2005 FIVE-YEAR REVIEW REPORT

VOLUME I

FORMER FORT DEVENS
DEVENS, MASSACHUSETTS

GSA CONTRACT NO. GS-10F-0399N

Prepared for:

Former Fort Devens
Devens, Massachusetts
Middlesex County, MA
September 2005

Prepared by:

U.S. Army
BRAC Environmental Office
30 Quebec Street, Box 100
Devens, MA 01432

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Approved by:

Date: 9/28/2005

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FIGURES

APPENDICES

LIST OF ACRONYMS

A

AAFES	Army Air Force Exchange Services
ABB-ES	ABB Environmental Services, Inc.
AOC	Area of Contamination
ARAR	Applicable or Relevant and Appropriate Requirements
AREE	Area Requiring Environmental Evaluation
AST	Aboveground Storage Tank
AWQC	Ambient Water Quality Criteria

B

bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BOD_5	Biochemical Oxygen Demand
BRAC	Defense Base Closure and Realignment Act 1990

C

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	Cubic Feet per Minute
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COC	Contaminants of Concern
COPCs	Contaminants of Potential Concern
cPAH	Carcinogenic polynuclear aromatic hydrocarbons
CVOC	Chlorinated Volatile Organic Compounds
cy	Cubic Yards

D

DDD	2,2-bis(para-chlorophenyl)-1, 1-dichloroethane
DDE	2,2-bis(para-chlorophenyl)-1, 1-dichloroethene
DDT	2,2-bis(para-chlorophenyl)-1, 1,1-trichloroethane
DO	Dissolved Oxygen
DRMO	Defense Reutilization and Marketing Office

E

EBS	Environmental Baseline Survey
EOD	Explosive Ordinance Discharge
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
ERD	Enhanced Reductive Dechlorination
ESD	Explanation of Significant Differences

F

FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FORSCOM	United States Army Forces Command
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
ft	Feet

G

GAC	Granular Activated Carbon
gpm	Gallons per Minute
GW	Groundwater

H

HA	Health Advisories
HASP	Health and Safety Plan
HI	Hazard Index
HLA	Harding Lawson Associates

I

ICs	Institutional Controls
IDW	Investigation Derived Waste
IMP	Installation Master Plan
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
IRZ	In-Situ Reactive Zone
IWS	In-Well Stripping

L

LIFOC	Lease in Furtherance of Conveyance
LTM	Long Term Monitoring
LTMP	Long Term Monitoring Plan
LNAPL	Light Non-Aqueous Phase Liquid

M

MAAF	Moore Array Airfield
MADEP	Massachusetts Department of Environmental Protection
MCLGs	Maximum Contaminant Level Goals
MCLs	Maximum Contaminant Levels
MCP	Massachusetts Contingency Plan
µg/L	Micrograms per liter
mg/L	Milligrams per liter
MEP	Master Environmental Plan
mL/min	Milliliters per Minute
MMCL	Massachusetts Maximum Contaminant Level

MNA	Monitored Natural Attenuation
MNG	Massachusetts National Guard
MOGAS	Motor Vehicle Gasoline
msl	Mean Sea Level

N

NCP	National Contingency Plan
NDIR	non-dispersive infrared spectroscopy
Nobis	Nobis Engineering, Inc.
NPL	National Priorities List

O

OB/OD	Open Burning/Open Detonation
OB/BR	Overburden/Bedrock
O&M	Operations and Maintenance
OPS	Operating Properly and Successfully
ORP	Oxygen-Reduction Potential
ORS	Office of Research and Standards

P

PA	Preliminary Assessment
PAH	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyl
PCE	Tetrachloroethylene
PID	Photoionization Detector
POL	Petroleum Oil and Lubricants
POTW	Publicly Owned Treatment Works
ppb	Parts per billion
ppmv	Parts per million by volume
PRE	Preliminary Risk Evaluation
PRG	Preliminary Remediation Goals
PVC	Polyvinyl Chloride

R

RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Doses
RFTA	Reserve Forces Training Area
RGs	Remedial Goals
RI	Remedial Investigation
ROD	Record of Decision
RTS	Regional Training Site

LIST OF ACRONYMS (cont.)

S

SA	Study Area
SAP	Sampling and Analysis Plan
SHL	Shepley's Hill Landfill
SI	Site Investigation
SOW	Statement of Work
SPIA	South Post Impact Area
SSI	Supplemental Site Investigation
SW	Surface Water
SWET	Stone and Webster Environmental Technology
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compounds

T

TAL	Target Analytes List
TBC	To be Considered
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDA	Table of Distribution and Allowances
TOC	Total Organic Compound
TPHC	Total Petroleum Hydrocarbon Compounds
TPH	Total Petroleum Hydrocarbon
TSCA	Toxic Substances Control Act

U

USAEC	United States Army Environmental Center
USACE	United States Army Corp. of Engineers
USACE-NAE	United States Army Corp. of Engineers – New England District
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

V

VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons

EXECUTIVE SUMMARY

Nobis Engineering, Inc. (Nobis) has performed the second comprehensive Five-Year Review of remedial actions for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites at the former Fort Devens and the Devens Reserve Forces Training Area (RFTA). This review, completed in accordance with the U.S. Environmental Protection Agency (EPA) Comprehensive Five-Year Review Guidance, dated June 2001, was performed from March 2005 through September 2005.

The purpose of Five-Year Reviews is to determine whether the remedy at a site is protective of human health and the environment. In addition, five-year review reports identify deficiencies, if any, found during the review, and identify recommendations to address them.

This review is required by statute and policy, and is being implemented consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Comprehensive reviews were performed for all sites where a CERCLA Record of Decision (ROD) has been executed. Five-Year Reviews should be conducted by statute if both of the following conditions are true:

- Upon completion of the remedial action, hazardous substances, pollutants, or contaminants will remain on site; 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 removal action was selected under CERCLA 121.

Five-Year Reviews should be conducted as a matter of policy for the following types of actions:

- A pre- or post-SARA remedial action that, upon completion, will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete;
- A pre-SARA remedial action that leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure;
- A removal-only site on the National Priorities Listing (NPL) where a removal action leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure and where no remedial action has or will take place.

Five-Year Reviews were performed for the following sites:

<u>Policy Review Sites</u>
- AOCs 43G & 43J.
- AOCs 32 and 43.
- AOC 50 (Area Requiring Environmental Evaluation [AREE 69]).

Statutory Review Sites

- Barnum Road Maintenance Yards (Area of Concern [AOC]s 44 and 52).
- AOC 57.
- South Post Impact Area (SPIA), (AOCs 25, 26, 27, and 41 - Groundwater).
- AOC 69W.
- Consolidation Landfill (AOCs 9, 11, 40, and 41; Study Areas [SAs] 6, 12, and 13).
- Shepley's Hill Landfill Operable Unit (AOCs 4, 5 and 18).

A brief description of each site where a ROD has been executed along with a summary of findings of the Five-Year Reviews is provided below.

Barnum Road Maintenance Yards (AOCs 44 and 52). The Barnum Road Maintenance Yards are located in the northeast corner of the former Main Post, near Barnum Gate. This site consists of former vehicle maintenance yards. Contamination at the site was primarily attributed to petroleum and oil releases associated with maintenance activity. The ROD describing the selected cleanup remedy was signed in March 1995. Remedial actions consisting of soil excavation, asphalt batching of contaminated soil, repaving, and installation of a stormwater collection system were completed in April of 1996.

There were no areas of noncompliance or deficiencies noted during the review that would make the remedial actions at AOCs 44 and 52 noncompliant with the ROD. The remedy at AOCs 44 and 52 is protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled.

Shepley's Hill Landfill Operable Unit (AOCs 4, 5, and 18). Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens. Landfill operations at Shepley's Hill Landfill began at least as early as 1917, and stopped as of July 1, 1992. Landfill capping was completed in May 1993. Remedial Investigation (RI) and RI Addendum investigations performed between 1991 and 1993 identified potential human exposure to arsenic in groundwater as the primary risk at the site. A Feasibility Study (FS) was performed in 1995 to evaluate alternatives to reduce potential exposure risks, and in September 1995, the ROD was signed. The selected remedy consists of landfill closure, landfill maintenance, long-term groundwater and landfill gas monitoring, and institutional controls.

Based on the data collected to date, the required incremental reduction in risk was not achieved and the Army and regulatory agencies decided to implement the contingent element of the selected remedy (Alternative SHL-9, Groundwater Extraction and Discharge to the Town of Ayer, publicly owned treatment works [POTW]). Modifications to the implementation of the contingency remedy were detailed in the Final Explanation of Significant Differences (ESD), (CH2M Hill, June 2005) and included; 1) change the POTW from Ayer to Devens, and 2) provide pretreatment to meet Devens POTW discharge limitations. The contingency extraction treatment and discharge system has been constructed and the system is discharging to the Devens POTW. Alternative discharge options for treated water are currently under evaluation by the Army and the regulatory agencies.

There continues to be ponding on the northern half of the landfill, with ponding also present in the swales located to the south and northwest of the landfill. This appears to be an ongoing issue that has been documented in Long Term Monitoring Reports. Areas of poor drainage and ponding will be addressed by a Landfill Cap Maintenance Contract to be performed during the fall 2005. Fencing, vehicle gates, and gas monitoring probes will also be installed as part of this contract.

Elevated concentrations of arsenic in groundwater continue to be detected at the Shepley's Hill Landfill. A new arsenic MCL standard of 10 μg/L was promulgated in January 2001 and public water systems must comply with this new standard by January 2006. Although ROD clean-up goals have not changed, to date, it is anticipated that they will change to be responsive to this new standard while incorporating knowledge of the known ranges of background arsenic concentrations in groundwater at Devens. This change in the standard will be an added difficulty in achieving cleanup goals. Attainment of the proposed standard would increase the stringency of the groundwater cleanup, and would reduce the potential residual risk from exposure to groundwater.

Although numerous studies have been performed to date, data gaps may exist regarding the lateral extent, flow directions, discharge points, and nature of the arsenic plume. In order to identify these data gaps and to evaluate risk associated with the remedies in place at the landfill, a Comprehensive Site Assessment (CSA) and Corrective Action Alternatives Analysis (CAAA) will be performed for the Shepley's Hill Landfill. The CSA will include an offsite groundwater plume investigation, human health and ecological risk assessments and a landfill cap assessment. The CAAA will review all prior feasibility study alternatives, revise and/or validate the alternatives based on new data and develop any new alternatives as necessary.

Based on the noted conditions and issues, the following recommendations are planned for the Shepley's Hill Landfill:

- Start up of extraction and treatment system
- Performance monitoring of the extraction and treatment system
- Landfill Cap Maintenance
- Performance of the CSA/CAAA

A protectiveness determination of the remedy at the Shepley's Hill Landfill cannot be made at this time until further information is obtained through completion of the recommendations and follow up actions detailed above. It is expected that these actions will take approximately 2 years to complete (mostly dependent on the CSA and CAAA), at which time a protectiveness determination will be made. Pending the availability of adequate funding, the Army will implement the remedy identified by the CSA/CAAA to achieve protectiveness within a reasonable time period.

AOC 57. 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 adjacent to Barnum Road. These sub-areas received stormwater runoff and wastes from vehicle maintenance activities conducted at the storage yards. These yards were eventually abandoned in 1998, and the pavement and fencing were removed. The former storage yards are now soil and grass-covered areas. Areas 2 and 3 are located within Lease Parcel A6a that the Army plans to transfer to the Massachusetts Development Finance Corporation (Mass Development).

A ROD was signed on September 28, 2001 for AOC 57 presenting selected remedial actions for soil and groundwater contamination at Areas 1, 2 and 3. The selected remedy for Area 1 was no further action. The selected remedy for Area 2 was excavation (for possible future use) and institutional controls. The selected remedy for Area 3 was excavation (to accelerate groundwater cleanup) and institutional controls. Excavation activities at AOC 57 were completed in 2003.

Other components of the selected remedy include wetlands protection and environmental monitoring and inspections. An ESD (USACE, 2004) was prepared in 2003 to address increased soil removal volumes and cost for Area 2, inclusion of extractable petroleum hydrocarbon (EPH) as a contaminant of concern (COC) for Area 2 soils, addition of EPH C11-C22 Aromatic Hydrocarbon (200 μg/l cleanup goal) and addition of polychlorinated biphenyls (PCBs) as COCs in Area 2 groundwater.

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOCs 57 Areas 1, 2, and 3 non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

Long term monitoring should continue as specified the Draft Long Term Monitoring Program (LTMP), (USACE, 2004). The long-term monitoring is currently performed on a semi-annual basis (Spring and Fall time period each year). Results of the ongoing monitoring indicated that there are reducing conditions at AOC 57. It is recommended that the reducing conditions observed at AOC 57 be assessed by the Army by plotting and contouring arsenic concentrations, as well as oxygen-reduction potential (ORP) and dissolved oxygen (DO). The assessment should include a determination of the cause of the reducing conditions, by evaluating the relationship between arsenic levels and DO/ORP. Future surface water results should be compared to National Recommended Water Quality Criteria to ensure compliance and to determine if an impact to the protectiveness of the remedy has occurred. The above recommendations will be evaluated as part of the established LTMP which be updated in the spring 2006.

The remedies at AOC 57 are protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Excavation activities at AOC 57 were completed in 2003.

AOCs 43G and 43J. Both AOCs 43G and 43J are former gas stations located within the Devens RFTA. AOC 43G is located on Queenstown Road in the central portion of the former Main Post. AOC 43J is located on Patton Road at the southern edge of the former Main Post. Contamination at both sites is attributed to releases from gasoline and waste underground storage tanks (USTs). Site investigations (SIs) and Supplemental Site Investigations (SSIs) were performed between 1992 and 1994 at both sites. In June 1996, CERCLA based RI/FS investigations were completed at both AOCs to address contaminated groundwater. A ROD was signed in October of 1996 documenting intrinsic remediation as the final selected cleanup remedy at both AOCs 43G and 43J. Specific components of the selected remedy for both AOCs include: intrinsic bioremediation assessment, data collection and groundwater modeling, installation of additional monitoring wells, long term groundwater monitoring, and annual data reports.

Review of the groundwater sampling data from 1999 through October 2004 indicate that groundwater concentrations of organic COCs are decreasing at source locations at AOCs 43G and 43J and that the plumes are not expanding or migrating off RFTA property. Groundwater sampling results from sentry well locations are below cleanup goals for organic COCs and most metals, with the exception of manganese at AOC 43G and AOC 43J. Concentrations of VPH aromatics C9-C10 have exceeded cleanup goals in one sentry well during the October 2004 sampling round. No further field action is warranted at either site before the next scheduled sampling round in November or December 2005. Analytical results are supportive of the intrinsic bioremediation assessment conclusion that migration of VPH concentrations in exceedances of

GW-1 standards off RFTA property is not probable. Installations of groundwater monitoring wells and groundwater modeling have been completed, as stipulated in the ROD, and groundwater monitoring is ongoing. No contingency action is required at this time at either AOC.

Current remedial action activity should continue and consists of implementing the remaining three components specified in the ROD: a long-term groundwater monitoring program, annual reporting, and Five-Year Reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with performance standards and reporting of the remedial progress.

It is recommended that development of risk-based standards for manganese, utilizing current RfD factors, as supported by the EPA, be considered prior to significant modification to the long-term monitoring plans at AOCs 43G and 43J. Modifications to the sampling program, the IRA modeling, potential pathways, off-site migration and remedial duration should continue to be reviewed as part of the established LTMP. It also recommended to repair the damaged well AAFES-6 at AOC 43G.

The remedies at AOCs 43G and 43J are protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. Human health is not at risk at AOCs 43G and 43J because groundwater is not used as a drinking water source.

