Figure 1: Plan and narrative description of Grant HA

Figure 2: Plan of Impact Area

Figure 3: Grant HA and Impact Area in relation to Devens as a whole

Figure 4: Plan of Grant HA and Impact Area in relation to each another

Exhibits

Exhibit A: Reports relating to presence, assessment, and removal of UXO at the Grant HA and Impact Area

Exhibit B: Supplemental Deed Notice for Grant HA

Exhibit C: Sample Narrative for Insert for Periodic Inclusion in Utility Bills for future residents of Grant HA

Exhibit D: Sample List of Educational Materials for community website

Exhibit E: Current Devens Soils Management Policy

Exhibit F: Draft Grant of Environmental Restriction and Easement (GERE)

Exhibit G: Checklist for Annual Review

Exhibit H: Land Use Control Implementation Schedule

end of page

Figure 1

Plan of Grant HA

Figure 1

(Plan of Grant HA)

Due to illegibility after electronically scanning and recording and pursuant to G.L. c. 36, §12A, **Figure 1 (Plan of Grant HA)** has been omitted from the LUCIP recorded as Exhibit B to this Grant of Environmental Restriction and Easement. A full copy of the LUCIP can be found at www.devensec.com/documents/Final_LUCIP_051611.pdf and at the locations listed in Paragraph 5.1 of the LUCIP.

Description of Grant HA

A certain parcel of land located within the Devens Enterprise Zone known as the Residential I Zone. The parcel is an irregular shaped parcel located west of Antietam Street and south of West Main Street. The parcel is more particularly described as follows:

Beginning at a point located at the northeast corner of Parcel 6. Said point is located at the centerline of Antietam Street, about 60' more or less westerly of Balls Bluff Street. Said point being on the Harvard/Ayer town line; thence

Southwesterly and southerly along the centerline of Antietam Street, a distance of 2,201' more or less, to a point, thence

Westerly forming an interior angle of 77°, a distance of 146' more or less, to a point; thence

Southwesterly forming an angle of 233°, a distance of 743' more or less, to a point. Said point is located on the centerline of Pine Street where Pine Street splits, about 295' more or less easterly from Grant Road; thence

Southwesterly along the centerline of Pine Street, Grant Road and Hospital Road, a distance of 1,035' more or less to a point; thence

Northwesterly forming an interior angle of 82°, a distance of 611' more or less, to a point; thence

Northwesterly forming an interior angle of 225°, a distance of 384' more or less, to a point; thence

Southwesterly forming an interior angle of 215°, a distance of 479' more or less, to a point; thence

Northwesterly forming an interior angle of 144°, a distance of 400' more or less, to a point; thence

Westerly forming an interior angle of 205°, a distance of 327' more or less, to a point. Said point is located in the centerline of an existing path.

The previous five courses being 100' from and parallel to the northerly line of parcel 7; thence

Northeasterly forming an interior angle of approximately 44° meandering along the existing path which approximately parallels the Nashua River, a distance of 4,692' more or less, to the town line of Harvard and Ayer; thence

Easterly along said town line, a distance of 855' more or less, to the point of beginning.

Said parcel, as described above and shown on the accompanying graphic as "Zoning District 6" contains approximately 148.6 acres, more or less.

Figure 2

(Plan of Impact Area)

Due to illegibility after electronically scanning and recording and pursuant to G.L. c. 36, §12A, **Figure 2 (Plan of Impact Area)** has been omitted from the LUCIP recorded as Exhibit B to this Grant of Environmental Restriction and Easement. A full copy of the LUCIP can be found at www.devensec.com/documents/Final_LUCIP_051611.pdf and at the locations listed in Paragraph 5.1 of the LUCIP.

Figure 3

(Plan of Grant HA and Impact Area in relation to Devens)

Due to illegibility after electronically scanning and recording and pursuant to G.L. c. 36, §12A, **Figure 3 (Plan of Grant HA and Impact Area in relation to Devens)** has been omitted from the LUCIP recorded as Exhibit B to this Grant of Environmental Restriction and Easement. A full copy of the LUCIP can be found at www.devensec.com/documents/Final_LUCIP_051611.pdf and at the locations listed in Paragraph 5.1 of the LUCIP.

Figure 4

(Plan of Grant HA and Impact Area in relation to each other)

Due to illegibility after electronically scanning and recording and pursuant to G.L. c. 36, §12A, **Figure 4 (Plan of Grant HA and Impact Area in relation to each other)** has been omitted from the LUCIP recorded as Exhibit B to this Grant of Environmental Restriction and Easement. A full copy of the LUCIP can be found at www.devensec.com/documents/Final_LUCIP_051611.pdf and at the locations listed in Paragraph 5.1 of the LUCIP.

EXHIBIT A

Reports

Army, 1996. EPA Federal Facilities Agreement. 26 March.

Army, 2001. MassDevelopment Environmental Services Cooperative Agreement. September.

Human Factors Applications, Inc. 1996. *Final Removal Action Report, Ordnance, Ammunition and Explosives Removal Action, Devens RFTA, Ft. Devens, Massachusetts*. October.

MassDevelopment, 1997. *Final Zone II Plan.* MassDevelopment, Devens Commerce Center. 16 September.

Nobis Engineering, Inc. 2005. *2005 Five-Year Review Report, Volume I & II, Former Fort Devens, Devens Massachusetts*, prepared for U.S. Army Corp of Engineers, September 2005. URL http://www.epa.gov/region1/superfund/sites/devens/237422.pdf

Ordnance & Explosives Remediation, Inc. 2006. *Site Specific Final Report Digital Geophysical Mapping (DGM) & Unexploded Ordnance (UXO) Removal, Grant Housing Area, Former Ft. Devens, Harvard, Worcester, Massachusetts*. 22 March.

USACE, St. Louis District, 1995a. *U.S. Department of Defense BRAC, Ordnance, Ammunition and Explosives-Archives Search Report Findings*, Fort Devens. May.

USACE, St. Louis District, 1995b. *U.S. Department of Defense BRAC, Ordnance, Ammunition and Explosives-Archives Search Report Conclusions and Recommendations*, Fort Devens. May.

USACE, St. Louis District, 1995c. *U.S. Department of Defense BRAC, Ordnance, Ammunitions and Explosives-Archives Search Report Maps*, Fort Devens. May.

USACE, 2006. New England District, *Final Expanded Conceptual Site Model Report*. June.