South Post Impact Area (AOCs 25, 26, 27, and 41). The South Post Impact Area (SPIA) covers approximately 1,500 acres and is located within the 4,800-acre South Post section of the former Fort Devens. The SPIA is an active weapons and ordnance discharge area used by the Army, the Massachusetts National Guard, and law enforcement agencies for training purposes. Old Turnpike Road, Firebreak Road, the southern portion of Harvard Road, Trainfire Road, and Dixie Road roughly bound the area. The SPIA includes AOCs 25, 26, 27 and 41 as well as several SAs, and a number of firing ranges along Dixie Road and Trainfire Road that are not designated as AOCs.

The portion of the SPIA covered by the ROD encompasses the 964 acres north and west of New Cranberry Pond. This area is referred to as the SPIA monitored area. CERCLA directed RIs have been conducted for the SPIA and the associated AOCs. A ROD was signed in July 1996 documenting No Action as the final selected remedy for the SPIA monitored area groundwater, surface water, soil, and sediment, and AOC 41 groundwater. The following components were included as part of the selected No Action Remedy: groundwater monitoring for potential contaminant migration out of the SPIA monitored area, groundwater monitoring at the individual AOCs, sampling of Well D-1 (classified as a transient non-community supply well), developing a LTMP (SWETS, 1997) and Integrated Natural Resources Management Plan (INRMP), restricting development of new drinking water sources within the SPIA monitored area, and submitting annual reports to document the results of monitoring. The Army is currently finalizing the updated INRMP.

RDX was detected in well 26M-92-08X at AOC 26. In general, the purpose of the South Post Monitoring (SPM) well series (those that are monitored as part of the LTMP efforts) is to serve as a network of sentinel sampling points, for determination of off-site migration. RDX was not detected in the SPM wells. These issues do not make the remedial actions at the SPIA non-compliant with the ROD, and they are not sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews, and continued monitoring of the situation. It is recommended that RDX at the SPIA continue to be monitored.

Long-term monitoring will be continued as outlined in the ROD and LTMP following low-flow collection procedures in accordance with USEPA Region I Low-Flow Sampling Procedures (USEPA, 1996). These procedures emphasize the need to minimize stress to the aquifer through low pumping rates (usually between 100 to 400 mL/min) in order to collect samples with minimal alterations to water chemistry.

In addition, the Army should continue to evaluate the potential for off-site migration, impact to sensitive receptors, trend analysis, and remedial duration as part of the established LTMP for SPIA. Evaluation of the LTMP will occur in spring 2006. In addition, the INRMP will be finalized in the fall 2005.

The No Action remedy at AOCs 25, 26, 27, and 41 is protective of human health and the environment and exposure pathways that could result in unacceptable risk are being controlled.

AOCs 32 and 43A. AOC 32 (Defense Reutilization and Marketing Office [DRMO Yard]) was used as a materials storage facility. Operational records indicate that the facility was active from at least 1964 to 1995. A former UST site (UST #13) has also been incorporated into AOC 32. This UST was used to store waste oil and was located just northeast of the DRMO Office. At the time of base closure in 1996, AOC 43A was being used as a petroleum, oils and lubricants (POL) storage area. Located across Market Street from AOC 32, this area served as the central distribution point for all gasoline and fuel at the former Fort Devens from the 1940s to base closure. AOC 43A consists of a fenced lot within a developed industrial area. A ROD was signed in February 1998 documenting the selected remedies for AOCs 32 and 43A. Key components of the remedy at AOC 32 include excavation of contaminated soils and annual groundwater monitoring. The groundwater remedy for AOCs 32 and 43A includes establishing institutional controls, installing additional monitoring wells, collecting data to support monitored natural attenuation, groundwater modeling, performing annual long term groundwater monitoring, and providing annual reports to regulators.

The remedial actions at AOCs 32 and 43A are protective of human health and immediate threats do not exist. The Army has installed source area groundwater monitoring wells and re-initiated long-term monitoring. The 2003 annual groundwater monitoring report and the groundwater sampling data from fall and spring 2004 document that natural attenuation is effectively remediating groundwater at AOCs 32 and 43A, with the possible exception of one location (32M-01-18XBR). Groundwater sampling results from all other locations are below cleanup goals. Contamination at the bedrock source well 32M-01-18XBR is limited to some VOCs, VPH C_9-C_{10} aromatics, and manganese. This well is located beneath pavement adjacent to the newly constructed Webvan warehouse. The warehouse and its pavements are reducing groundwater recharge from surface water infiltration, resulting in less attenuation due to recharge. The capping effect of the building and pavement is creating anaerobic conditions, but not sufficient for dechlorination of the chlorobenzene compounds. If conditions become sufficiently reducing, the potential for anaerobic de-chlorination of the chlorobenzene compounds exists, if the bacterial community can support this degradation process.

The current LTMP (SWETS, 2001a,b) and monitored natural assessment (MNA), (SWETS, 2001) were developed for the former site configuration and well network. The LTMP and MNA is currently being updated for the current site configuration. Since there are plans to expand the Webvan warehouse, the documents should take into account these proposed modifications to the site. It is recommended that the sampling be conducted in the future with the analyte list reduced to exclude EPH, PCBs, NH_3, TOC, COD, dissolved gases, alkalinity, dissolved metals, and anions.

It is recommended that all wells at the site, especially flush-mount wells in parking lot areas, be inspected for damage, and that repairs be implemented as appropriate before the wells are subject to snow and potential intrusion of sand and/or road salt. Well 43M-01-16XBR was observed to be missing its road box. It is anticipated that these activities will occur in October 2005.

Based on current and planned site conditions, a site-specific vapor intrusion assessment is recommended, including evaluation of subslab soil gas and indoor air concentrations (if warranted) and/or site-specific mathematical modeling in accordance with the November 2002, EPA Draft Subsurface Vapor Intrusion Guidance. The vapor intrusion evaluation is planned for March 2006.

The remedy at AOC 32 and AOC 43A currently protects human health and the environment because institutional controls (ICs) are incorporated into the deed that prohibit the extraction of groundwater from the site for industrial and/or potable use and contaminants are not migrating off-site. However, in order for the remedy to be protective in the long-term, the identified recommendations and follow-up actions need to be taken to ensure long-term protectiveness.

AOC 69W. AOC 69W comprises the former Fort Devens Elementary School (Building 215) and the associated parking lot and lawn extending approximately 300 feet northwest to Willow Brook. Contamination at AOC 69W is attributed to No. 4 heating oil, which leaked from underground piping in two separate incidences: once in 1972 and again in 1978. It is estimated that approximately 7,000 to 8,000 gallons of fuel oil were released to soil from each release.

Based on the nature and distribution of contaminants, a Removal Action was undertaken in the winter of 1997 and 1998 to remove contaminated soil associated with the historic releases. Contaminated soil was removed near the school and extending to the UST. Confirmatory subsurface soil sample results from the Removal Action showed that concentrations of fuel-related contaminants still exceed Massachusetts Contingency Plan (MCP) S-l/GW-1 standards for extractable petroleum hydrocarbons (EPH) in subsurface soils immediately adjacent to the school building, but are generally low in downgradient areas (only a few concentrations in soil slightly exceeded MCP S-1/GW-1 standards). In 1999, a Limited Action ROD was signed. The Limited Action consists of long term groundwater monitoring and institutional controls to limit potential exposure to contaminated soils and groundwater under both existing and future site conditions.

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial action at AOC 69W non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports, a review of ARARs and the findings from the site inspection and interviews with personnel familiar with the site. Long-term monitoring should continue as specified in the AOC 69W LTMP (HLA, 2000). However, groundwater monitoring can be terminated if four consecutive groundwater samples are below action criteria. No reductions in sampled locations or in frequency are recommended at this time. The long term monitoring is currently performed on a semi-annual basis. The Army is responsible for implementation.

Given the present site conditions and noted analytical data, the Army should review the previously computed indoor air assessments. In addition, the Army should evaluate potential off-site sensitive receptors as part of the established LTMP for AOC 69W.

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. Human health is currently not at risk at AOC 69W because groundwater at the AOC is not being used for potable use nor proposed for potable use and COCs exceeding cleanup goals are not migrating off-site. The proposed deed restrictions prohibiting future use of groundwater as drinking water have not yet been implemented, since the property has yet to be transferred.

AOCs 9, 11, 40, 41 (Solid Waste), SAs 6, 12, and 13. These seven sites were all small former landfills and debris disposal areas at the former Fort Devens. SAs 6 and 12, and AOC 41 are located on the South Post. AOC 9 is located on the former North Post. AOCs 11 and 40, and SA 13 are located on the former Main Post. A ROD was issued in July 1999 which presented the selected remedial action of no further action for SA 6; surface debris and hot spot removal at SA 12, and AOC 41; debris removal and consolidation or offsite transport at AOC 9, 11, 40, and SA 13; and wetlands restoration at AOCs 9, 11, and 40. An evaluation of the on-site versus off-site disposal option was conducted and the findings were presented in the Remedy Selection Report. 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 determined to be the "best value" alternative. The approved remedial alternative (alternative 4c) documented in the ROD called for no further action at SA-6; limited removal at SA-12 and AOC-41; full excavation of AOCs 9, 11 and 40, and SA-13, with on-site consolidation or off-site disposal.

The decision to proceed with on-site consolidation was issued June 30, 2000, and a temporary (120 day) access agreement to begin construction was signed on September 15, 2000. The Consolidation Landfill was constructed at the Former Golf Course Driving Range. Debris from each of the six landfill areas was excavated, characterized, transported and disposed at either the secure on-site landfill or an off-site licensed facility if characterization results exceeded on-site disposal requirements.

At present, there are no deficiencies that would prevent planned response actions from being protective of human health and the environment, nor are any expected in the future. It is the recommendation of this review that operation and maintenance at the Consolidation Landfill be continued as outlined in the Landfill Operation and Maintenance (O&M) Plan (Shaw, 2003) and the Wetland and Upland Habitat Restorations (Shaw, 2003) at AOCs 9, 11, 40 and SAs 12 and 13 be evaluated during the first three growing seasons.

Significant soil erosion was observed in the north-northeast gabion slope drain starting at the intersection with the bench drain and deposition of the eroded materials was observed in the perimeter swale of the Consolidation Landfill. A SOW has been issued and awarded by the U.S. Army Corps of Engineers, for this repair of the gabion slope drain and work is planned to be completed in the fall 2005.

The remedies at AOCs 9, 11, 40, and 41 and SAs 12 and 13 are protective of human health and the environment, and exposure pathways that could result in unacceptable risk are being controlled. Human health is currently not at risk at AOCs 9, 11, 40, and 41 and SAs 12 and 13 because contaminated soils have been excavated and placed in the Consolidation Landfill where it has been capped. All components of the ROD have been implemented. No contingency action is required at this time. Current remedial action activity consists of continued implementation of the components specified in the ROD: the long-term groundwater monitoring and maintenance program at the Consolidation Landfill, annual reporting, and Five-Year Reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

AOC 50 (AREE 69 AE). AOC 50 is located on the northeastern boundary of the former Moore Army Airfield (MAAF), within the former Fort Devens North Post in Ayer, Massachusetts. The AOC 50 Source Area comprises less than 2 acres and includes Buildings 3803 (the former parachute shop), 3840 (the former parachute shakeout tower), 3824 (a gazebo), and 3801 (the former 10th Special Forces airplane parachute simulation building). Sources of groundwater contamination within AOC 50 include two World War II fueling systems, a drywell, and the tetrachloroethylene (PCE) drum storage area; these sources are collectively referred to as the Source Area. 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 Southwest Plume extends from the Source Area approximately 3,000-feet downgradient to the Nashua River.

In March 2004 a ROD was signed depicting the following remedial components: enhanced reductive dechlorination (ERD) treatment program and in-well stripping (IWS), soil vapor extraction (SVE), contingencies, long-term groundwater monitoring, institutional controls, and Five-Year Reviews. Initial results indicate that significant degradation of PCE is occurring at the site due to the implementation of the IWS and ERD treatment systems. The Army believes that the remedy is operating properly and successfully (OPS) and will request OPS certification from the USEPA in the near future.

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOC 50 non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

Elevated concentrations of CVOCs, continue to be detected in groundwater at AOC 50, however, a decreasing trend has been observed in some areas of the site due to the ongoing remedial efforts. A Remedial Action Work Plan (RAWP), including a Land Use Control Plan (LUCP) is currently being finalized by the Army. The remedial actions at AOC 50 are expected to allow unrestricted use and unlimited exposure upon final achievement of Remedial Goals (RGs) in groundwater. The Army has installed groundwater monitoring wells and initiated long-term monitoring. The groundwater sampling data from fall 2004 and spring 2005 document that both the ERD system and the IWS system are effective in degrading PCE and creating proper conditions for treatment. PCE and TCE contaminant concentrations in groundwater are decreasing.

Current remedial actions as specified in the ROD should continue. These components enable continued assessment for compliance with remedial goals established in the ROD and reporting of the remedial progress. Performance standards should be followed and an assessment of contaminant migration and remedial duration should continue. Evaluation of the SVE system is ongoing. The IC's should be implemented through deed restrictions in accordance with the RAWP prior to the OPS Demonstration.

The remedy at AOC 50 is expected to be protective upon completion, and in the interim, exposure pathways that could lead to unacceptable risks are being controlled. Human health is currently not at risk at AOC 50 because groundwater at the AOC is not being used for potable use nor proposed for potable use. Current remedial action activity consists of operation of the remedy, long-term groundwater monitoring, annual reporting, and Five-Year Reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

1.0 INTRODUCTION

Nobis Engineering, Inc. (Nobis) has performed the second comprehensive Five-Year Review of remedial actions for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites at the former Fort Devens, Devens Massachusetts. This review, completed in accordance with relevant U.S. Environmental Protection Agency (USEPA) Comprehensive Five-Year Review Guidance, was performed from March 2005 through September 2005.

1.1 Purpose of the Review

The purpose of Five-Year Reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify deficiencies, if any, found during the review, and identify recommendations to address them. This review is required by statute and policy, and is being implemented consistent with the CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Five-Year Reviews should be conducted by statute if both of the following conditions are true:

- Upon completion of the remedial action, hazardous substances, pollutants, or contaminants will remain on site; 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 removal action was selected under CERCLA 121.

Five-Year Reviews should be conducted as a matter of policy for the following types of actions:

- A pre- or post-SARA remedial action that, upon completion, will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete;
- A pre-SARA remedial action that leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure;
- A removal-only site on the National Priorities Listing (NPL) where a removal action leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure and where no remedial action has or will take place.

1.2 Background

Fort Devens is located approximately 35 miles west of Boston, Massachusetts. The former Fort Devens is comprised of approximately 9,280 acres divided into North, Main and South Posts. The South Post is approximately 4,800 acres, and the North and Main Post make up the remaining 4,480 acres. The facility is located in the Towns of Devens, Ayer, Shirley, Lancaster and Harvard. Massachusetts Highway 2 divides the South Post from the Main Post. The Nashua River runs though the North, Main and South Posts. The area surrounding the former Fort Devens is largely rural/residential.

In 1991, the U.S. Department of the Army and the USEPA signed a Federal Facility Agreement (FFA) under Section 120 of CERCLA for environmental investigations and remedial actions at

Fort Devens. The agreement required that Site Investigations (SIs) be undertaken at each Study Area (SA) to verify whether a release or potential release of contaminants existed, to determine the nature of the associated risk to human health and the environment, and to determine whether further investigations or response actions would be required.

In 1985, Fort Devens applied for a Resource Conservation and Recovery Act (RCRA) Part B Permit for its hazardous waste storage facility. The submission included a list of Solid Waste Management Units that showed potential for the release of hazardous substances to the environment. Under the FFA between the Army and the USEPA, these potential areas of contamination are referred to as SAs.

Argonne National Laboratory's Environmental Assessment and Information Sciences Division completed an environmental assessment in November 1988, as part of the environmental restoration of Fort Devens. The objective of the assessment was to characterize on-site contamination and provide recommendations for potential response actions. Fort Devens was placed on the National Priorities List (NPL) effective December 1989.

The results of this assessment are reported in a document entitled the Master Environmental Plan (MEP) for Fort Devens, Massachusetts (Biang Ct al., 1992). The MEP summarizes preliminary assessment activities and provides an historical summary of the installation, discusses the geologic and hydrologic setting, discusses the nature and extent of contamination, and proposes response actions.

In 1991, the former Fort 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 Fort Devens. Since 1991, the U.S. Army Environmental Center (USAEC, formerly the U.S. Army Toxic and Hazardous Materials Agency) and the U.S. Army Corps of Engineers (USACE) have tasked Army contractors to perform SIs, Remedial Investigations (RIs), Feasibility Studies (FSs), and other CERCLA related activities for the sites addressed in this report. To a significant extent, the Five-Year Review draws upon information collected during the previous activities performed by Army contractors. Previous reports generated by prior activities, containing information used during the Five-Year Review, are referenced in this report.

The remainder of this report describes the Five-Year Reviews performed for the CERCLA sites at the former Fort Devens and Devens Reserve Forces Training Area (RFTA) where Records of Decisions (RODs) have been executed. Some of the sites comprise more than one SA or area of concern (AOC) (See Figure 1-1). The sites consist of the following:

<u>Policy Review Sites</u>

- AOCs 43G & 43J.
- AOCs 32 and 43.
- AOC 50 (Area Requiring Environmental Evaluation [AREE 69]).

<u>Statutory Review Sites</u>

- Barnum Road Maintenance Yards (AOCs 44 and 52).
- AOC 57.
- South Post Impact Area (SPIA), (AOCs 25, 26, 27, and 41 - Groundwater).
- AOC 69W.
- Consolidation Landfill (AOCs 9, 11, 40, and 41; Study Areas [SAs] 6, 12, and 13).
- Shepley's Hill Landfill Operable Unit (AOCs 4, 5 and 18).

1.3 Community Participation

In February 1992, the Army released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities at Fort Devens. As part of this plan, the Army established a Technical Review Committee (TRC) in early 1992. The TRC, as required by SARA Section 211 and Army Regulation 200-1, included representatives from USEPA, U.S. Army Environmental Center, Devens RFTA, Massachusetts Department of Environmental Protection (MADEP), local officials, and the community. Until January 1994, when it was replaced by the Restoration Advisory Board (RAB), the TRC generally met quarterly to review and provide technical comments on schedules, work plans, work products, and proposed activities for the study areas (SAs) and AOCs at Devens RFTA. The RI, FS, ESDs, and Proposed Plan (PP) reports, and other related support documents have been submitted to the RAB for their review and comment.

The Army, as part of its commitment to involve the affected communities, forms a RAB when an installation closure involves transfer of property to the community. The Fort Devens RAB was formed in February 1994 to add members of the Citizen's Advisory Committee (CAC) to the TRC. The CAC had been established previously to address Massachusetts Environmental Policy Act/Environmental Assessment issues concerning the reuse of property at Devens RFTA. The RAB consists of representatives from the Army, USEPA Region I, MADEP, local governments and citizens of the local communities.

The Army has held regular and frequent informational meetings, performed presentations, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at Devens. Currently, the RAB meets every other month or more if needed. The RAB members provide advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public. In 2001, 2002, 2004 and 2005, the Army performed public site tours at sites where significant actions were occurring or were planned. In addition, on two occasions, the Army has sent out questionnaires to obtain feedback from citizens of the local communities.

At the March 10, 2005 RAB meeting, the USEPA announced the commencement of this Five-Year Review. On September 8, 2005, an update of the 5-Year Review, including information for each AOC was presented to the RAB by the USACE. Upon completion, another announcement will be made at a RAB meeting and formal notifications will be released. Copies of the applicable community participation information is included in Appendix K of the Five-Year Review.

2.0 BARNUM ROAD MAINTENANCE YARDS AOCs 44 & 52 FIVE-YEAR STATUTORY SITE REVIEW

2.1 Site Chronology

Table 2-1 Chronology of Site Events

Event	Date
Motor vehicle gasoline (MOGAS 20 gals) release at Cannibalization Yard (4 cy contaminated soil removed)	April 1985
Exploratory test pits for spill containment basin in the Table of Distribution and Allowances (TDA) Maintenance Yard; petroleum contaminated soil detected (0-12" depth)	July 1991
Contaminated soil removed from TDA Maintenance Yard during spill containment basin construction	December 1991
Waste oil UST removed at Cannibalization Yard (120 cy of contaminated soil removed)	May 1992 July 1992
Site Investigation (SI) completed	April 1993
Supplemental SI (SSI) completed, SAs designated as AOCs	June 1993
Feasibility Study (FS) issued	January 1994
Record of Decision (ROD) signature and Remedial Design (RD) 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 recommendation to discontinue annual groundwater sampling	October 1999
First Five-Year Review	September 2000
Round 3 Groundwater Sampling Report issued	April 2004
Draft Remedial Action Report issued	May 2004
Second Five-Year Review	September 2005

2.2 Background

The Barnum Road Maintenance Yards (Area of Concern [AOCs] 44 & 52) are former Army vehicle storage and maintenance yards located within the Devens Reserve Forces Training Area (RFTA). These sites were combined administratively under one Record of Decision (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 1/2 mile southwest of the Barnum Road Gate. The total area of the Barnum Road Maintenance Yards is approximately 8.8 acres (Figure 3 reprinted from the Draft Remedial Action Report, Mactec 2004 is presented in Appendix A). The Maintenance Yards are bordered to the north by Massachusetts Army National Guard 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, located south of the site, is used by the Army for vehicle maintenance activities. The Maintenance Yards are fenced, paved, and presently used for military vehicle parking.

Prior to base closure, AOC 44 was known as the Cannibalization Yard. It was an area where vehicles were stored before being dismantled for usable parts. AOC 52 was a maintenance yard where vehicles were stored while awaiting repairs. It was historically known as the Table of Distribution and Allowances (TDA) Maintenance Yard. Northwest of the Cannibalization Yard was a separately fenced vehicle storage yard known as the RTS (Regional Training Site) Yard. An area that was fenced-off southeast of the main portion of the TDA Maintenance Yard was known as the 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 & 52 and combined as one operable unit. They are referred to collectively in the ROD and this Five-Year Review as the Maintenance Yards, or the site.

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 1992 Site Investigation (SI) water level survey, inferred groundwater flow from the Maintenance Yards is northeast toward Grove Pond. The town of Ayer currently owns and operates two water supply wells within 150 feet of the south side of Grove Pond and approximately one-half mile from the yards. Currently there is no evidence that contamination found in the Maintenance Yards' soils is affecting groundwater quality.

The soils in the area of the Maintenance Yards are products of glacial meltwater deposition in lake and ice-contact environments during the final retreat of Pleistocene glaciers. The yards are located on a kame terrace. The deposits consist of stratified sands and gravelly sands possibly overlying till.

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 motor vehicle gasoline (MOGAS) and hydraulic fluid released near the center of the Cannibalization Yard in 1985 during the cannibalization process. Approximately 4 cubic yards (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. These tests pit revealed zones of petroleum-contaminated soil below the surface. In November and December 1991, the 100-foot 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 suspected 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 compounds (TPHC) concentrations ranging from non-detect to 7 parts per million by volume (ppmv).

A 1,000-gallon underground storage tank (UST) formerly used to store waste oil was removed from the Cannibalization Yard in May 1992. Laboratory analysis of soil samples detected TPHC concentrations of 17,600 ppmv and 9,780 ppmv. After over-excavation of the tank site in July 1992, residual soil TPHC concentrations ranged up to 2,740 ppmv at the limits of excavation. An estimated 120 cy of contaminated soil was removed from the waste oil storage tank area and shipped to an off-site facility.

In 1992, the Army initiated a Site Investigation (SI) for AOCs 44 & 52. The purpose of the SI was to verify the presence or absence of environmental contamination and to determine whether further investigation or remediation was warranted. The Final SI Report was issued April 1993. In June 1993, a Supplemental SI (SSI) was performed to fill specific data gaps. The SI and SSI met the requirements of a Remedial Investigation (RI) in defining the nature and extent of contamination at the Maintenance Yards. As a result of the SI and SSI, the Maintenance Yards SAs were designated as AOCs because of contamination detected in the unsaturated soils. A Feasibility Study (FS) was completed in 1994 to evaluate remedial action alternatives for cleanup of the Maintenance Yards soils. In March 1995, the ROD was signed.

2.3 Remedial Actions

A ROD was signed in March 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 & 52 (USAEC, 1995). Remedial action objectives (RAOs) for the selected cleanup remedy at AOCs 44 & 52 are discussed below.

- Minimize direct contact/ingestion and inhalation with surface soils at the Maintenance Yards, which are estimated to exceed the U.S. Environmental Protection Agency (USEPA) Superfund target range of one in 1.0×10^{-4} to one in 1.0×10^{-6} (excess cancer risks for carcinogens).
- Reduce off-site run-off of contaminants that might result in concentrations in excess of Ambient Surface Water Quality standards and background concentrations in sediments.
- Reduce or contain the source of contamination to minimize potential migration of contaminants of concern, which might result in groundwater concentrations in excess of the federal drinking water Maximum Contaminant Levels (MCLs).

2.3.1 Selected Remedy

The selected remedy at AOCs 44 & 52 addresses long-term worker exposure to contaminated surface soil, the principal known threat at the Maintenance Yards and two known release areas (a reported release of MOGAS and leakage from a former waste oil UST, herein referred to as the hot spot areas). The selected remedial alternative relies on cold mix asphalt batching soils to control site risks. The following are the major components of the selected remedy.

- Excavate surface soil (top two feet across the site).
- Excavate the two hot spot areas.
- Stockpile soils for sampling and analysis.
- Cold mix asphalt batch soils exceeding site cleanup levels of 7 ppmv (average) total carcinogenic polynuclear aromatic hydrocarbons (cPAHs) and 500 ppmv TPHC.
- Backfill excavations with uncontaminated stockpiled soil and then place the asphalt batched material.
- Apply a pavement-wearing course for a vehicle-parking surface.
- Expand the existing storm-water collection system.
- Perform groundwater monitoring.

- As a precautionary measure, institute the following Institutional Control (IC) deed restrictions;

    1) Prohibit residential development/use of the Maintenance Yards;
    2) Minimize the possibility of long term (working lifetime) exposure to subsurface soils; and
    3) Require management of soils resulting from construction related activities.

2.3.2 Remedy Components Specified by the ROD

The components listed above, are summarized below based on detailed description presented in the ROD. The remedial components were implemented and completed between 1995 and 1996. Groundwater monitoring was conducted between 1993 and 2003. Details of the implementation of these components are included in Section 2.3.3.

Excavate Surface Soils. The ROD specified that prior to commencement of the remedial design, predesign test pits would be excavated to better predict the typical soil characteristics (color, texture, and presence of pavement) and layers containing cPAHs that may be encountered when the top 2 feet of soil is removed during remediation. This preview enabled: planned optimization of soil excavation and handling activities during remedial action, improved estimates on the volume of soils that will require treatment and provided soil gradation data for the asphalt batching design.

It was proposed that the Maintenance Yards surface soils be excavated in 6-inch layers down to a 2-foot depth, and stockpiled and sampled in 100-cy batches. Soils were initially screened for visible and olfactory evidence of waste material or overtly contaminated soils. Soils observed to contain broken pieces of pavement were segregated as cPAH-contaminated soil in maximum 100-cy piles and kept in separate piles for analytical screening. Soils with fuel odor or evidence of petroleum contamination were also separated from soil with no evidence of contamination. All soil to a 2-foot depth was excavated, stockpiled and sampled regardless of physical evidence of contamination.

Excavate Hot Spot Areas. The ROD specified that trench explorations would first be performed to delineate hot spots near the boring 44B-93-10X area as the potential MOGAS spill area, 44B-92-06X and around the waste oil UST. Headspace and non-dispersive infrared spectroscopy (NDIR) screening was planned on sidewalls and/or bottom of trench (if staining was not evident). Hot spots were fully excavated to the approximate dimensions as determined by the trench screening and excavation continued until laboratory analysis revealed concentrations of less than 500 ppm TPHC. Any other hot spot areas observed during the excavation of the surface soils would also be excavated, segregated, stockpiled and sampled in a similar manner.

Stockpiling, Sampling and Analysis. The ROD specified that soils excavated from hot spot areas were to be placed on, and covered with a minimum 8-mil polyethylene tarp to prevent mixing of TPHC contaminated soils with clean soils. Sample collection and analysis was required (one sample for every 100 cy) to determine if soil could be reused at the site without treatment. The ROD specified that a field laboratory would analyze samples from hot spot stockpiled soils for TPHC and the following cPAHs.

- Benzo(a)anthracene.
- Benzo(b)fluoranthene.

- Benzo(k)fluoranthene.
- Benzo(a)pyrene.
- Chrysene.
- Dibenzo(a,h)anthracene.
- Indeno(1 ,2,3-cd)pyrene.

All analytical samples were screened through a No. 20 sieve at the laboratory to remove any pavement particles down to the size of medium sands prior to performing the analysis.

Asphalt Batch Soils Exceeding Site Cleanup Levels. The ROD specified that stockpiled soils with contaminants exceeding an average total cPAH concentration of 7 ppm and 500 ppm TPHC would be cold mix asphalt batched on site. Asphalt batching site soils would immobilize the contaminants exceeding cleanup levels present in the top two feet of soil, thus minimizing direct contact/ingestion of the contaminated soils.

Backfill Excavations. The ROD specified that excavations would be backfilled with "clean" stockpiled soil and the asphalt batches. Site soil were classified as "clean" if it met the cleanup criteria of 500 ppm for TPHC and the risk-based cleanup criteria of 7 ppm (average) for total cPAHs. This soil would be used to refill a portion of the excavated areas at the Maintenance Yards. Preferably, upon receipt of analytical results, the soil would be immediately backfilled into designated areas. The asphalt-batched material would then be spread and rolled to the thickness and contours to be detailed in the final design and would serve as the sub-base or base course for the paved parking lot.

Expand the Existing Stormwater Collection System. Construction of the paved parking lot at the Maintenance Yards would increase the amount of stormwater runoff during rain events. Therefore, the selected remedy included expansion of the existing stormwater collection system including installation of additional catch basins, additional stormwater piping, and oil and grease traps as required. Additionally, potential effects on wetlands at stormwater outfalls were to be investigated and, as needed, minimized by construction of detention basins and flow reducers.

Apply a Pavement Wearing Course. A pavement wearing course is a topcoat of pavement that is placed over a pavement base course to provide a smooth, durable surface in high traffic areas. A pavement wearing course placed over the batched material is not a required remedial component for selected remedy. However, the Army chose to add a pavement wearing course for a vehicle parking surface over the asphalt batched material as an ancillary component.

Perform Groundwater Monitoring. The objective of groundwater monitoring was to provide assurance to the public and the 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. Sampling and analysis of groundwater from existing wells at the Maintenance Yards should be performed yearly for a period of five years upon commencement of remedial activities, which occurred in 1995.

Institute Deed Restrictions. The ROD stipulated that, as a precautionary measure, institutional controls in the form of deed restrictions would be implemented to prevent potential circumstances, which may result in risk of harm to health, safety, public welfare or the environment. These restrictions included the following:

1) No residential development/use of the Maintenance Yards would be permitted. The quantitative risk evaluation and established cleanup level assume the property should remain zoned for commercial/industrial use.