USACE, New England District, 2007. *Performance Work Statement for Completion of CERCLA Documents Related to Munitions and Explosives of Concern at Oak and Maple Housing Areas, Devens, MA*. Revised 11 May.

WESTON, 2004. *Draft Final Explosives, Lead, and Perchlorate - Conceptual Site Model Investigation Areas - Grant, Locust, and Cavite Housing Areas, Former Fort Devens, Devens, Massachusetts*. December.

WESTON, 2008a. *Final Focused Feasibility Study, Grant Housing Area and 37MM Impact Area Former Fort Devens Army Installation, Devens, Massachusetts*. April.

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WESTON, 2008c. *Final Preliminary Assessment Site Inspection/Supplemental Site Investigation Comprehensive Report*. October.

WESTON, 2009. *Final Release Abatement Measure Completion Report/Partial Response Action outcome Statement – Grant Housing Area*. June.

WESTON, 2009. *Record of Decision, Grant Housing Area and 37-mm Impact Area Former Fort Devens Army Installation, Devens, Massachusetts*. September.

EXHIBIT B

Supplemental Deed Notice

SECTION ___: SUPPLEMENTAL NOTICE OF POTENTIAL PRESENCE OF UNEXPLODED ORDNANCE:

Grantor hereby gives notice that (i) the premises conveyed herein (or a portion thereof) are within the Grant Housing Area portion of the Property (as described below), and (ii) for a short period of time between World War I and World War II, the Property **[or portion thereof, as supported by a legal description and a sketch]** was used by the United States Army (the "Army") for training, including the use of military munitions, and from the early 1960s until the closure of Fort Devens in March 1996, the Property was used for military housing purposes. The Property is or was held by MassDevelopment pursuant to two deeds: (a) a deed, that included "Parcel 1" inclusive of the former Grant Housing Area, in favor of MassDevelopment's predecessor (Massachusetts Government Land Bank) dated May 9, 1996 and recorded with the Worcester (South District) Registry of Deeds in Book 17907, Page 001 (the "1996 Army Deed"); and (b) a deed, that included "Parcel A.21" inclusive of the former Oak Housing Area, a portion of the former Grant Housing Area and the 37mm Impact Area, in favor of MassDevelopment dated February 11, 2003 and recorded with the Worcester (South District) Registry of Deeds in Book 29378, Page 064 (the "2003 Army Deed," and, together with the 1996 Army Deed, the "Army Deeds"). Prior to conveyance of the Property, the Army performed removal actions of unexploded ordnance ("UXO") from the Property as described in the 1996 report by Human Factors Applications, Inc. ("HFA Report") Section XVII of the 1996 Army Deed and Section XI of the 2003 Army Deed provide a standard UXO notice indicating that, as a result of historic operations of the Property as an active military installation, there exists a possibility that UXO

may exist on the Property, but that based on a comprehensive records search and statistical and physical testing of areas of the Property, the Army does not believe that UXO is present on the Property.

Following the conveyance of the Property to MassDevelopment, and in preparation for the development of portions of the Property (including the Grant Housing Area) for new residential construction, the removal actions described in the HFA Report were determined to be incomplete and additional removal actions were determined to be necessary. Thereafter, the United States Environmental Protection Agency ("EPA"), with the review and comment of the Massachusetts Department of Environmental Protection ("DEP"), oversaw an investigation of the Property to identify and address an array of possible contaminants, including UXO and other munitions and explosives of concern (MEC), at the Property. In March 2003, the Army initiated a Preliminary Assessment/Site Investigation ("PA/SI") and a subsequent Supplemental Site Investigation ("SSI") on portions of the Property (including the former Grant Housing Area) to address these contaminants. However, before the final PA/SI/SSI was completed, in order to accelerate the redevelopment of the Property for residential use, MassDevelopment voluntarily contracted with a private company to investigate and, as necessary, remediate UXO and other MEC at the Property. MassDevelopment's contractor performed digital geophysical mapping and UXO removal at the Property, reviewed the reports, studies, maps, and other materials generated by the Army and/or its contractors with respect to UXO and other MEC at the Property, and conducted extensive field investigations and removal actions to remove residual UXO and MEC from the Property. Details and conclusions from those investigations and removal actions are contained in the report prepared for MassDevelopment (Ordnance & Explosives Remediation, Inc. 2006).

Following the completion of MassDevelopment's investigations and removal actions, the Army completed the PA/SI/SSI. The final PA/SI/SSI recommended that land use controls be evaluated and implemented on the Property to address the potential for residual MEC. As a result of these recommendations, the Army prepared a Focused Feasibility Study ("FFS") to evaluate the remedial alternatives to protect the public, including residents and workers, from any potential UXO and other MEC on the Property in light of the previous investigations and removal actions. Copies of the report detailing MassDevelopment's investigations and removal actions, the PA/SI/SSI and the FFS are available for review at the New England regional office of the EPA (5 Post Office Square, Boston), the Army (BRAC Division – Devens), the DEP (One Winter Street, Boston), the public libraries for the Town of Ayer, Massachusetts, the Town of Harvard, Massachusetts, and the Town of Shirley, Massachusetts.

The various alternatives that were evaluated by the EPA and the Army, and the selected remedy, are described in the Record of Decision dated September 2009 ("ROD"), a copy of which is available for review at the New England regional office of the EPA (5 Post Office Square, Boston), the Army (BRAC Division – Devens), the DEP (One Winter Street, Boston), the public libraries for the Town of Ayer, Massachusetts, the Town of Harvard, Massachusetts, and the Town of Shirley, Massachusetts. The ROD reached the following conclusions: (a) the investigation and removal actions have occurred using the best available technology; (b) while not 100% conclusive, these efforts have removed all identified UXO from the top 18 inches of soil throughout the Grant HA and the Impact Area and to greater depths within the Impact Area; (c) UXO in the Grant HA is unlikely at depths greater than 18 inches due to the angle of penetration of projectiles into the ground surface along the range, the effect of local soil composition (i.e., sand and gravel deposits) on limiting penetration depths, and up to 90 years for