2) Removal of the 2-foot cover or an asphaltic barrier from the Maintenance Yards will be prohibited to prevent surface soil exposure to existing subsurface soils (2-foot to 5-foot level). This deed restriction will be implemented as a precautionary measure to minimize the possibility of long-term (working lifetime) exposure to subsurface soils. This restriction did not apply to excavations undertaken in connection with construction of buildings or other structures, utilities, infrastructures or any other construction related purpose where the cover is penetrated and/or temporarily removed and protection from long-term exposure to subsurface soil is not jeopardized. To comply with this deed restriction, the 2-foot layer of cover material (which may consist of one or combination of "clean" site soil used as backfill, asphalt batched material, off-site soils/aggregate and bituminous pavement) should remain over the subsurface soil (existing 2- to 5-foot soil level) to minimize direct contact/ingestion to the present subsurface soils. The continuity of the paved surface need not be maintained providing the cover thickness of 2 feet is provided. As an alternative, a continuous and maintained paved surface, which would prevent exposure to subsurface soils, could be substituted for the 2-foot thick cover.

   This restriction would not apply to excavation and use that is within the scope of any authorized response action. The deed restriction may be nullified, as approved by the regulatory agencies, should there be future evidence showing that contaminant concentrations within the 2- to 5-foot soil zone are below site surface soil cleanup levels.

3) Excavation below 2 feet at the Maintenance Yards, subsequent to completion of the remedial action established in the ROD, would require:

   a) Development and implementation of a Health and Safety Plan for the work area; and
   b) Development and implementation of a Sampling and Analysis Plan for management of the excavated soils in accordance with the following:

   Where reuse of soil within the Maintenance Yards is intended, sampling and analysis of stockpiled soils excavated below 2 feet would follow criteria detailed in this ROD for hot spot area soils. Soils with contaminants exceeding the 500 ppm cleanup level for TPHC will be treated in a manner consistent with this ROD. Soils with contaminants below the established cleanup level may be returned to the excavation. Soil excavated from below 2 feet that would be replaced to less than 2 feet (as surface soil) must also be sampled, analyzed and, if required, treated for cPAH contaminants as detailed in the ROD.

   Where reuse of soil outside the Maintenance Yards is intended, sampling/analysis and action levels for stockpiled soils excavated below 2 feet will follow criteria governed by the regulations or policies in effect for the final disposal area.

If property transfer occurs in the future, institutional controls will be incorporated into the property deed or other instrument of property transfer. Until that time, the Installation Master Plan (R & K Engineering, 1999) would cover institutional control restrictions.

2.3.3 Remedy Implementation

Remedy implementation consisted of completion of a remedial design and the remedial action, performing groundwater monitoring, and enforcing institutional controls as general accordance with the criteria specified in the ROD. Remedial construction was completed by April 1996. The Remedial Action Completion Report was issued on June 1996 (Weston, 1996). The remedial components, specified in the ROD, are summarized below:

2.3.3.1 Design

The design was performed by ABB Environmental Services, Inc. (ABB-ES), presently MACTEC Engineering and Consulting, under contract with the U.S Army Corps of Engineers (USACE), and was documented through submission of several interim deliverables. Predesign field activities commenced July 1994 in anticipation that the ROD would be signed prior to completion of the remedial design. Predesign field activities consisted of excavating test pits, evaluating the existing stormwater system and performing a site topographic survey. Details of these investigation results were submitted in the Predesign Investigation Report (ABB-ES, 1994a) that was followed by the Conceptual Design (ABB-ES, 1994b) and are summarized above.

Following approval of the Conceptual Design, ABB-ES submitted an In-Progress Review Design Submission (65 percent) (ABB-ES, 1994c) in December 1994 followed by the Final Design (ABB-ES, 1995) in March 1995 for regulatory review. Portions of the specifications and drawings were revised and issued final in August 1995. Details of the design consisted of the construction components listed in the ROD.

2.3.3.2 Remedial Actions

The USACE contracted Roy F. Weston, Inc. to construct the selected remedy. Construction commenced on August 1995 and entailed excavating and sampling of over 30,000 cy of surface soils from the top 2 feet of the site to segregate and treat soils exceeding the cleanup level of 7 ppm for cPAH and 500 ppm for TPH. During the excavation, a total of three hot spots were excavated below the 2-foot surface soil depth to delineate and batch contaminated 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 backfilled soil. Four inches of bituminous pavement was place over this sub-base material to complete a pavement wearing course for Army vehicle parking.

In addition to the excavation and soil treatment, a drainage system was installed throughout the Maintenance Yards to collect surface stormwater from the newly 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 within 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; however, the leaching pit was not located during construction activities. Remedial construction was completed by April 1996.

Figure 3 (Area of Soil/Excavation, AOC 44 & 52) and Figure 4 (Monitoring Well Locations, AOC 44 & 52) from the Final Remedial Action Completion Report are included in Appendix A.

2.3.3.3 Groundwater Sampling

The objective of the groundwater monitoring required by the Record of Decision 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 (*Record of Decision, Barnum Road Maintenance Yards,* ABB-ES, March, 1995a). During the meeting it was suggested that the existing monitoring wells located in and around AOCs 44 and 52 might not be positioned to readily detect the full impact of the UST and spill contamination sources on groundwater. In response, 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 is located approximately 50 feet downgradient of the former tank area and G3M-93-11X is located approximately 50 feet 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 (VOCs), semi volatile organic compounds (SVOCs), TPH, and inorganics. Results from Round 1 (June 1993) showed no detectable concentrations of TPH (quantitation limit of 178 μg/L) 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 (2.6 μg/L in G3M-93-10X) were detected in the groundwater. Concentrations for these analytes were below state and federal drinking water MCLs and below MCP GW1 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. The fact that no significant contamination was detected supported the conclusion that surface soil contaminants at the Cannibalization Yard did not affect 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 Record of Decision did not require installation of additional monitoring wells.

The Sampling and Analysis Plan for long-term groundwater monitoring required by the Record of Decision was issued in April 1998 (Weston, 1998a) and 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 are 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 MNG-1, located on Massachusetts Army National Guard property north of the Maintenance Yards, could not be located during the sampling rounds and may have been destroyed or buried during new construction near the well location.

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 EPH, 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 a 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 Method 1 GW-1 Standards. Because two 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 Record of Decision requirement that sampling be performed "...for a period of five years upon commencement of remedial activities" (USEPA, 1999). MADEP questioned the recommendation to discontinue sampling, and the matter was discussed at a BCT meeting in April 2000. Meeting minutes indicate brief discussion with the outcome that discontinuance of sampling was left to the discretion of the Army. The decision for termination of 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. Results of the 2003 round yielded limited PAH detections; however, all detections were below Method 1 GW-1 Standards. This final round was completed more than five years after issuance of the Groundwater Sampling and Analysis Plan and more than eight years after the commencement of remedial activities. The requirements of both the Sampling and Analysis Plan and the Record of Decision for the duration of groundwater monitoring are thereby satisfied.

Analytical summary tables are provided in Appendix A of this report.

2.3.3.4 Institutional Controls

There are no current or future plans for transfer of AOC 44 and 52 from the RFTA at this time. If property transfer occurs in the future, institutional controls will be incorporated into the property deed or other instrument of property transfer. Until that time, the Installation Master Plan IMP (R&K Engineering, Inc., June 1999) will cover institutional control restrictions. The IMP identifies known environmental conditions, restrictions and required actions that are in place for AOC 44 and 52. The Army is currently updating the IMP, which will be finalized in spring 2006.

2.3.4 System Operations/Operation & Maintenance

Other than the standard operation and maintenance (O&M) requirements of the drainage system and oil/water separator, as detailed in Appendix Q of the Remedial Action Completion Report (Weston, 1996), there are no long term O&M needs to maintain the integrity of the remedial action. O&M of the drainage system, including responsibilities, will be described in the Draft Storm Water Management Plan to be updated by the Army in the spring of 2006. O&M costs were not available at the time of this five-year review.

2.4 Progress Since the Last Five Year Review

This is the second Five-Year site Review for AOCs 44 & 52. The first Five-Year Review (completed in September 2000) concluded that the remedies at AOCs 44 and 52 were protective of human health and the environment.

2.5 Five-Year Review Process

2.5.1 Document Review

The following documents were reviewed for this five-year review:

- Final Site Investigation prepared by ABB Environmental Services, Inc., April 1993.
- Record of Decision prepared by U.S. Army Environmental Center, March 8, 1995.
- First Five-Year Review prepared by Harding Lawson Associates, September 2000.
- 2003 Groundwater Monitoring Report prepared by U.S. Army Corps of Engineers, May 2004
- Draft Remedial Action Report prepared by Mactec Engineering and Consulting, Inc., May 2004

2.5.2 Data Review

The Round 3 groundwater data collected in December 2003 was reviewed for this Five-Year Review and compared to the Round 1 and 2 groundwater data collected in May 1998 and June 1999, respectively. The data was consistent with the Round 1 and 2 data. No contaminants of concern were detected above their respective MCP GW-1 standards.

Tables C-1, C-2, and C-3 reprinted from the 2003 Groundwater Monitoring Report are presented in Appendix A. These tables show analytical results for wells G3M-92-04x and G3M-92-05x for sampling performed in 1998, 1999, and 2003.

2.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOCs 44 & 52. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s.

AOC 44 and 52 are situated in the northeast corner of the former Main Post on Barnum Road, approximately 1/2 mile southwest of the Barnum Road Gate. The total area of the Barnum Road Maintenance Yards is approximately 8.8 acres. The Maintenance Yards are bordered to the north by Massachusetts Army National Guard 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, located south of the site, is used by the Army for vehicle maintenance activities. The Maintenance Yards are fenced, paved, and presently used for military vehicle parking.

Use of the yard remained consistent with the restrictions outlined in the ROD. The inspection did not reveal any signs of disturbed pavement or excavation within or near the maintenance yard. Based on a visual inspection, no evidence was observed that suggested that the storm water collection system was not operating properly. Protective casings and monitoring wells were intact and secure.

2.5.4 Interviews

The following individuals were interviewed as part of the five-year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit. Institutional controls are in effect for AOC 44 & 52 (as discussed in other sections of this report).

With the exception of monitoring well MNG-1, which was not located during the site inspection and may have been damaged or buried, personnel interviewed were not aware of outstanding problems or issues regarding implementation of the selected remedy or the site in general. Ellen Iorio stated that the Draft Remedial Action Report (USACE, 2005) is in the process of being finalized.

2.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 44 and 52.

In 1994, the Army presented the Proposed Plan (PP) for AOC 44 and 52. In accordance with the PP, the Army published public notices and held a public information meeting on June 15, 1994. The PP and FS were also made available for review at local libraries and a formal 30-day public comment period was conducted from May 25 through June 24, 1994.

Currently the Restoration Advisory Board (RAB) meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public.

2.6 Technical Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Remedial Action Performance: Remedial action and groundwater monitoring at AOCs 44 & 52 are complete and no longer being implemented at this site. The 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). 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.

Annual groundwater monitoring has been completed and a supplemental sampling round was performed in December 2003 by the USACE. The data indicate no exceedances of MCP Method 1 GW-1 standards. The Remedial Action Closure Report is being reviewed by Regulatory agencies at this time.

System Operations/Operation and Maintenance: Other than five-year site reviews and basic maintenance of the stormwater system, there is no current system O&M required or being performed.

Opportunities for Optimization: Remedial action activities have been completed at this site. Therefore, there are no proposed opportunities for optimization.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results were consistent with expectations. No infractions of the IC requirements were noted during the site inspection.

Implementation of Institutional Controls and Other Measures: The Maintenance Yards may be transferred from the RFTA to Mass Development if the property is no longer required for military purposes. Until the time of property transfer, the IMP will cover institutional control restrictions.

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

Changes in Standards and To Be Considered: As part of this Five-Year Review, Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed in 1995. See Section 2.6.2, ARARs.

Excavation activities and asphalt batching of contaminated soils at AOC 44 & 52 were completed by April 1996. The RAOs for soil specified in the ROD have been permanently achieved. There are no current ARARs for the soil contaminants at the Site. Because the remedy included excavation and asphalt batching of contaminated surface soils and minimizing contact with deeper soils, changes to soil TBCs do not affect the protectiveness of the implemented remedy.

Changes in Exposure Pathways: No changes in the site conditions that affect exposure pathways were identified as part of the Five-Year Review. The ROD identified unacceptable risks from the following exposure pathways: direct contact with and ingestion of contaminated surface soils by long-term site workers. Based on indications from analytical results of confirmatory soil samples collected from excavated areas, the excavation and removal of contaminated soil have eliminated the direct contact with and ingestion of contaminated soils exposure pathways. The planned industrial land use is not expected to change in the future. Current use complies with the ICs on residential land-use and excavation below 2 feet for AOC 44 & 52. No new contaminants, sources, or routes of exposure were identified.

Changes in Exposure Assumptions: The risk assessments supporting the ROD for AOC 44 & 52 used exposure assumptions consistent with standard practice at the time. Since that time, USEPA has updated some of the recommended dermal contact exposure assumptions. New guidance for evaluating dermal contact exposures was finalized in July 2004 (*Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*). Because the remedy includes excavation and asphalt batching of contaminated surface soils and minimizing contact with deeper soils, changes to the exposure parameters do not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: The toxicity of individual cPAHs is now better understood than it was at the time of the risk assessment, which supported the ROD. At that time, all cPAHs were evaluated using the toxicity values for the most toxic of the PAHs, benzo(a)pyrene. It is now standard practice to evaluate each cPAH using the benzo(a)pyrene cancer slope factor in conjunction with a relative potency factor. Thus, the original risk assessment likely overestimated risk from cPAHs. The ROD imposed institutional controls prohibiting contact with soils deeper than 2 feet below ground surface. Post excavation sampling of excavated soils indicates that the majority of contamination was limited to the top 6-12 inches of soil. For these reasons, the institutional controls placed on the site because of the risk assessment are sufficient to assume that risks to human health will be minimized.

Changes in Risk Assessment Methodologies: There have been several changes in risk assessment guidance since the risk assessment for AOC 44 & 52 was performed. As noted above, guidance now recommends the use of relative potency factors in evaluating risks from cPAHs. Guidance also now directs that the 95 percent upper confidence level of the mean be used as the reasonable maximum exposure point concentration rather than the maximum concentration. The methods for evaluating dermal contact exposures also have changed since the time of the risk assessment supporting the ROD for AOC 44 & 52, based on USEPA's *Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*, July 2004. The exposures associated with the human health and ecological risks discussed in the ROD have been eliminated by the excavation and asphalt batching of soils and the institutional controls. Therefore, while the methods for evaluating exposures have changed since the time of the risk assessment supporting the ROD for AOC 44 & 52, these risk assessment methodology changes do not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at AOC 44/52 during this review period.

2.6.1 Summary of Technical Assessment

Excavation activities and asphalt batching of contaminated soils at AOC 44 & 52 were completed by April 1996. The RAOs for soil specified in the ROD have been permanently achieved.

Annual groundwater monitoring has been completed; however, a supplemental sampling round was performed in December 2003 by the USACE and the data indicate no exceedences of MCP Method 1GW-1 standards. The Remedial Action Closure Report is being reviewed by Regulatory agencies at this time.

2.6.2 Applicable or Relevant and Appropriate Requirements Review

The ARARs presented in Table 19 of the ROD are reprinted and appended in Appendix A. These standards and regulations, current at the signing of the ROD and for the first five-year site review, have been reviewed for changes that could affect protectiveness.