frost heaves to have brought items to the surface; (d) UXO in the Impact Area may be buried at depths deeper than the frost line, but that any potential associated with frost heaves bringing UXO to the surface is considered minimal; (e) the probability of encountering UXO in the Grant Housing Area is low; (f) although there remains a risk of exposure to remnant UXO with an explosive safety hazard, the remaining hazard of encountering UXO in the Grant Housing Area or the Impact Area would be primarily associated with construction work during future development (e.g., utility or foundation installation or other deeper excavation activities); and (g) the implementation of Land Use Controls ("LUCs") is the appropriate remedy to provide additional protection to residents and workers in the event that they encounter UXO at the Property. The LUCs for Grant Housing Area portion of the Property require the insertion of this Supplemental Deed Notice in subsequent deeds conveying ownership interests in this portion of the Property , and distribution of educational materials to inform the property owners, residents, and construction workers and utility workers conducting ground intrusive activities on the Grant Housing Area portion of the Property of the potential presence of UXO, how to identify UXO, and what actions to take if suspect UXO is encountered. The LUCs are more fully described in the Land Use Control Implementation Plan ("LUCIP"), a copy of which is available for review at the New England regional office of the EPA (5 Post Office Square, Boston), the Army (BRAC Division – Devens), the DEP (One Winter Street, Boston), the public libraries for the Town of Ayer, Massachusetts, the Town of Harvard, Massachusetts, and the Town of Shirley, Massachusetts. The ROD further concludes that, subject to compliance with the LUCs, the Grant Housing Area portion of the Property is suitable for unrestricted future use, including use for residential purposes.

However, should suspect UXO or other MEC be encountered at the Property, the Army has certain obligations to take necessary remedial action pursuant to Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. § 9620(h), Section VII of the 1996 Army Deed and Section I of the 2003 Army Deed. Section VII of the 1996 Army Deed and Section II of the 2003 Army Deed reserve for the Army a right of access to the Property if needed to fulfill these obligations. The ROD confirms the Army's commitment with respect to MEC and UXO, including the obligations to conduct actions required by CERCLA and the Army Deeds.

This section of this Deed contains important factual and legal information. It shall be referenced in any subsequent deed conveying ownership interests in all or part of the Property.

The reports listed in Exhibit A of this Supplemental Deed Notice are available for review at the New England regional office of the EPA (5 Post Office Square, Boston), the Army (BRAC Division – Devens), the DEP (One Winter Street, Boston), the public libraries for the Town of Ayer, Massachusetts and the Town of Harvard, Massachusetts.

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EXHIBIT A to Supplemental Deed Notice

Reports

Army, 1996. EPA Federal Facilities Agreement. 26 March.

Army, 2001. MassDevelopment Environmental Services Cooperative Agreement. September.

Human Factors Applications, Inc. 1996. *Final Removal Action Report, Ordnance, Ammunition and Explosives Removal Action, Devens RFTA, Ft. Devens, Massachusetts*. October 1996.

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USACE, New England District, 2007. *Performance Work Statement for Completion of CERCLA Documents Related to Munitions and Explosives of Concern at Oak and Maple Housing Areas, Devens, MA*. Revised 11 May.

WESTON, 2004. *Draft Final Explosives, Lead, and Perchlorate - Conceptual Site Model Investigation Areas - Grant, Locust, and Cavite Housing Areas, Former Fort Devens, Devens, Massachusetts*. December.

WESTON, 2008a. *Final Focused Feasibility Study, Grant Housing Area and 37MM Impact Area Former Fort Devens Army Installation, Devens, Massachusetts*. April.

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WESTON, 2009. *Record of Decision, Grant Housing Area and 37-mm Impact Area Former Fort Devens Army Installation, Devens, Massachusetts*. September.

EXHIBIT C

Narrative for Sample Insert

Text for LUCIP Pamphlet and for public posting at Grant HA

INFORMATION FOR DEVENS RESIDENTS

Devens is located on land once owned by the U.S. Army. For nearly 80 years from World War I until 1996, Devens' 4,400 acres were used for housing, research, education, administration, and military training purposes. [MassDevelopment may add additional text to provide historic and other context].

(Map of Devens with Grant Road/Impact Area and other housing areas/uses indicated.)

What parts of Devens were used for military training?
Of the 4,400 acres, between World War I and World War II a 130-acre parcel called the Grant Road Housing Area was the site of a firing range (including a firing point) principally for 37 millimeter anti-tank shells. A firing point is an area from which Army personal fired artillery and other weapons at a target for training purposes. A firing range is the area between the firing point and the target. The Army stopped using the firing point in the 1930s. From the 1960s until the base closed in 1996, the area was occupied by approximately 260 homes for military families.

Where was the firing range?
Weapons were located along the western boundary of the Grant Road Housing Area. Targets were located in an "impact area" on the northern slope of Oak Hill which is now surrounded by a fence.

Was UXO found and removed?
In 1994 and 1995 as the base prepared to close, the U.S. Army Corps of Engineers identified training areas and ranges and removed significant amounts of unexploded ordinance (UXO) and scrap metal from the side of Oak Hill. At Devens, UXO consists mainly of 37 millimeter anti-tank shells and other munitions that did not explode at the time they were initially used during training exercises. Most of the UXO was in two dense groupings on or near the surface of the ground around former target locations. In 2004, with the availability of more sensitive survey equipment, MassDevelopment conducted a digital geophysical survey of the entire Grant Road Housing Area to a depth of 18 inches. MassDevelopment then hired specialists who removed additional UXO.

Do I need to be concerned about unexploded shells or other ordinance?
There is a possibility that UXO remains in the housing and impact areas. However, the Army and MassDevelopment have taken all steps recommended by the federal Environmental Protection Agency (EPA) with the review and comment of the Massachusetts Department of

Environmental Protection (DEP) to identify and remove UXO from the housing and impact areas. The Army and EPA, with the review and comment of DEP, concluded that (a) all identified UXO in the top 18 inches of the surface have been removed and (b) given the primary type of UXO found--37 millimeter shells--the angle of penetration, soil condition and decades of frost heaves, the presence of UXO deeper than 18 inches is unlikely. However, since technology cannot guarantee 100% detection, there remains the possibility of additional finds of UXO with an explosive safety hazard.

What does UXO look like and what should I do if I suspect I have found it?
UXO may appear as corroded bullets, shells of various sizes, or grenades. Below are some pictures of UXO that might be found at Devens. If you find an object or objects above or below ground and suspect you have found UXO or if the object otherwise looks unfamiliar, do the following:

- Leave it in place and note its location.
- Do not touch it.
- Leave the area.
- Call Devens Emergency Dispatch Center at 978.772.7200.
- Follow the Dispatcher's instructions.

Also, make sure your family members, visitors and landscapers know what to do if they suspect they have found UXO.

(images of typical UXO)

Where can I get more information?
For information on UXO and UXO removal, call:
- Devens Fire Department: 978.772.4600
- MassDevelopment: 978.784.2900

If you are conducting any activity that requires a building permit, call:
- Devens Enterprise Commission: 978.772.8831

Awareness Briefings:

The Devens Fire Department conducts awareness briefings for contractors and other construction and utility personnel who intend to conduct ground intrusive activities (such as digging) at Devens. The purpose of these briefings is to instruct personnel how to visually recognize UXO and the steps to follow should suspect UXO be encountered. Occupants of Devens are also invited to attend an awareness briefing. To receive an awareness briefing, contact

- Devens Fire Department: 978.772.4600

For links to information on land use controls and related implementation plan, visit the Devens Enterprise Commission (DEC) website (www.devensec.com).

EXHIBIT D

Sample List of Educational Materials

Information on Unexploded Ordnance at Devens

Information for Devens Residents and Occupants (pamphlet)

Additional Information

Land Use Control and Implementation Plan (LUCIP)

Devens Soils Management Plan

Guidelines for Contractors Working at Devens

Contacts

Devens Emergency Dispatch Center: (978) 772-7200
Devens Fire Department: (978) 772-4600
Devens Enterprise Commission: (978) 772-8831
MassDevelopment: (978) 784-2933

EXHIBIT E

Devens Soils Management Policy

The following represents the policy of the Massachusetts Development Finance Agency ("MassDevelopment" or the "Agency"), with regard to the disturbance, excavation, movement and/or removal of soils located in the Devens Regional Enterprise Zone ("Devens").

MassDevelopment, pursuant to Chapter 498 of the Acts of 1993, has been designated as the public agency responsible for the redevelopment, reuse, and operation of Devens.

Whereas, Devens is a former active military installation, it is possible that unexploded ordnance ("UXO") or Munitions of Explosive Concern ("MEC") and environmental contaminants may exist and/or be encountered at Devens. With this policy, MassDevelopment seeks to reduce any risk to human health and safety and the environment.

Until amended or rescinded, it shall be the policy of the Agency that:

1. Prior to commencing any intrusive earth work within Devens (due diligence, construction or otherwise) all personnel to be on site shall view a UXO/MEC video briefing provided by MassDevelopment. This video is intended to instruct on-site personnel as to how to visually recognize UXO/MEC if found during construction activities and to provide instructions on what to do if potential/suspected UXO/MEC is observed.

2. To the extent reasonably practicable, no soil shall leave any construction site at Devens. Construction sites at Devens should be "balanced", i.e., engineered such that all soils remain on the development site and result in no excess soil.

3. In the event that excess soils must be removed from a development site, the following protocol shall apply:

   (a) Excess soils may be transported to another suitable location within Devens, provided however, that:

      i. the soils must be restricted for use only at a commercial site;

      ii. there is written documentation evidencing the consent and approval of the party agreeing to accept the soils for a specific use and the use, location and disposition of the soils shall be approved in writing by MassDevelopment;

iii. chemical testing of soils to be transported must be performed in conformity with the soil management plan developed by Haley and Aldrich (to be provided by MassDevelopment upon request) and any site specific requirements imposed by the Massachusetts Department of Environmental Protection ("MA DEP"). The MA DEP must review and approve the results of the soils tests prior to the soils being transported;

iv. upon approval of soil test results by the MA DEP, the owner of the soils shall request that MassDevelopment provide written approval for the soils to be transported; and

v. any relocation of soils shall be compliant with all applicable DEC regulations and bylaws.

(b) If there is no suitable location on Devens to relocate the soils, the soils may be removed to a location outside of Devens, provided however, that:

i. the requirements of paragraphs 3(a)(i-v) shall apply; and

ii. all soils to be relocated outside of Devens shall be passed through a 1" diameter screen under the supervision of qualified personnel; and

iii. all tailings (i.e. debris/matter not passing through the screen) shall be utilized on site; and

iv. if UXO/MEC is found in the tailings (or elsewhere), operations in the vicinity of the found item shall immediately cease and MassDevelopment and State Police shall be notified by the contractor.

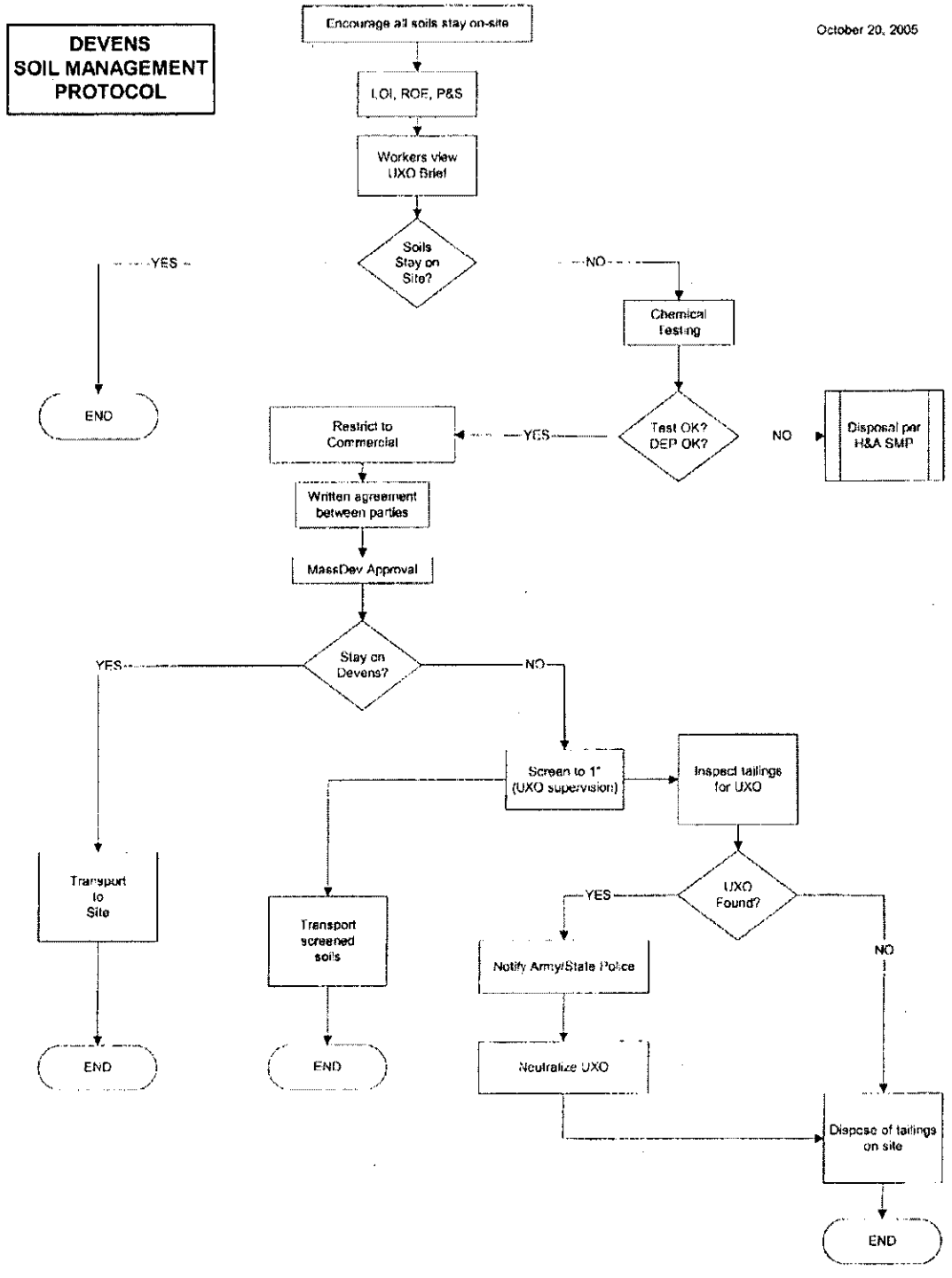
(State Police phone #:978-772-7200)