Several regulations were updated since the ROD, and may only have been applicable had they been in effect during actual construction activities, but no longer apply given that remedial action is complete. These updated regulations include the following:

- Appendix A of 310 CMR 7.00 Massachusetts Air Pollution Regulations, updated in 2002 and revisions pertained to emission offsets and non-attainment review.
- 310 CMR 7.18 "Volatile and Halogenated Organic Compounds" was in effect May 1, 1998 and updated in 2002; applicable to facilities that emit volatile organic compounds (VOCs), but not to the completed remedy.
- 310 CMR 30.000 Hazardous Waste was in effect May 1, 1998 and was superseded on February 27, 2004.

In addition, a search was performed for any newly promulgated standards, which could affect protectiveness at the site. No new ARARs were identified that would affect the protectiveness of the remedy.

2.7 Issues

The remedial action is complete and annual groundwater monitoring has been completed.

2.8 Recommendations and Follow-up Actions

The remedial action is complete. Based on the noted conditions and finding of this review, the Army will be describing the O&M of the drainage system in the Draft Storm Water Management Plan, which will be updated in spring 2006. In addition, the Army is currently updating the IMP, which will be finalized in spring 2006.

2.9 Protectiveness Statement

The remedy at AOCs 44 & 52 is protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled.

Human health is protected at AOCs 44 & 52 because surface soils that were found to contain contaminants exceeding site cleanup levels were asphalt batched. The remedy effectively prevents direct human contact with these contaminants and minimizes the probability of contaminant migration.

Although ICs are specified in the ROD, noted changes in risk assessment methodology and updated analytical data would suggest that these ICs are more than sufficient at protecting human health and the environment.

2.10 Next Review

This is the second Five-Year Review that has been performed for AOC 44 & 52. The next review will be performed in 2010.

2.11 References

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VRA-100999 AANJ; prepared for U.S. Army Corps of Engineers, New England District, Concord, Massachusetts; October 1998.

R&K Engineering, Inc. 1999. "Real Property Master Plan, Long Range Component, for Devens Reserve Forces Training Area"; June 1999

U.S. Environmental Protection Agency (USEPA), 1999. "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents". USEPA 540-R-98-03 1, OSWER 9200.1 -23P July 1999.

U.S. Army Environmental Center (USAEC), 1995. "Record of Decision, Barnum Road Maintenance Yards, Fort Devens, Massachusetts"; March 1995.

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3.0 SHEPLEY'S HILL LANDFILL OPERABLE UNIT (AOCs 4, 5, AND 18) STATUTORY FIVE-YEAR SITE REVIEW

3.1 Site Chronology

Table 3-1 Chronology of Site Events

Event	Date
Ft. Devens placed on NPL	December 1989
Waste disposal at Shepley's Hill Landfill ends	July 1992
Landfill capping complete	May 1993
Remedial Investigation (RI) complete	1993
Supplemental RI complete	1993
Feasibility Study (FS) complete	February 1995
Record of Decision (ROD) signature	September 1995
Long Term Monitoring and Maintenance Plan complete	May 1996
Long term monitoring begins	November 1996
Final Capping Closure Report	1996
60% Extraction design complete	November 1997
First Shepley's Hill Landfill Five-year Review complete	August 1998
Second Five-Year Statutory Review	September 2000*
Supplemental Groundwater Investigation 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 the Comprehensive Site Assessment (CSA) and Corrective Action Alternatives Analysis (CAAA)	March 2005
RD/RA Work Plan Final 100% Submittal for the SHL Groundwater Extraction, Treatment and Discharge Contingency Remedy	May 2005
Final ESD	June 2005
Request for Proposal (RFP) for Cap Maintenance Contract Issued	June 2005
Start-up of Treatment System	August 2005
Performance Monitoring Plan for SHL Groundwater Extraction, Treatment and Discharge Contingency Remedy	August 2005
Third Five-Year Review	September 2005

* In 2000, 5-Year Reviews were required for all sites at the Former Fort Devens undergoing investigations or remediation.

3.2 Background

Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens (Figure 1-1). It is situated between the bedrock outcrop of Shepley's Hill on the west and Plow Shop Pond on the east. Nonacoicus Brook, which drains Plow Shop Pond, flows through a low-lying wooded area at the north end of the landfill. The southern end of the landfill borders the formerly occupied Defense Reutilization and Marketing Office (DRMO) yard, motor repair shops, and a warehouse. In addition, there was formerly an exposed bedrock knob southwest of the landfill, just north of Market Street and a second exposed bedrock knob further to the south, just north of the intersection of Antietam and Carey Streets.

As part of Devens redevelopment efforts, the southern bedrock knob and a portion of the northern knob were removed to facilitate building construction. In 2001, a 35,000 square foot building and associated paved areas were constructed in this area. An area east of the landfill and south of Plow Shop Pond is the site of a former railroad roundhouse which was investigated as Study Area 71. Shepley's Hill Landfill includes three Area of Concerns (AOCs): AOC 4, the sanitary incinerator; AOC 5, sanitary landfill No. 1; and AOC 18, the asbestos cell. AOCs 4, 5, and 18 are all located within the capped area at Shepley's Hill Landfill. The three AOCs are collectively referred to as Shepley's Hill Landfill.

Landfill operations at Shepley's Hill Landfill began at least as early as 1917, and stopped as of July 1, 1992. During its last few years of use, the landfill received about 6,500 tons per year of household refuse and construction debris, and operated using the modified trench method. A portion of the waste was buried below the water table.

In an effort to mitigate the potential for off-site contaminant migration, Fort Devens initiated the Fort Devens Sanitary Landfill Closure Plan in 1984 in accordance with Massachusetts regulations entitled "The Disposal of Solid Wastes by Sanitary Landfill" (310 CMR 19.00, April 21, 1971). The Massachusetts Department of Environmental Protection (MADEP) (then the Department of Environmental Quality Engineering) approved the plan in 1985. Closure plan approval was consistent with 310 CMR 19.00 and 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.
- Implementing a groundwater monitoring program based on sampling five existing monitoring wells every four months.

The capping was completed in four phases as shown in Figure 1-2 reprinted from the revised draft Shepley's Hill Landfill Supplemental Groundwater Investigation Report prepared by Harding, ESE (2003) included in Appendix B. In Phase I, 50 acres were capped in October 1986; in Phase II, 15 acres were capped in November 1987; and in Phase III, 9.2 acres were capped in March 1989. The Phase IV closure of the last 10 acres was accomplished in two steps: Phase IV-A was closed in 1991, and Phase IV-B was closed as of July 1, 1992, although the geomembrane cap was not installed over Phase IV-B until May 1993.

Because of the large area and shallow surface slope of the existing landfill, early phases of the landfill closure were completed with a 2 or 3 percent surface slope. Slopes were increased to 5 percent in Phase IV-B. Phases I through IV-A were capped with a 30-mil polyvinyl chloride (PVC) geomembrane overlain with a 12-inch drainage layer and 6-inch topsoil layer. At the request of MADEP, the Phase IV-B cap design was modified to include a 40-mil PVC geomembrane, a 6-inch drainage layer, and a 12-inch topsoil layer. A landfill-gas collection system consisting of 3-inch diameter gas-collection pipes placed in a minimum 6-inch thick gas-venting layer was installed beneath the PVC geomembrane in all closure phases. Gas vents were installed through the PVC geomembrane at 400-foot centers. A minimum 6-inch cushion/protection layer was maintained between the geomembrane and underlying waste. As requested by the U.S. Environmental Protection Agency (USEPA) and MADEP, four additional groundwater monitoring wells were installed in 1986, two in 1993 and three in 1996 to supplement the five wells in the original groundwater program. Fourteen wells, in total are sampled as part of the LTMP. The Army submitted a draft closure plan to MADEP on July 21, 1995, pursuant to 310 CMR 19.000, to document that Shepley's Hill Landfill was closed in accordance with plans and applicable MADEP requirements. The MADEP issued a Landfill Capping Compliance Letter approving the closure as of February 8, 1996, per the requirement of the 1995 ROD for the Landfill.

AOC 4, the sanitary landfill incinerator, was located in former Building 38 near the end of Cook Street and within the area included in Phase I of the sanitary landfill closure. The incinerator, constructed in 1941, burned household refuse, and operated until the late 1940s. Ash from the incinerator was buried in the landfill. The incinerator was demolished and buried in the landfill in September 1967. The building foundation was removed and buried on-site in 1976.

AOC 18, the asbestos cell, is located in the section of the landfill closed during Phase IV. Between March 1982 and November 1985, an estimated 6.6 tons of asbestos construction debris were placed in the section of the landfill closed during Phase IV-A. In 1990, a new asbestos cell was opened in the section closed during Phase IV-B, and was used until July 1992 for disposal of small volumes of asbestos-containing material.

The Army performed a Remedial Investigation (RI) (E&E, 1993) and supplemental RI (ABB-ES, 1993) at Shepley's Hill Landfill in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), between 1991 and 1993. The RI and RI Addendum reports identified potential human exposure to arsenic in groundwater as the primary risk at Shepley's Hill Landfill. The RI Addendum Report also identified potential ecological risks to aquatic and semi-aquatic receptors from exposure to Plow Shop Pond surface water and sediments.

A feasibility study (FS) was performed in 1995 to evaluate alternatives to reduce potential exposure risks associated with human exposure to Shepley's Hill Landfill Operable Unit groundwater, and in September 1995, a Record of Decision (ROD) was finalized (ABB-ES, 1995a; ABB-ES, 1995b). The Plow Shop Pond Operable Unit was established to evaluate actions to manage risk from exposure to Plow Shop Pond surface water and sediment. In 1995, the Army designated Plow Shop Pond as AOC 72.

A more complete description of the Shepley's Hill Landfill Operable Unit can be found in the RI Addendum report, (ABB-ES, 1993), and the FS report, (ABB-ES, 1995a).

3.3 Remedial Actions

Based on types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed in the FS to aid in the development and screening of alternatives (ABB-ES, 1995a). These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. The remedial objectives for the Shepley's Hill Landfill Operable Unit are:

- Protect potential residential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of Maximum Contaminant Levels (MCLs).

- Prevent contaminated groundwater from contributing to the contamination of Plow Shop Pond sediments in excess of human-health and ecological risk-based concentrations.

In addition, the ROD did not identify remedial objectives for surface soil, landfill gas, or leachate. The risk assessments did not identify potential risks from exposure to surface soil, and ambient air monitoring during the RI did not identify airborne contaminants. Leachate was not identified during either RI or supplemental RI activities. The Plow Shop Pond Operable Unit was established to evaluate additional actions that may be necessary to manage risks from exposure to Plow Shop Pond surface water and sediment because it was believed that capping the Landfill had eliminated discharge of leachate to Plow Shop Pond. The Army performed surface water and sediment chemical characterization as well as sediment toxicity characterization in Plow Shop Pond and Grove Pond from 1992 through 1995. Results of these studies were reported in the Remedial Investigation Addendum Report (ABB-ES, 1993) and in the Draft Plow Shop Pond and Grove Pond Sediment Evaluation (ABB-ES, 1995c).

To address groundwater contamination at Shepley's Hill Landfill, Alternative SHL-2 (Limited Action) was selected with Alternative SHL-9 (Groundwater Extraction and Discharge to the Ayer publicly owned treatment works [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. Groundwater cleanup levels were developed using appropriate USEPA guidance at the time the ROD and are listed in Table 3-2.

Table 3-2 Groundwater Cleanup Levels Established in ROD

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

Notes:

1) The Long Term Monitoring Program (SWET, 1996c) established arsenic, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane as trigger chemicals because of the carcinogenic risk associated with each of these compounds.

2) The current cleanup level for manganese was updated in the Long Term Monitoring and Maintenance Plan to 1,715 µg/L based on risk-based concentrations derived from the updated RfD value (4.7×10^{-2} milligrams/kilogram/day) and has been used as the remedial goal since 1996. Based on this RfD, a hazard quotient of 1 is associated with the concentration of 1,715 µg/L based on USEPA default exposure assumptions.

However, this RfD value does not account for other dietary intake of Manganese and will be revised based on the updated RfD value for water intake of (2.4 x 10^{-2} milligrams/kilogram/day) supported by USEPA.

The ROD indicated that the residual human health risk from residential exposure for groundwater, after attainment of cleanup levels, is estimated to be approximately $1x10^{-3}$ and $1x10^{-4}$ if modified to account for the uncertainty associated with exposure to arsenic. This uncertainty, relates to toxicological data that suggests the dose response curve for skin cancer may be sub- linear and, consequently, the cancer slope factor used to generate risk estimates may be overestimated.

3.3.1 Selected Remedy

Alternative SHL-2 contained components to maintain and potentially improve the effectiveness of the existing landfill cover system and to satisfy the Landfill Post-Closure Requirements of 310 CMR 19.142 to reduce potential future exposure to contaminated groundwater. Key components of this alternative included:

- Landfill closure in accordance with applicable requirements of 310 CMR 19.000.
- Survey of Shepley's Hill Landfill.
- Evaluation/improvement of stormwater diversion and drainage.
- Landfill cover maintenance.
- Landfill gas collection system maintenance.
- Long term groundwater monitoring.
- Long term landfill gas monitoring.
- Institutional controls.
- Educational programs.
- 60 percent design of a groundwater extraction system.
- Annual reporting to MADEP and USEPA.
- Five-year site reviews.

3.3.2 Remedy Components Specified by the ROD

The components listed above, are summarized below based on detailed descriptions presented in the ROD.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000. The ROD required closure of Shepley's Hill Landfill in accordance with Commonwealth of Massachusetts regulations at 310 CMR 19.000. These regulations contain requirements for the submittal to, and approval by, MADEP of plans and supporting materials to document that landfill closure occurs according to approved plans and applicable MADEP requirements.

Survey of Shepley's Hill Landfill. The ROD required an accurate topographic survey of the ground surface at Shepley's Hill Landfill.

Evaluation/Improvement of Stormwater Diversion and Drainage. The ROD required an evaluation of stormwater diversion and drainage systems at and adjacent to Shepley's Hill Landfill. The focus of the evaluation was to include the following items of concern:

- Landfill cap runoff patterns and drainage ditch flow capacities.

- Potential run-under along the western edge of the landfill, particularly where the existing geomembrane cap may not have a good seal with the underlying bedrock.
- The effectiveness of stormwater drainage systems upgradient of the landfill (i.e., at the transfer station, tire recycling station, DRMO yards, and along Market Street) in diverting run-off from potential infiltration areas upgradient of the landfill.

Landfill Cover Maintenance. The ROD required that a small area of ponded water in the northwestern section of the landfill be drained and regraded to minimize stress on the cover system and prevent future ponding and potential for leakage through the PVC geomembrane. The area was approximately 100 feet in diameter and was estimated to be about 1 foot deep. The water would be pumped out and the ponded area backfilled with common borrow to bring the area up to the desired grade. A new section of the PVC geomembrane would be installed on top of the fill and seamed to the existing geomembrane cap to provide low permeability surface in this area.

At the northern end of the landfill, erosion of cover soil in sections of the drainage swales had occurred in the past, exposing PVC geomembrane. That erosion was repaired, however it was noted that additional repair may be needed in the future.

Annual inspections were proposed to monitor the condition of the landfill cover, including monitoring wells, cover surface, and drainage swales to decide if maintenance would be needed. Landfill maintenance and mowing was scheduled to minimize potential adverse effects to the Grasshopper Sparrow, a state-listed species of special concern that may nest on the cover.

Landfill Gas Collection System Maintenance. The ROD required annual inspections to monitor the Shepley's Hill Landfill gas collection system and perform any necessary repairs.

Long Term Groundwater Monitoring. The ROD required development of a long term groundwater monitoring plan at Shepley's Hill Landfill to evaluate remedy performance and assess future environmental effects. The ROD called for semi-annual groundwater monitoring for a minimum of 30 years.