4. In the event that areas of suspected environmental contamination (i.e. underground storage tanks, foreign materials, substances, etc.) are found, operations in the area in the vicinity of the suspected contamination shall cease and the contractor shall immediately notify MassDevelopment

(Ron Ostrowski: phone # 978-784-2936 or
George Ramirez: phone # 978-784-2933)

MassDevelopment shall work with its environmental consultants and DEP and/or EPA to promptly agree upon a plan to temporarily relocate the foreign materials, if possible,

in order to permit work on the site continue while a permanent disposal/remediation plan is established.


DEVENS
SOIL MANAGEMENT
PROTOCOL
October 20, 2005
Encourage all soils stay on-site
LOI, ROE, P&S
Workers view UXO Brief
Soils Stay on Site?
YES
NO
END
Chemical Testing
Test OK? DEP OK?
YES
NO
Disposal per H&A SMP
Restrict to Commercial
Written agreement between parties
MassDev Approval
Stay on Devens?
YES
NO
Transport to Site
END
Screen to 1" (UXO supervision)
Transport screened soils
END
Inspect tailings for UXO
UXO Found?
YES
NO
Notify Army/State Police
Neutralize UXO
Dispose of tailings on site
END

B3853900.31

EXHIBIT F

Draft of Grant of Environmental Restriction and Easement

GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT
42 U.S.C. § 9601, *et seq.*; M.G.L. C. 21E, § 6

[Note: This instrument is established as an institutional control for a federal Superfund site, a portion of a former federal facility, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, as set forth below, and contains a GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT running to the MASSACHUSETTS DEPARTMENT of ENVIRONMENTAL PROTECTION]

This GRANT OF ENVIRONMENTAL RESTRICTION AND EASEMENT (the "Environmental Restriction and Easement") is made as of this ____ day of _____, 2010, by Massachusetts Development Finance Agency, a body corporate and politic, having its principal office at 160 Federal Street, Boston, Massachusetts and maintaining a Devens Office at the Devens Commerce Center, 33 Andrews Parkway, Devens, Massachusetts ("Grantor").

WITNESSETH

WHEREAS, Grantor is the owner in fee simple of certain land (the "Property") located in Town of Harvard, Worcester County, Massachusetts, with the buildings and improvements thereon, pursuant to a deed from the United States of America acting by and through the Secretary of the Army (the "Army") and recorded with the Worcester District Registry of Deeds in **Book 29378, Page 064** (the "Army Deed");

WHEREAS, a portion of said Property known as the "Impact Area", which is more particularly bounded and described in Exhibit A , attached hereto and made a part hereof ("Impact Area") is subject to this Grant. The Impact Area is shown on a plan entitled "Impact Area Plan Grant Road Housing Area / Oak Street" prepared for Massachusetts Development Finance Agency prepared by WSP – Sells dated April 11, 2011 and recorded with the Worcester District Registry of Deeds in **Plan Book ___, Plan ___** ;

WHEREAS, the Impact Area is subject to covenants, restrictions, easements and other rights and obligations under the terms and conditions of this instrument;

WHEREAS, the Impact Area is part of a federal Superfund Site, known as the Fort Devens Superfund Site (the "Site"). The U.S. Environmental Protection Agency, an agency established under the laws of the United States, having its New England regional office at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109 ("EPA"), pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended

("CERCLA"), 42 U.S.C. § 9605, placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on November 21, 1989, 54 Fed. Reg. 48184, due to a release of hazardous substances, as that term is defined by the Section 104 of CERCLA, 42 U.S.C. § 9604;

WHEREAS, EPA regulates activities at disposal sites pursuant to CERCLA and the National Contingency Plan, 40 C.F.R. 300.400, *et seq.*, as amended (the "NCP");

WHEREAS, as set forth in the Army Deed, the Property was formerly part of an active Army military installation, known as Fort Devens. Fort Devens was used as a training camp and induction center for military personnel from 1917 until 1996. The Impact Area and other portions of the Property were, at one time, used as a firing range. In accordance with CERCLA and the NCP, the Army performed a removal action of unexploded ordnance ("UXO") from the Property during the period April 22, 1996 to July 26, 1996. The Army Deed indicates that, as a result of historic operations, UXO may be found on the Property. Section XVIII of the Army Deed states that based on information available to the Army at the time, no UXO was believed to be present. Subsequent to the execution of the Army Deed in 2003, UXO was identified at the Property including the Impact Area. To expedite development of the Property, Grantor voluntary conducted site investigations and removal actions to identify and remove munitions and explosives of concern ("MEC"), including UXO, at the Property. As the result of such investigations, UXO and other MEC were removed from the Property, including the Impact Area;

WHEREAS, the investigations and removal actions have used the best available technology, and the efforts have removed all identified UXO from the top 18 inches of soil and to greater depths within the Impact Area where extensive removal actions occurred at two identified target locations. There is nevertheless the possibility that MEC or UXO remains on the Property, including the Impact Area;

WHEREAS, in a document entitled, "Record of Decision, Grant Housing Areas and 37-MM Impact Area, Former Fort Devens Army Installation, Devens, Massachusetts," dated September 2009 (the "ROD"), said ROD being on file at the United States Environmental Protection Agency, Region I ("EPA") Record Center located at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109, the Army, with the approval of EPA and the concurrence of MassDEP (as defined below), has selected certain response actions (the "Selected Remedy") for the Site in accordance with CERCLA, 42 U.S.C. §§ 9601, *et seq.*, and the NCP, 40 C.F.R. §§ 300.1 *et seq.*;

WHEREAS, the Selected Remedy is based, in part, upon the restriction of human access to and contact with undiscovered UXO; and the restriction of certain uses and activities occurring in, on, through, over or under the Impact Area;

WHEREAS, pursuant to CERCLA Section 120(h)(3)(A)(ii), the Army Deed contained a covenant warranting that (a) all remedial action necessary to protect human health and the environment with respect to any hazardous substances including UXO remaining on the Impact Area had been taken; and (b) any additional remedial action found to be necessary after the date of the Army Deed would be conducted by the United States;

WHEREAS, Section VII of the Army Deed reserved for the Army a right of access to the Impact Area if needed to fulfill the obligations identified in the previous paragraph, which right is not affected or diminished in any way by this Grant of Environmental Restriction and Easement;

WHEREAS, Section VIII D of the Army Deed requires that the property owner comply with any institutional controls established or put in place by the Army relating to the property which are required by any ROD, or amendments thereto, related to the property, which ROD was approved by the Army and EPA and issued by the Army pursuant to CERCLA or the Federal Facilities Agreement ("FFA") before or after the date of the Army Deed.

WHEREAS, the Army established certain other restrictions on the Impact Area in the Army Deed;

WHEREAS, the Massachusetts Department of Environmental Protection, a duly constituted agency organized under the laws of the Commonwealth of Massachusetts, having its head office at One Winter Street, in Boston, Massachusetts 02108 ("MassDEP" or "Grantee"), pursuant to Sections 3(a) and 6 of Chapter 21E, is authorized to take all action appropriate to secure to the Commonwealth the benefits of CERCLA; and pursuant to said Section 6, is authorized to acquire an interest in real property if necessary to carry out the purposes of CERCLA and Chapter 21E, subject to the approval of the Commissioner of MassDEP;

WHEREAS, MassDEP has indicated a willingness to hold the within Grant pursuant to the aforesaid authority in furtherance of the response action assurances required by Section 120(h)(3) of CERCLA; and

WHEREAS, EPA has approved a plan entitled "Land Use Control and Implementation Plan" prepared by the Army and Grantor and dated January 2011, as the same may be amended from time to time (as so amended, the "LUCIP"). The LUCIP is on file at the EPA Record Center located at 5 Post Office Square, Suite 100, Boston, Massachusetts 02109, and a current copy of which is attached hereto as Exhibit __.

NOW, THEREFORE, in accordance with the provisions of M.G.L. c. 21E, § 6, the MASSACHUSETTS DEVELOPMENT FINANCE AGENCY hereby grants to the MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION ("Grantee" or "MassDEP"), for consideration of Ten and 00/100 Dollars, such grant being a gift, and in connection with federal regulatory requirements for establishing institutional controls required in the ROD, with QUITCLAIM COVENANTS, an ENVIRONMENTAL RESTRICTION AND EASEMENT ("Restriction") in, on, through, over and under the Impact Area, said Impact Area being more particularly bounded and described as aforesaid.

Said Environmental Restriction and Easement is subject to the following terms and conditions:

1. Purpose. It is the purpose of this instrument to establish covenants and restrictions and to convey to the Grantee real property rights involving access and enforcement, all of which shall run with the land, to protect human health and the environment by reducing the risk of exposure to hazardous material, including UXO.

2. Applicability. The restrictions set forth in Paragraph (3) ("Restricted Uses and Activities") shall not apply:

a. to any response action undertaken by EPA or MassDEP, or its respective agents, representatives, contractors, subcontractors or employees, pursuant to CERCLA or Chapter 21E and its respective implementing regulations; or

b. to any response action undertaken by the Army, or its agents, representatives, contractors, subcontractors or employees, in accordance with and pursuant to the FFA and consistent with the ROD, and any approval by EPA and/or MassDEP required thereunder.

3. Restricted Uses and Activities. Except as provided in Paragraph (4) and (5) of this Grant, Grantor shall not perform, suffer, permit or cause any person to perform any of the following activities in, on, upon, through, over or under the Impact Area, or any of the following uses to be made of the Impact Area:

a. Excavation, removal, or disturbance of any soil, or other ground intrusive work;

b. Industrial, commercial, residential, agricultural or recreational use or development of any kind; and

c. Any other action or inaction which, in the written opinion of the Army, and/or the EPA and/or MassDEP, is reasonably likely to create a significant risk of harm to health, safety, public welfare or the environment.

4. Permitted Uses and Activities. Grantor expressly reserves the right to perform, suffer, allow or to cause appropriately trained personnel to perform any of the following activities in, on, through, over or under the Restricted Area:

a. Surface inspections of the Impact Area for the presence of UXO and the removal of such UXO discovered during such inspections in accordance with the LUCIP;

b. Installation and maintenance of a fence, signage and vegetative cover to limit public access to the Impact Area; and

c. Emergency excavation as described in Paragraph 5, below

5. Emergency Excavation. Notwithstanding the requirements of Paragraph 3, Grantor shall be permitted to excavate, remove or disturb any soil or perform other ground intrusive work within the Impact Area to conduct emergency repairs or replacements of existing utility lines in accordance with an emergency excavation plan on file with the Devens Fire Department, subject to Grantor's compliance with the following:

a. Grantor shall limit the actual disturbance involved in such activities to the minimum reasonably necessary; and

b. Grantor shall develop and submit to MassDEP, the Army and EPA a site-specific health and safety plan prepared under the direction of a qualified professional, and otherwise implement all measures reasonably necessary to limit actual or potential risk to health, safety, public welfare or the environment, including such measures set forth in the LUCIP.

6. Easement. Grantor hereby grants an easement for the term of this Grant to MassDEP and its authorized agents, contractors, subcontractor, and employees:

a. an easement to pass and repass over the Impact Area and such other portions of the Property necessary to access the same for purposes of inspecting the Impact Area to insure compliance with the terms of this Environmental Restriction and Easement.

b. an easement in, on, upon, through, over and under the Impact Area for the following purposes:

i. conducting and/or participating in five-year reviews of the remedial action taken pursuant to the ROD, as identified *supra*, in accordance with Section 121(c) of CERCLA;

ii. verifying any data or information submitted to the Army, EPA, or MassDEP;

iii. conducting investigations relating to contamination at or near the Impact Area;

iv. surveying;

v. obtaining samples;

vi. determining whether additional restrictions are necessary; and

vii. conducting other investigations and/or remediation activities consistent with CERCLA, the NCP, Chapter 21E and/or other applicable State or federal environmental statutes and regulations.