Long Term Landfill Gas Monitoring. The ROD required development of plans for monitoring landfill gas at landfill gas vents.

Institutional Controls. The ROD required implementation of institutional controls in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill during Fort Devens base-closure activities. The Fort Devens Preliminary Reuse Plan, Main and North Posts proposed that Army land bordering Plow Shop Pond be zoned for open space and rail-related uses. By pre-empting residential use, these controls helped limit human exposure. In addition, the Army would place deed restrictions on landfill area property to prohibit installation of drinking water wells. This, in combination with landfill capping and long term groundwater monitoring, would protect potential human receptors from risks resulting from exposure to contaminated groundwater. The ROD indicated that there were no current human receptors for groundwater exposure and that institutional controls (ICs) would be drafted, implemented, and enforced in cooperation with state and local governments as necessary.

Educational Programs. The ROD required conduct of periodic public meetings and presentations to increase public awareness. This would help keep the public informed of the site status, including both its general condition and remaining contaminant concentrations. This could be accomplished by holding public meetings every five years coincident with the five-year site reviews for Shepley's Hill Landfill. The presentation would summarize site activities and the results of monitoring programs.

60 Percent Design of a Groundwater Extraction System. The ROD required the Army to perform predesign hydrogeologic studies and prepare a 60 percent complete engineering design for groundwater extraction and discharge to the Town of Ayer POTW. The 60 percent complete engineering design was to be completed before the Shepley's Hill Landfill five-year review, scheduled for 1998.

Annual Reporting to MADEP and USEPA. The ROD required annual reports to MADEP and USEPA to describe site activities and summarize results of environmental monitoring. This reporting was stipulated to satisfy the requirements of 310 CMR 19.132 and 19.142.

Five-year Site Reviews. The ROD required the Army to perform five-year reviews to assess whether the implemented remedy is protective of human health and the environment and whether the implementation of additional remedial action is appropriate. The ROD stipulates that the five-year reviews for Alternative SHL-2 will evaluate the alternative's effectiveness at reducing potential human health risk from exposure to groundwater and preventing groundwater from contributing to Plow Shop Pond sediment contamination in excess of human health and ecological risk-based values. Five-year reviews were scheduled for 1998, 2003, and 2008, based on the elapsed time following supplemental RI sampling. However, five-year reviews were performed in 2000 for all sites at Devens, including Shepley's Hill Landfill, where remediation or investigations were occurring.

The ROD identified cleanup levels for 13 chemicals historically detected in monitoring wells at Shepley's Hill Landfill. Chemicals with MCLs (i.e., 1, 2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, arsenic, chromium, lead, and nickel) and manganese were identified as chemicals of concern, exceedances of which would justify implementation of contingency remedial action. The Long Term Monitoring Program (SWET, 1996c) established arsenic, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane as trigger chemicals because of the carcinogenic risk associated with each of these compounds.

Incremental reduction of risk rather than incremental reduction in concentration of individual contaminants was specified as a measure of progress toward attainment of cleanup levels to focus on the cleanup of arsenic, which was the primary contributor to risk. This approach prevents a situation in which failure to attain a concentration reduction goal for a minor contributor to risk (e.g., 1, 2-dichloroethane) overshadows the achievement of 50 percent or greater reduction in the concentration of arsenic.

The ROD stipulated the following specific criteria for evaluating the effectiveness of the selected remedial action (Alternative SHL-2) at Shepley's Hill Landfill. Based on the data collected to date, the required incremental reduction in risk was not achieved and the Army and regulatory agencies decided to implement the contingent element of the selected remedy (Alternative SHL-9, Groundwater Extraction and Discharge).

Group 1 Wells. For Group 1 wells where analyte concentrations have historically attained cleanup levels, Alternative SHL-2 will be considered effective if concentrations of individual chemicals within individual wells do not show statistically significant cleanup level exceedances. To determine statistical significance, the Army will apply methods consistent with the regulations at 40 CFR 264.97, 40 CFR 258.53, and 310 CMR 3 0.663.

Group 2 Wells. For Group 2 wells where chemical concentrations have exceeded cleanup levels in the past, Alternative SHL-2 will be considered effective if a 50 percent reduction in the increment of risk between cleanup levels and baseline concentrations for the contaminants of concern (COCs) within individual wells is achieved by January 1998, if an additional 25 percent (75 percent cumulative) is achieved by January 2003, and if cleanup levels are attained by January 2008.

The ROD indicated that a contingency remedy will be implemented if the above criteria are not met for any chemical for which cleanup levels were based on MCLs and for manganese. An MCL for manganese has not been established. The cleanup level for manganese was based on background concentrations because background concentrations exceeded the risk-based concentration derived from the available RfD value (5×10^{-3} milligrams/kilogram/day). The current cleanup level for manganese was updated in the Long Term Monitoring and Maintenance Plan to 1,715 µg/L based on risk-based concentrations derived from the updated RfD value (4.7×10^{-2} milligrams/kilogram/day). However, this value does not account for other dietary intake of Manganese based on the updated RfD value for water intake of (2.4×10^{-2} milligrams/kilogram/day) supported by USEPA. The 2005 Annual Report will utilize a revised cleanup level, based on the updated RfD value.

For aluminum and iron, additional remedial actions would not be needed if cleanup levels are not achieved because these were based on background concentrations since dose/response values were not available. For sodium, additional remedial actions would not be implemented if the cleanup level is not attained since the cleanup level for sodium was based on the health advisory for individuals on a reduced sodium diet.

The following table lists monitoring wells listed in the Long Term Monitoring and Maintenance Plan (SWET, 1996). The Long Term Monitoring and Maintenance Plan considered all these monitoring wells to be Group 2 wells.

Table 3-3 Long Term Monitoring and Maintenance Plan Monitoring Wells

SHL-3	SHL-11	SHM-93-22C
SHL-4	SHL-19	SHM-96-22B
SHL-5	SHL-20	SHM-96-05B
SHL-9	SHL-22	SHM-96-05C
SHL-10	SHM-93-10C	

3.3.3 Remedy Implementation

This subsection compares completed and ongoing activities at the Shepley's Hill Landfill Operable Unit with the requirements of the ROD.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000. The Army submitted a draft closure report for Shepley's Hill Landfill to MADEP in July 1995, and the MADEP issued a Landfill Capping Compliance Letter approving the closure as of February 8, 1996 with review comments and specific recommendations to address issues of concern. Following review of the MADEP comments, the Army submitted the final closure report in March 1996 pursuant to 310 CMR 19.000 (SWET, 1996b) and the Long Term Monitoring and Maintenance Plan in May 1996 (SWET, 1996c).

Survey of Shepley's Hill Landfill. The landfill surface was surveyed as part of post-closure activities (SWET, 1996a) and was resurveyed in 2002 to monitor subsidence.

Evaluation/Improvement of Stormwater Diversion and Drainage. As part of long term maintenance activities, the Army has performed routine maintenance on stormwater ditches at the landfill. Significant portions of drainage ditch have been regraded and seeded or lined with rip-rap stone to reduce erosion. Additional maintenance activities to the drainage swales are planned as part of cap maintenance activities scheduled for fall 2005.

Potential run-under along the western edge of the landfill was evaluated as part of the Shepley's Hill Landfill Supplemental Groundwater Investigation. Although test pits indicated that run under could occur, soils are sandy and the geomembrane cap did not fit the underlying bedrock surface tightly, the Shepley's Hill Landfill Supplemental Groundwater Report concluded that the effect of potential run under on groundwater elevation and direction of flow was small. There was not consensus with the Base Closure Team (BCT) regarding the impact of potential the run under this item will be re-evaluated in a Comprehensive Site Assessment/Corrective Action Alternatives Analysis (CSA/CAAA).

Significant changes to stormwater drainage have been made in the area south of Shepley's Hill Landfill as part of Mass Development Devens redevelopment activities. Reconfiguration of runoff and drainage patterns that divert storm runoff away from SHL to settling ponds that in turn discharge predominantly away from the area upgradient of the landfill.

Landfill Cover Maintenance. A Long Term Monitoring and Maintenance Plan was prepared for the Shepley's Hill Landfill Operable Unit in 1995 to outline proposed monitoring, maintenance, and reporting activities (SWET, 1996c). Since that time, the Army has performed maintenance on the landfill cap. These activities have been documented in annual reports (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000; USACE, 2001; USACE 2002; USACE, 2003; USACE, 2004; and USACE 2005) and have included the following activities as recommended in the annual reports and in the past Five Year Reviews:

- Performing annual inspections of the landfill surface.
- Draining a small area of ponded water in the northwestern section of the landfill to minimize stress on the cover system and regrading to prevent further ponding.
- Regrading and rip-rapping substantial portions of drainage ditches at the landfill.
- Filling animal burrows.
- Repairing roads.
- Mowing the landfill vegetative cover.

The 2004 Annual Report (USACE, 2005) is in the process of being finalized and has not been submitted to the MADEP and USEPA. The following recommendations were made in the 2004 Annual report and remain outstanding:

- The number of wells where semi-annual water levels are collected be increased fro one year, so that updated water level contours for the landfill can be determined, confirming or re-evaluating the historically found contours.

- Repair and regrade around the catch basins on the south side of the landfill.
- Repair the hasps on the casings of groundwater monitoring wells SHL-4 and SHL-9.

All wells sampled in 2004 continue to be part of the sampling plan for 2005 to evaluate the effects of the new groundwater remediation system.

Landfill Gas Collection System Maintenance. The above ground portion of the landfill-gas collection system is inspected annually as part of landfill monitoring activities. During the most recent inspection in 2004 by the USACE, the gas vents are reported in good condition, and no repairs have been required.

Long Term Groundwater Monitoring. The Long Term Monitoring and Maintenance Plan (SWET, 1996c) outlined the groundwater monitoring program at the landfill. Groundwater monitoring is performed semi-annually at 14 monitoring wells, including SHM-96-05B, SHM-96-05C, and SHM-96-22B which were installed after signature of the ROD. Analytical data have been summarized and submitted to USEPA and MADEP annually (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000; USACE, 2001; USACE 2002; USACE, 2003; USACE, 2004; and USACE 2005). The 2004 Annual Report (USACE 2005) is being finalized and has not been submitted to the MADEP and USEPA. Long term groundwater monitoring data reprinted from the Annual Reports prepared by the USACE are appended in Appendix B.

Long-Term Landfill Gas Monitoring. As part of scheduled monitoring activities, landfill gas samples have been collected annually from each of 18 gas vents at the landfill and analyzed in the field by direct-reading instruments. Monitored parameters are listed below.

- Total VOCs (parts per million [ppm]).
- Percent oxygen.
- Hydrogen sulfide (ppm).
- Percent of lower explosive limit.
- Carbon monoxide (ppm).
- Percent carbon dioxide.
- Percent methane.

Landfill gas monitoring results have been submitted annually by the Army to USEPA and MADEP (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000; USACE, 2001; USACE 2002; USACE, 2003; USACE, 2004; and USACE 2005). Appendix B contains landfill gas monitoring data summary tables reprinted from the Annual Reports prepared by the USACE .

The purpose of the landfill gas monitoring program was to establish long term trends with regard to landfill gas production and venting in a safe manner. The Draft 2004 Annual Report (USACE, July 2005) showed that no VOCs were detected above 0.0 ppm based on field screening. The oxygen levels ranged from 0% to 21.3%. No gas vent probes tested positive for hydrogen sulfide. Lower explosive limits ranged from 0% to over 100% in several vents and the percentage of oxygen was greater than 5% at several of these vents. When this condition is observed (LEL nearing 100% and high oxygen readings indicating a potentially explosive condition) notification to the MADEP is required. Carbon monoxide registered from 0 ppm to 13 ppm. Carbon dioxide ranged from 0 ppm to 27.6 ppm. Methane ranged from 0 ppm to 37.5 ppm. These readings were within the parameters of a mature landfill (USACE, 2004). The available data suggested that no significant off-site migration was occurring, however slight increases in LEL, carbon monoxide, carbon dioxide and methane readings have been observed in several monitoring points.

Significant increases or decreases of remaining parameters have not been observed and were consistent with the data collected since 2001.

In response to recommendations, and concerns for landfill gas migration to nearby residences in the 2000 Five-Year Review, four (4) gas probes were installed in 2001 in the vicinity of Scully Road along the northern end of the landfill. Additional gas monitoring probes will be installed along the southern boundary of the landfill, part of the Cap Maintenance Contract currently planned for the fall of 2005. Figure C-1 included in Appendix B depicts location of monitoring wells, gas vents and gas probes.

Institutional Controls. The ROD proposed ICs in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill. No property has been released, and therefore administrative ICs have not been fully implemented.

Although not under the Army's control, the Town of Ayer Board of Health regulates the construction of private wells as a source of potable water for drinking, culinary and domestic purposes. Requirements include, driller registration with MADEP, minimum setbacks from a landfill or hazardous waste spill site, approval from the MADEP and local zoning ordinances. Other measures currently in place at the landfill consist of the fencing, gates and the landfill cap itself which prevents exposure. Based on the current condition of these other measures (as discussed in other sections of this report), repair to the fencing, gates and cap are planned as part of a Cap Maintenance Contract to be awarded in the fall of 2005.

Educational Programs. No public meetings or presentations have been held solely for Shepley's Hill Landfill since the public meeting on the Proposed Plan. However, Shepley's Hill Landfill is often discussed at the Restoration Advisory Board meetings, currently held on a bi-monthly schedule. Therefore, interested members of the community are kept informed of activities at the landfill. Please note that the Army, in conjunction with the Ayer Board of Health, held a Shepley's Hill Landfill community forum on January 5, 2002.

60 Percent Design of a Groundwater Extraction System. The Army issued a 60 percent complete engineering design for groundwater extraction and discharge to the Town of Ayer POTW in 1997 (USACE, 1997). A Draft Final 60% and Draft 100% design was developed in September 2004. The Army developed a Final 100% Remedial Design and Remedial Action Work Plan (CH2MHill, 2005) that was finalized in May 2005, with the objective to implement the contingent remedy (SHL-9 Groundwater Extraction with the Town of Ayer POTW discharge) identified in the 1995 ROD. However, it was determined that the Ayer POTW infrastructure capacity was inadequate to receive and convey this discharge.

The current objective of the project is groundwater pump, treatment, and discharge to the Devens POTW using a permanent treatment system. An explanation of significant differences (ESD) specifying the changes for the discharge to the Devens POTW from the ROD was finalized in June 2005 and approved by USEPA in July 2005. The goal of implementing the contingency remedy is to maintain groundwater quality below cleanup levels at Group I wells, and to attain cleanup levels at Group II wells.

Annual Reporting to MADEP and USEPA. Annual reports which include a description of site activities and a summary of results of environmental monitoring have been submitted annually to MADEP and USEPA (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000; USACE 2001; USACE 2002; USACE 2003; USACE, 2004; and USACE 2005). The 2004 Annual Report (USACE, 2005) has not been submitted to the USEPA and MADEP. This reporting satisfies the requirements of 310 CMR 19.132 and 19.142. In addition, the Army submits semi-annual groundwater analytical reports that summarize analytical data.

Five-year Site Reviews. In accordance with the schedule set forth in the ROD, the Army completed the first Five-Year review for Shepley's Hill Landfill in 1998 (SWET, 1998). In 2000, a Five-Year Review was performed for all Devens sites, therefore the Five-Year Review schedule was revised accordingly. The 2000 Five-Year review (HLA, 2000) concluded that the remedy at Shepley's Hill Landfill Operable Unit was protective to human health and the environment. However, little or no reduction in arsenic concentrations occurred in monitoring wells SHL-11, SHL-20, and SHM-96-05B. An increase in arsenic concentrations was noted in SHL-11, SHM-96-05B and SHM-96-22B. The data collected up to that point suggested that the 2003 incremental goals would be difficult to meet in monitoring wells SHL-11, SHL-20, SHM-96-05B and SHM-96-22B. In 2003 this was realized and is discussed in the 2003 Draft Annual Summary Report (USACE, 2003).