7. Construction and Severability.

a. This instrument shall be liberally construed in favor of the Grantee to effect the purpose of this instrument and the policies and purposes of CERCLA and/or Chapter 21E. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

b. If any court or other tribunal determines that any provision of this instrument is invalid or unenforceable, such provision shall be deemed automatically modified

to conform to the requirements for validity and enforceability as determined by such court or tribunal. In the event the provision invalidated is of such a nature, that it cannot be so modified, the provision shall be deemed deleted from this instrument as though it had never been included. In either case, the remaining provisions of this instrument shall remain in full force and effect.

8. Enforcement.

a. Grantor expressly acknowledges that a violation of the terms of this instrument could result in the following:

i. the assessment of penalties and other action by MassDEP to enforce the terms of this Environmental Restriction and Easement, pursuant to M.G.L. c. 21E; and/or

ii. upon a determination by a court of competent jurisdiction, the issuance of criminal and civil penalties, and/or equitable remedies which could include the issuance of an order to modify or remove any improvements constructed in violation of the terms of this Environmental Restriction and Easement.

b. All reasonable costs and expenses of Grantee, including but not limited to, attorney's fees, incurred in any such enforcement action shall be borne by Grantor (or, to the extent the Grantor no longer owns the Impact Area, a successor owner), to the extent not inconsistent with CERCLA, Chapter 21E and/or any other applicable law.

c. All rights and remedies available hereunder shall be in addition to, but not in lieu of, any and all rights and remedies at law or in equity, including CERCLA or Chapter 21E, which rights and remedies Grantee fully reserves. Enforcement of the terms of this instruments shall be at the discretion of Grantee, and any forbearance, delay or omission to exercise its rights under this instrument by Grantee shall not be deemed to be a waiver by Grantee of such term or any subsequent breach of the same or any other term, or of any other the rights of Grantee under this instrument.

9. Provisions to Run with the Land. This Environmental Restriction and Easement establishes certain rights, liabilities, agreements and obligations for the Impact Area, or any portion thereof, which shall run with the Impact Area, or any portion thereof, in perpetuity. Grantor hereby covenants for itself and its executors, administrators, heirs, successors and assigns, to stand seized and hold title to the Impact Area, or any portion thereof, subject to this Environmental Restriction and Easement.

The rights granted to MassDEP, its successors and assigns, do not provide, however, that a violation of this Environmental Restriction and Easement shall result in a forfeiture or reversion of Grantor's title to the Impact Area.

10. Concurrence Presumed. It is agreed that:

a. Grantor and all parties claiming by, through or under Grantor shall be deemed to be in accord with the provisions of this document; and

b. all such parties and any party claiming by, through or under them, and their respective agents, contractors, sub-contractors and employees, also agree that the Environmental Restriction and Easement herein established shall not be violated and that their respective interests in the Impact Area shall be subject to the provisions herein set forth.

11. Incorporation into Deeds, Mortgages, Leases and Instruments of Transfer. Grantor hereby agrees to incorporate this Environmental Restriction and Easement, in full or by reference, into all future deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer by which an interest in and/or a right to use the Impact Area, or any portion thereof, is conveyed.

12. Amendment and Release.

a. This instrument may be amended by Grantor only with the prior, written approval of Grantee. All amendments shall include Grantee's signed approval and shall become effective upon recordation with the appropriate registry of deeds.

b. Grantor hereby agrees to record and/or register any approved amendment to and/or release of this instrument with the appropriate registry of deeds within (30) days of the date of having received from Grantee any such amendment or release and shall provide Grantee with a certified Registry copy of the amendment and/or release. Grantor shall pay any and all recording fees, land transfer taxes and other such transactional costs associated with any such amendment or release.

13. No Dedication Intended. Nothing herein shall be construed to be a gift or dedication of the Impact Area to MassDEP, EPA or to the general public for any purpose whatsoever.

14. Term. This Environmental Restriction shall run with the land in perpetuity and is intended to conform to the exception for "other restrictions held by any governmental body" set forth in clause (c) of the first paragraph of M.G.L. c. 184, § 26, as amended.

15. Rights Reserved.

a. It is expressly agreed that acceptance of this instrument by Grantee or its assignees shall not operate to bar, diminish, or in any way affect any legal or equitable right of Grantee, its successors or assigns, to issue any future order or take response action with respect to the Impact Area or in any way affect any other claim, action, suit, cause of action, or demand which Grantee, its successors or assigns, may otherwise possess with respect thereto.

b. Nothing in this instrument shall limit or otherwise affect the rights of MassDEP to obtain access to, or restrict the use of, the Impact Area pursuant to CERCLA, Chapter 21E, or any other applicable statue or regulation.

16. Notice. Whenever, under the terms of this instrument, written notice is required to be given or a document is required to be sent to MassDEP or Grantor, as the case may be, it shall be directed to the respective addresses specified below, or such other addresses as may otherwise be directed in writing by such party:

As to MassDEP: Bureau of Waste Site Cleanup, Department of Environmental Protection, One Winter Street, Boston, MA 02108, Attention: Superfund Federal Facilities, Section Chief

As to Grantor: Massachusetts Development and Finance Agency, 160 Federal Street, Boston, MA 02110, Attention: President & CEO, with a copy to Massachusetts Development and Finance Agency, Devens Commerce Center, 33 Andrews Parkway, Devens, Massachusetts 01434, Attention: EVP, Devens Operations

17. Army Deed. This Grant incorporates by reference the provisions set forth in Section III of the Army Deed.

18. Successors. This Grant, including without limitation all easements, rights, covenants, obligations and restrictions inuring to the benefit of Grantee, herein contained, shall be run to the benefit of, and may be enforced by, a successor of Grantee. Grantor's liability hereunder shall be limited to matters arising during Grantor's ownership of the Impact Area, and in the event that Grantor (or any successor owner) shall convey or dispose of the Impact Area to another party, such party shall thereupon be and become "Grantor" hereunder and shall be deemed to have fully assumed and be liable for all obligations of Grantor under this Grant which first arise after the date of conveyance.