The 2000 Five-Year review recommended that:

- annual landfill inspections continue.
- landfill gas and semi-annual groundwater sampling should continue with annual reporting.
- review of the long term sampling program should be performed to eliminate monitoring parameters.
- landfill maintenance should continue as presented in the Long Term Monitoring and Maintenance Plan.
- Additional assessment and evaluation of groundwater and landfill gasses be conducted, and
- the contingency remedy (groundwater extraction and discharge) be re-evaluated.

3.3.4 Shepley's Hill Landfill Draft Supplemental Groundwater Investigation

A draft version of this report (Harding ESE, 2000) was issued in July 2000 to present supplemental data available at that time. Given that additional investigations were needed to address regulatory review comments on the draft report, this additional data was included in a revised draft report in February 2002. As of April 2003, no additional comments were provided and the revised draft report was issued. The purpose of the Draft Supplemental Groundwater Investigation was to present and interpret data collected during supplemental investigations in 1999, 2000, and 2001 to assess the effect of Shepley's Hill Landfill on groundwater. The investigation focused on arsenic and was intended as a tool to guide decision-making concerning further investigative activities at Shepley's Hill Landfill. It was neither a baseline risk assessment nor an assessment of the protectiveness of the selected remedial action at Shepley's Hill Landfill. The Shepley's Hill Landfill Revised Draft Supplemental Groundwater Report presented and discussed the results of those studies (Harding ESE, 2003).

The Army performed the following activities to further investigate the interaction of groundwater and Shepley's Hill Landfill:

- Assessing the effects of precipitation runoff on groundwater levels within the landfill.

- Collecting hydrogeologic data to assess groundwater flow north of Shepley's Hill Landfill.

- Collecting analytical data to characterize contaminant concentrations moving away from the landfill and physical-chemical factors affecting contaminant migration.
- Refining the Shepley's Hill Landfill groundwater model to further assess groundwater flow and potential contaminant transport north of the landfill.
- Re-evaluating potential human-health risks in light of new analytical data.
- Preliminary evaluation of various remedial alternatives, utilizing the groundwater flow model.

The Army also contacted several local and regional public health agencies in an effort to confirm the availability and use of a public water supply in the area downgradient of Shepley's Hill Landfill and to find out whether and to what extent private wells may exist in the area north of the landfill to supplement the public water supply. There were no public records of private wells downgradient of the landfill, but the presence of undocumented wells was possible.

The supplemental data indicated a well-defined plume with elevated arsenic concentrations migrating southeast to northwest away from Shepley's Hill Landfill and towards the wetland north of West Main Street in Ayer. In addition to high arsenic concentrations, groundwater in the center of the plume had a very low redox potential, high concentrations of dissolved (i.e., reduced) iron and manganese, very low to no dissolved oxygen, and a chemical oxygen demand of 30 to 40 milligrams per liter (mg/L). These conditions were conducive to the continued migration of the arsenic toward the wetland. The preferred migration pathway was in sandy overburden materials above deeper till and bedrock.

The groundwater flow model suggested that most of the groundwater associated with Shepley's Hill Landfill flows north, discharging mainly to a section of Nonacoicus Brook in the wetland north of West Main Street. The pathway indicated by the model corresponds to distributions of contaminants seen in monitoring locations along Molumco Road. The Army collected surface water samples to confirm the location of groundwater discharge to the wetland.

Based on available data there is no known current use of, or exposure to, groundwater migrating away from Shepley's Hill Landfill, and no current human health risk. However, to assess the potential for adverse effects if groundwater were hypothetically to be used, the Army performed a limited risk analysis to evaluate potential risks to hypothetical residential users. Adult residential use of groundwater with arsenic at the concentrations found at Molumco Road, if it were to occur, would result in potential cancer risks of 6E-03 and non-cancer risks corresponding to a Hazard Index (HI) of 36. For a child resident, the corresponding cancer risk is 4E-03, and the HI is 110. The total resident cancer risk (child plus adult) is 1E-02. These risk levels exceed the USEPA target cancer risk range of 1E-06 to 1E-04 and target HI of 1.

High concentrations of arsenic in groundwater within the footprint of the landfill and at its downgradient edge suggest that arsenic concentrations in groundwater moving away from the landfill may become higher than present concentrations. It is likely that the landfill will continue to cause reducing conditions for 100 years or more if the capping system is not re-engineered. During that period arsenic concentrations within the landfill footprint are expected to continue to exceed drinking water MCLs. It should be noted that background groundwater concentration of arsenic at Shepley's Hill Landfill and in its vicinity may exceed the MCL of 10 μg/L (E&E, 1993).

An ecological risk assessment to evaluate potential ecological risks from exposure to surface water and sediments in the Nonacoicus Brook wetland north of West Main Street was performed to determine whether sediment and surface water levels of arsenic, iron, and manganese were adversely affecting the benthic macro invertebrate community in Nonacoicus Brook (Normandeau Associates, 2001). Benthic habitat quality at all sampling stations were comparable and, in general, habitat quality was considered good which suggested that there is no significant risk of harm to benthic macro invertebrates from exposure to site related contaminants in Nonacoicus Brook.

A Comprehensive Site Assessment and Corrective Action Alternatives Assessment will be conducted to determine what final corrective action is necessary to further protect human health and the environment at Shepley's Hill Landfill Operable Unit. The Army intends to implement the final corrective action within the requirements of the FFA.

3.3.5 Systems Operation/Operations and Maintenance

Operation and maintenance (O&M) is being performed in accordance with the Long Term Monitoring and Maintenance Plan (SWET, 1996c). Yearly O&M costs for implementation of the remedy are not readily available for review.

<u>3.4 Progress Since the Last Five Year Review</u>

The protectiveness statement in the second Five-Year review (HLA, 2000) stated that the remedy at the Shepley's Hill Landfill Operable Unit was protective of human health and the environment. There were no known users of groundwater along the modeled downgradient path of the groundwater leaving the landfill, although the presence of undocumented wells was possible. Further, the remedy directs groundwater flow away from Plow Shop Pond. A health and safety plan (HASP) and investigation derived waste (IDW) handling procedures were in place in 2000 and were deemed sufficient to control risk to on-site workers and the public, and were properly implemented during groundwater sampling. Human health was deemed to be not at risk at the Shepley's Hill Landfill Operable Unit because groundwater was not used for potable use nor proposed for potable use.

The second Five-Year site review recommended that the list of parameters monitored as part of the long-term sampling program should be reviewed with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry (cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, biological oxygen demand [BOD_5], and cyanide). Analysis of total organic carbon (TOC) in lieu of BOD_5, would provide insight on the concentration of organic material in groundwater, which is not currently available. None of the parameters originally monitored have been removed from the long-term sampling program. TOC analysis was added to the program in 2001.

A second recommendation of the second Five-Year review was that the Army assess whether subsurface migration of landfill gas is occurring due to high landfill gas measurements during routine sampling. Annual Reports have stated that additional landfill gas monitoring probes should be installed along the commercial property at the south side of the landfill. The installation of these wells is included in the Cap Maintenance Contract to be issued in late summer of 2005.

A third recommendation of the second Five-Year review was that the contingency remedy of groundwater extraction with subsequent discharge to the Town of Ayer POTW be re-evaluated by the Army. The Army has developed a Final 100% Remedial Design and Remedial Action Work Plan, with the objective to implement the contingent remedy (SHL-9 Groundwater Extraction with the Town Ayer POTW discharge) identified in the 1995 ROD. However, the Ayer POTW was inadequate to receive the discharge, therefore, and an onsite location or the Devens POTW will be the discharge location. The current objective of the project is groundwater pump, treatment, and discharge to the Devens POTW using a pretreatment system. An ESD specifying the changes from the ROD was finalized in June 2005. As a result of the contingency remedy implementation, a Performance Monitoring Plan (CH2M Hill, 2005) was developed which presents the planned monitoring and sampling activities, which will be conducted to assess the effects of extracting groundwater on the aquifer. Monitoring to be performed to evaluate system performance and effects on the aquifer include:

- Step and Extraction Testing
- Hydraulic Monitoring
- Geochemical Sentinel Monitoring (Field Parameters)
- Geochemical Sentinel Monitoring (Laboratory Analytical)
- Influent/Effluent Monitoring

System sampling shall be performed at the sample locations/frequencies for selected analytes in accordance with the discharge permit requirements established with Mass Development (July, 2003).

3.5 Five –Year Review Process

3.5.1 Document Review

The following documents were reviewed for this Five-Year review:

- Record of Decision prepared by ABB Environmental Services, Inc., September 1995.
- 2000 Annual Report, Long-Term Monitoring and Maintenance prepared by the U.S. Army Corps of Engineers, May 2001.
- Semi-Annual Groundwater Analytical report prepared by the U.S. Army Corps of Engineers, spring 2001.
- Benthic Community Survey of Nonacoicus Brook prepared by Normandeau Associates, Inc., November 2001.
- 2001 Annual Report, Long-Term Monitoring and Maintenance prepared by the U.S. Army Corps of Engineers, April 2002.
- Semi-Annual Groundwater Analytical report prepared by the U.S. Army Corps of Engineers, spring 2002.
- Revised Draft Supplemental Groundwater Investigation, Volume I and II prepared by Harding-ESE, February 2002.
- 2002 Annual Report, Long-Term Monitoring and Maintenance prepared by the U.S. Army Corps of Engineers, March 2003.
- Draft 2003 Annual Report, Long-Term Monitoring and Maintenance prepared by the U.S. Army Corps of Engineers, June 2004.

- Draft 2004 Annual Report, Long -Term Monitoring and Maintenance prepared by the U.S. Army Corps of Engineers, July 2005.
- Revised Draft Supplemental Groundwater Investigation prepared by Harding-ESE, May 2003.
- Project Management Plan Extraction, Discharge, and Treatment System prepared by CH2MHill, October 2003.
- Groundwater Extraction, Treatment, and Discharge Contingency Remedy prepared by CH2MHill, April 2005.
- Remedial Design & Remedial Action Work Plan Final 100% submittal Groundwater Extraction, Treatment, and Discharge Contingency remedy prepared by CH2MHill, May 2005.
- Various applicable BCT meeting minutes.

3.5.2 Data Review

Based on available data there was no current use of, or exposure to, groundwater migrating away from Shepley's Hill Landfill, and no current human-health risk. Analytical data from 2000 through 2004 summarized in the Long Term Monitoring and Maintenance Annual Reports prepared by the USACE was reviewed for Shepley's Hill Landfill. Refer to section 3.6 of this report for further discussion of the data reviewed. Analytical results, depicting historical results, and reprinted from the Annual Reports are included in Appendix B.

A summary of the data from the Draft 2004 Annual Report is presented in the following table:

Table 3-4 Summary of Arsenic Results

Landfill Compliance Point Monitoring Well ID	Arsenic (µg/L)									
	May-00	Nov.-00	May-01	Oct.-01	May-02	Oct.-02	May-03	Nov.-03	May-04	Nov.-04
SHL-3	<2.5	17.4	<4.1	<1.5	2.6B	<3.2	<4.7	<4.1	2.6U	5.8U
SHL-4	11B	91.5	**50.6**	**88.0**	47.8B	56.1	26.6	13.4	27.2	19.5
SHL-5	<2.5	13.8	13.6	14.8	11.9B	<3.2	73	4.7	7.4B	6.8B
SHM-96-5B	**5,110**	**2,500**	**3,800**	**1,850**	**3,800**	**1,970**	**3,820**	**3,380**	**3,950**	**2,110**
SHM-96-5C	**52.2**	40.3	**80.5**	41.1	50.4B	41.3	**55.1**	48.3	47.1	49.5
SHL-9	15.0	31.4	15.1	28.1	**144**	29.0	13.4	30.6	19.8	32.2
SHL-10	<2.5	<4.2	<4.1	<1.5	4.0B	<3.2	<4.7	<4.1	2.6U	5.8U
SHM-93-10C	5.8J	8.8	6.9	10.1	11.0B	7.1	98	<5.2	7.2B	10.6
SHL-11	**404**	**52.3**	**487**	**573**	**469**	**648**	**49B**	**638**	**502**	**617**
SHL-19	41.4	**154**	**129**	**183**	**68.9**	**164**	36.1	**83.6**	**75.0**	**121**
SHL-20	**216**	**172**	**166**	**165**	**154**	**175**	**197**	**194**	**136**	**156**
SHL-22	14.6	45.0	47.6	44.2	55.9B	**77.1**	**101**	**76.4**	**88.1**	**65.4**
SHM-96-22B	**1,360**	**1,180**	**1,540**	**1,570**	**2,040**	**159**	**2,070**	**2,500**	**1,690**	**2,360**
SHM-93-22C	34.4	47.6	19.7	31.8	30.5B	30.1	21.0	29.8	27.8	34.9

Molumco Road Monitoring Well ID	Arsenic (µg/L)									
	May-00	Nov.-00	May-01	Oct.-01	May-02	Oct.-02	May-03	Nov.-03	May-04	
SHM-99-31A	8.1J	21.3	14.2	9.6	16.6B	11.6	NS	12.3	NS	
SHM-99-31B	44.3	**65.5**	**57.9**	**66.8**	**75.1**	**71.1**	**69.6**	**80.1**	**65.0**	
SHM-99-31C	**332**	**318**	**321**	**317**	**345**	**332**	**347**	**312**	**292**	
SHM-99-32X	**188**	**198**	**181**	**187**	**176**	NS	NS	NS	NS	

Notes:

J: estimated value.

B: value within five times of the greater amount detected in the equipment or preparation blank samples.

NS: not sampled.

*: Molumco Road monitoring wells are not compliance point wells, data is provided for comparison purposes.

Bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 µg/L).

U = Analyte or compound was analyzed but not detected at a concentration above the reporting limit.

Review of the Long Term Maintenance and Monitoring Annual Reports for Shepley's Hill Landfill indicated that other chemicals that are not designated as trigger chemicals were detected at concentrations above cleanup levels. These include iron and sodium.

3.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at the Shepley's Hill Landfill which includes three AOCs: AOC 4, the sanitary incinerator; AOC 5, sanitary landfill No. 1; and AOC 18, the asbestos cell. Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens (Figure 1-1). It is situated between the bedrock outcrop of Shepley's Hill on the west and Plow Shop Pond on the east. Nonacoicus Brook, which drains Plow Shop Pond, flows through a low-lying wooded area at the north end of the landfill. The southern end of the landfill borders the formerly occupied Defense Reutilization and Marketing Office (DRMO) AOC 32 yard, motor repair shops, and a warehouse. An area east of the landfill and south of Plow Shop Pond is the site of a former railroad roundhouse which was investigated as Study Area 71. The pump and treat facility, which is not operational at the current time, is located on the northern end of the landfill. A berm runs along the top of the landfill, from the south to the north, which contains utilities for the treatment facility.

Conditions during the inspection were favorable with no precipitation and temperatures in the 50s. It should be noted that the Army performs detailed annual inspections of the landfill as part of the Long Term Monitoring and Maintenance Plan. The results of the inspections along with recommendations for follow-up maintenance action and documentation of maintenance activities performed during the previous year are reported to USEPA and MADEP.