19. Authority. The President and Chief Executive Officer for the Massachusetts Development Finance Agency, _____, hereby certifies that he has the authority to execute this instrument on behalf of, and that this instrument is binding upon, the Massachusetts Development Finance Agency, and that he has been so authorized.

20. Effective Date. This Restriction shall become effective upon its recordation and/or registration with the appropriate Registry of Deeds and/or Land Registration Office.

As this instrument is granted to an agency of the Commonwealth of Massachusetts, no Massachusetts deed excise tax stamps are affixed hereto, none being required by M.G.L. Chapter 64D, Section 1.

***

Witness the execution hereof under seal this __ day of _____, 2011.

GRANTOR:

MASSACHUSETTS DEVELOPMENT
FINANCE AGENCY

By: _____

_____
President and Chief Executive Officer

COMMONWEALTH OF MASSACHUSETTS

_____, ss

On this _____ day of _____, 2011, before me, the undersigned Notary Public, personally appeared the above-named _____, proved to me by satisfactory evidence of identification, being (check whichever applies): □ driver's license or other state or federal governmental document bearing a photographic image, □ oath or affirmation of a credible witness known to me who knows the above signatory, or □ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing to be signed by him voluntarily for its stated purpose as President and Chief Executive Officer for the Massachusetts Development Finance Agency.

_____
Notary Public
My Commission Expires:

In accordance with M.G.L. c. 21E, § 6, as amended, the Commissioner of the Department of Environmental Protection hereby approves the Grant (as to form, only).

_____
Kenneth L. Kimmell
Commissioner
Department of Environmental Protection
Date:

Exhibit A to Grant of Environmental Restriction and Easement
Legal Description
Impact Area

A certain impact area located on Parcel 1 of land owned by the Massachusetts Development Finance Agency (as successor to the Government Land Bank) and located in the Devens Regional Enterprise Zone, County of Worcester, Massachusetts situated westerly of Maple Street and northerly of Oak Street and being shown as "IMPACT AREA" on a plan entitled "Impact Area Plan Grant Road Housing Area / Oak Street" prepared for Massachusetts Development Finance Agency prepared by WSP – Sells dated April 11, 2011. Said plan is recorded in the Worcester District Registry of Deeds in Plan Book _____, Plan _____.

Beginning at the southeasterly corner of the Impact Area herein described near Maple Street; thence,

N 74-47-07 W one hundred fifty eight and seventeen hundredths feet (158.17') to a stone bound with drill hole set, thence;

N 01-35-43 E one hundred forty six and ninety two hundredths feet (146.92') to a stone bound with drill hole set, thence;

N 65-00-20 W one hundred sixty eight and seventy five hundredths feet (168.75') to a stone bound with drill hole set, thence;

N 70-38-16 W one hundred ninety three and twenty six hundredths (193.26') to a stone bound with drill hole set, thence;

N 02-55-38 E two hundred eighty eight and fourteen hundredths feet (288.14') to a stone bound with drill hole set, thence;

S 64-11-20 E two hundred sixty two and ninety three hundredths feet (262.93') to a stone bound with drill hole set, thence;

S 58-07-40 E ninety four and one hundredths feet (94.01') to a stone bound with drill hole set, thence;

S 33-46-52 E one hundred seventy one and twenty hundredths feet (171.20') to a stone bound with drill hole set, thence;

S 22-09-34 E one hundred fifty and seventy six hundredths feet (150.76') to a stone bound with drill hole set, thence;

S 00-01-36 E one hundred sixty five and forty seven hundredths feet (165.47') to the point of beginning.

The above described "IMPACT AREA" contains 134,864 square feet or 3.10 Acres, more or less, according to said plan.

EXHIBIT G

Annual Review Checklist

Grant HA and Impact Area		
check√	*task*	*notes*
☐	Interview of municipal personnel as to the discovery, reporting and disposal of UXO	Name(s) and title(s) of person(s) interviewed: Date(s) of interview: Any UXO discovered? ☐ No. ☐ Yes. (if "yes", provide detail regarding objects discovered, dates and locations of discovery and information regarding reporting and disposal)

Impact Area only		
check√	*task*	*notes*
☐	Physical Inspection	Date conducted: Condition of fencing, signage and vegetation: Evidence of unauthorized access? ☐ No. ☐ Yes. (if "yes", describe) Any surface or near surface UXO? ☐ No. ☐ Yes. (if "yes", provide detail regarding objects discovered, dates and locations of discovery and information regarding reporting and disposal)
☐	Interview current owner regarding utility repair or emergency work	Name(s) and title(s) of person(s) interviewed: Date of interview: Work conducted? ☐ No. ☐ Yes. (if "yes", provide detail information of the work including the date(s) of performance and the discovery of UXO)

Grant HA only		
check√	*task*	*notes*
☐	Verify existence of website and content	
☐	Verify the inclusion of required utility bill inserts	
☐	Verify posting of utility bill insert in a conspicuous location	
☐	Verify distribution of current soils management policy to construction	
☐	Verify that awareness training is being conducted	(1) Did ground intrusive construction activities occur during the reporting period in the Grant HA? ☐ No. ☐ Yes. (2) At the time of application for the building permit, were contractors who were applying to conduct ground intrusive construction activities in the Grant HA provided a current copy of the Devens Soil Management Policy? ☐ No. ☐ Yes. (3) Were all contractors who applied for a building permit required to attend UXO awareness training prior to commencing ground intrusive construction activities? ☐ No. ☐ Yes.
☐	Verify that supplemental deed notice has been included in deeds conveying portions of the Grant HA	
☐	Physical Inspection (to be conducted only if deemed necessary)	☐ No.

		☐ Yes. (if "yes", provide date of inspection, the areas that were inspected and whether any surface or near surface UXO were discovered)

EXHIBIT H

LUCIP Implementation Schedule

Milestone Activity	Completion Date
Finalize / Record the GERE (Exhibit F)	August 31, 2011
Finalize the Educational Pamphlet/Insert (Exhibit C)	August 31, 2011*
Finalize the Web-based Visual and Audio Media (Sections 2 & 3)	August 31, 2011*
Install Impact Area Fencing, Vegetation and Signage (Section 3)	August 31, 2011*
Install kiosk or community bulletin board in Grant HA (Section 2)	Within thirty (30) days after issuance of the first building permit for a residential dwelling in Grant HA
* following initial implementation, such items may be modified in the future in accordance with the LUCIP	

ATTEST: WORC. Anthony J. Vigliotti, Register