Operation and maintenance of the landfill remained consistent with the specifications and restrictions outlined in the ROD. The inspection did not reveal signs of disturbance on or near the landfill cap which is covered with grass. Vehicular access to the landfill was controlled by a gate at the former DRMO yard at the southwestern corner of the landfill. The gate was closed at the time of the inspection. Several restriction deficiencies were noted during the site visit including in the vicinity of the main gate, one area on the southern portion of the landfill and two areas along the western side of the landfill. It is the intention of the USACE to install additional fencing and vehicle swing gates as part of the Landfill Cap Maintenance Contract to be awarded late summer or early fall of 2005.

There was stormwater pooling throughout the western and northern side of the landfill. Significant growth of brush, small trees and wetland species were noted in the southern and western drainage swales. Standing water was noted in the southern drainage swale. Areas of poor drainage and ponding will be addressed as part of the Landfill Cap Maintenance Contract to be awarded late summer or early fall of 2005. Mr. Salvadore indicated that the site visit to the Landfill was cursory and did not include a detailed survey of the site but dark red staining was noted in the western swale.

3.5.4 Interviews

The following individuals were interviewed as part of the Five-Year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Devens Reserve Forces Training Area (RFTA)
- Mr. Peter Kaselis, Devens RFTA
- Mr. Robert Simeone, Devens RFTA

Ms. Iorio, Mr. Salvador and Mr. Tada were interviewed on April 21, 2005 while performing the site visit.

Ms. Iorio indicated that a CSA and CAAA are currently being planned for the fall of 2005. The CSA and CAAA will be conducted in accordance with the March 25, 2005 Performance Work Statement (PWS), prepared by the Army. The general goals of the Army and other project stakeholders described in the PWS included:

1) Evaluation of the plume to determine whether the plume is impacting the wetlands and the potential magnitude of that impact, if any.
2) Evaluation to determine if there is any impact to the McPherson water supply well and the magnitude of such impact, if any.
3) Evaluating landfill cap integrity and effectiveness at minimizing surface/groundwater intrusion and leachate generation.
4) Assessing Red Cove as an area of historic and possibly current leachate discharge.
5) Assessing landfill gas issues and the non-vegetated cap areas along the southeast portion of the Landfill.
6) Completion and closure of all CERCLA related investigations/reporting for Shepley's Hill Landfill.

Ms. Iorio also indicated that the USACE is intending to award a Landfill Cap Maintenance Contract to correct the drainage deficiencies noted at the landfill, the limited access restrictions to the landfill and to monitor gas migration to the south of the landfill in the vicinity of the commercial development area. This work is planned for fall of 2005.

Mr. Simeone indicated that ICs are included in the Lease In Furtherance of Conveyance (LIFOC) currently in affect for the Shepley's Hill Landfill. The LIFOC agreement identifies general restrictions and required actions that are in place to protect the remedy for Shepley's Hill Landfill. Administrative ICs would be developed and detailed in the FOST and included with the Deed prior to transfer of the land parcels associated with the Shepley's Hill landfill property.

Mr. Kaselis indicated that the 35,000 square foot Webvan warehouse building, located to the south of the landfill, was constructed circa 2001. Roof drains from this building and runoff from paved areas were diverted into infiltration basins to the west of the building (and south of the landfill). In addition, Mr. Kaselis indicated that the detention basins, located adjacent to the southern limit of the landfill were constructed with a clay liner bottom and are considered to be low permeability basins. Overflow from these basins is directed to Plow Shop Pond via a rip-rap lined swale.

3.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at Shepley's Hill Landfill.

The Army presented the Proposed Plan for Shepley's at the May 4, 1995, Restoration Advisory Board (RAB) Meeting. In May 1995, the Army, published public notices announcing the proposed plan and held a public information meeting on June 30, 1995. The feasibility study was also made available for review at local libraries and a formal 30-day public comment period was conducted from June 1 through June 30, 1995.

Currently the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public.

The contingency remedy design was provided to the People of Ayer Concerned about the Environment (PACE) consultant for technical review and meetings were held with the Town Administrator and Engineer regarding sewer connection. On October 30, 2003 and on August 12, 2004, CH2MHill presented the Shepley's Hill Landfill Extraction, Treatment, and Discharge System to the RAB. In conjunction with the August 12, 2004 presentation, a site tour of the Shepley's Hill Landfill was also performed. A copy of the August 12, 2004 presentation is included in Appendix B.

The ESD was provided for public review in the spring 2005 and comments were received. The Final ESD dated June 2005 was signed by USEPA in July 2005.

3.6 Technical Assessment

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

Remedial Action Performance: The first Five-Year review for Shepley's Hill Landfill was performed in 1998 (SWET, 1998). The review summarized site activities and monitoring activities and compared achieved risk reductions to risk-reduction goals. Data presented in the review showed that reductions in arsenic concentrations and corresponding risk satisfied the evaluation criteria at nine of eleven historical groundwater monitoring wells; only monitoring wells SHL-10 and SHL-11 did not achieve risk-reduction goals. It was concluded, however, that substantial progress had been made toward achieving cleanup levels and, in light of the fact that there was no exposure to groundwater, implementation of contingency remedial action was not justified at that time.

The 2000 Five-Year review (HLA, 2000) concluded that little or no reduction in arsenic concentrations occurred in monitoring wells SHL-11, SHL-20, SHM-96-05B. An increase in arsenic concentrations was noted in SHL-11, SHM-96-05B and SHM-96-22B.

The 2003 Draft Annual Report (USACE, 2003) indicted that three of the Group 1 wells SHL-9, SHL-22 and SHL-93-22C exceeded cleanup levels for arsenic at least once since the first five-year review. Of those wells, SHL-22 continued to exceed the arsenic level in 2003. Arsenic was the only trigger chemical detected above the cleanup level during the 2003 sampling events. Most wells indicated no change over historic arsenic values, including SHM-96-5B (north of landfill), which historically contains the highest arsenic levels. Wells SHL-22 and SHM-96-22B (east of landfill), showed trends that arsenic levels may continue to rise. Well SHL-9 returned to its characteristic arsenic level after a spike in May of 2002. The arsenic levels in well SHL-20 were leveling instead of declining.

The 2004 Draft Annual Summary Report (USACE, 2005) indicated that arsenic was the only trigger chemical detected above the cleanup level during the 2004 sampling events. Most results indicated no significant changes from previous arsenic levels. The sampling results for fall 2004 showed that, for the first time since monitoring began, northern well SHM-96-5B was not the sample location with the highest concentration of arsenic. However, may be attributed to seasonal fluctuations. Northern well, SHM-96-22B, located in the vicinity of and screened at a similar depth to SHM-96-5B, exhibited a slightly higher arsenic concentration. SHM-96-22B shows a trend of generally increasing arsenic concentrations. Eight of the fourteen compliance point wells were below the arsenic cleanup level for the fall 2004 round of sampling. Northern well, SHL-22 was the only Group 1 well having an arsenic concentration exceeding the cleanup level. Concentrations measured at Group 2 wells, SHL-4, and SHM-96-5C met the cleanup level for arsenic, a trend that continues to be observed.

System Operations/Operation and Maintenance (Long Term Groundwater Monitoring): Post closure monitoring and maintenance was performed in accordance with the Long Term Monitoring and Maintenance Plan (SWET, 1996c). Yearly O&M costs for implementation of the remedy at each AOC were not available for review.

Opportunities for Optimization: As recommended in the Five Year review completed in September, 2000 (HLA, 2000), the list of parameters monitored as part of the long term groundwater sampling program have been reviewed with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry. These include copper, lead, nickel, selenium, silver, BOD_5, and cyanide. Optimization opportunities should be considered upon implementation of the contingency remedy and as part of the CSA and CAAA.

Early Indicators of Potential Remedy Failure: The ROD and Long Term Monitoring and Maintenance Plan established incremental reduction of risk as a measure of progress toward attainment of clean levels to focus on the cleanup of arsenic, which was the primary contributor to risk. The 2000 Five-Year Review (HLA, 2000) concluded the following observations and recommendations regarding the effectiveness of the initial remedy:

> *Review of the available data suggests that the remedy may have difficulty meeting 2003 interim groundwater cleanup goals. Because of this, the Army should re-evaluate the contingency remedy of groundwater extraction with subsequent discharge to the Town of Ayer publicly owned treatment works (POTW). Although groundwater extraction has the potential to contain groundwater contaminants, it will not prevent the release of arsenic from aquifer materials and would need to be performed for an indeterminate length of time. Also, it appears that the POTW would no longer be suitable for receipt of extracted groundwater. These studies should be completed prior to the 2003 assessment of risk at the Shepley's Hill Landfill.*

The Supplemental Groundwater Investigation (Harding ESE, 2003) further supported this by indicating that little or no reduction in arsenic concentration was occurring at monitoring wells SHL-11, SHL-19, SHL-20, SHL-22, SHM-96-5B, SHM-96-5C and SHM-96-22B.

Based on the data collected to date, the required incremental reduction in risk was not achieved. The Army and regulatory agencies decided to implement the contingent element of the selected remedy as specified in the ROD (Alternative SHL-9, Groundwater Extraction and Discharge to the Town of Ayer POTW).

The contingency extraction treatment and discharge system has recently been constructed and initiation of operations depended on final selection and approval of the location for the system effluent discharge. Modifications to the implementation of the contingency remedy were detailed in the ESD, (CH2M Hill, 2004a) and included; 1) change the POTW from Ayer to Devens, and 2) provide pretreatment to meet Town of Devens POTW discharge limitations. The current objective of the project is groundwater pump, treatment, and discharge to the Devens POTW using a pretreatment system. An ESD specifying the changes for discharge to the Devens POTW from the ROD was finalized in June 2005.

Implementation of Institutional Controls and Other Measures: The ROD proposed ICs in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill. No property has been released, and therefore administrative ICs have not been fully implemented. Lease terms are in force restricting groundwater use, soil excavation, and development of sensitive land uses. Although not under the Army's control, the Town of Ayer Board of Health regulates the construction of private wells as a source of potable water for drinking, culinary and domestic purposes. Requirements include, driller registration with MADEP, minimum setbacks from a landfill or hazardous waste spill site, approval from the MADEP and local zoning ordinances.

ICs are included in the LIFOC currently in affect for all leased parcels including Shepley's Hill Landfill. The LIFOC agreement identifies the general restrictions and required actions that are in place to protect the remedy. Administrative ICs would be developed and detailed in the finding of suitability to transfer (FOST) and included with the Deed prior to transfer of the land parcels associated with the Shepley's Hill Landfill property.

Other ICs currently in place at the landfill consist of the fencing, gates and the landfill cap itself which prevents exposure. Based on the current condition of these ICs (as discussed in other sections of this report), repair to the fencing, gates and cap are planned as part of a Cap Maintenance Contract to be awarded in late summer or early fall of 2005.

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

Changes in Standards and To Be Considered: As part of this Five-Year review, Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. Several changes have been promulgated since the ROD was signed (See Section 3.6.2, ARARs).

MCLs are health-based guidelines established by the USEPA for use by public water supply operators. The MCL for arsenic in effect at the time of the ROD (50 μg/L), was selected as a cleanup goal for groundwater. Arsenic was present on site at concentrations greater than its MCL (50 μg/L) during the remedial investigation and was a primary risk driver for the ingestion of groundwater exposure pathway at Shepley's Hill Landfill. The MCL for arsenic has been updated since the 1995 ROD. The MCL for arsenic was lowered to 10 μg/L, effective January 2006. Because the remedy includes prohibiting the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the implemented remedy.

In the spring of 2005, MADEP published new draft groundwater standards for RDX and HMX, which are military explosives. The proposed Method 1, GW-1, Groundwater Standards are 0.8 μg/L and 200 μg/L for RDX and HMX, respectively. Explosive concentrations were noted in the ROD for monitoring well SHL-24. Based on the emerging concern for these mission-related constituents as reflected in the development of the draft standards, it is recommended that this well be re-sampled for these constituents.

Changes in Exposure Pathways: No excessive or unacceptable risks currently exist at the Site because the potential for exposure to contaminated media is restricted and is thus unlikely to be occurring. The ROD identified unacceptable risks from the following hypothetical exposure pathway: ingestion of groundwater as the primary drinking water source by future residents. Groundwater at the site and downgradient from the site is not used as a drinking water source.

Land use at the site has not changed since the ROD. Current land use complies with the proposed deed restrictions on groundwater extraction. No new contaminants, sources or routes of exposure at the landfill were identified at the time this report was prepared, and none appear to be planned. However, new contaminant pathways were identified in the Draft Supplemental Groundwater Investigation (Harding-ESE, 2003). Further characterization associated with implementation of the contingency remedy has not led to significant changes in the conceptual model for the SHL hydrologic/hydrogeologic system. Characterization is ongoing, and the overall adequacy is yet to be determined. An off-site investigation including an evaluation of the surface water/groundwater interface will be performed as part of the upcoming CSA/CAAA.

Based on the observed LEL readings (up to 100% LEL) noted during the most recent landfill gas monitoring, performed in November 2004, and due to potential trespassers at the landfill, this exposure pathway should be evaluated during the risk assessment portion of the CSA, planned for fall 2005. In addition to evaluating the risk, LEL no greater than 25% and percent oxygen no greater than 5% at the landfill vents trigger requirements under 310 CMR 19.117 requiring proper operation of the gas collection system as indicated by the New Source Performance Standards in 40 CFR 60.753(c).

Changes in Exposure Assumptions: The risk assessments supporting the ROD for Shepley's Hill Landfill used exposure assumptions that are consistent with standard practices at the time. Because the remedy includes prohibiting the use of groundwater as drinking water, any more recent conventional changes to the exposure parameters would not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: Since the groundwater cleanup goals are based on drinking water standards and not on risk-based calculated concentrations, changes to the toxicity values do not directly impact the protectiveness of the groundwater cleanup goals.

USEPA issued a Lifetime Health Advisory of 0.3 mg/L for manganese in January, 2004. This Health Advisory is protective of formula-fed infants younger than 6 months for exposures of up to 10 days. The manganese cleanup level was updated in the Long Term Monitoring Program (May 1996) to 1,715 μg/L based on a risk-based concentration derived from the updated RfD value (0.047 mg/kg/day). However, this value does not account for other dietary sources of manganese. USEPA Region I currently supports an oral RfD for manganese that does account for these additional sources, of 0.07 mg/kg/day for ingestion of soil, sediments or food, and an oral RfD of 0.024 mg/kg/day for manganese in drinking water. A revised cleanup goal for Shepley's Landfill will be developed based on the updated RfD value for water intake of (0.024 mg/kg/day). The revised risk-based cleanup level is 876 μg/L for adults and 375 μg/L for children. Until the revised cleanup level are approved, the more stringent background value of 291 μg /L would be utilized as the cleanup level for manganese in groundwater.

USEPA's Integrated Risk Information System (IRIS) database currently lists a slightly lower oral cancer slope factor for arsenic (1.5) than the oral cancer slope factor used for arsenic in the risk assessments (1.75). Therefore, the oral cancer risks from exposure to arsenic as reported in the risk assessment may be only slightly underestimated.

USEPA's IRIS database currently lists a range of oral cancer slope factor for benzene ($1.5x10^{-2}$ to $5.5x10^{-2}$). Since the risk assessment used a cancer slope factor that falls within that range ($2.9x10^{-2}$), cancer risks from exposure to benzene may be over or under estimated. The USEPA's

IRIS database currently lists an oral RfD for benzene ($4x10^{-3}$). No RfD was used for benzene in the risk assessment. Although non-cancer health effects from exposure to benzene were not estimated, the cancer risks are the more sensitive health endpoint.

Because the remedy includes prohibiting the use of groundwater as drinking water, changes to the toxicity of groundwater contaminants do not affect the protectiveness of the remedy since exposures are not occurring.

Changes in Risk Assessment Methodologies: The methods for evaluating groundwater ingestion exposures have not changed since the time of the risk assessments supporting the ROD. The hypothetical human health risks discussed in the ROD have been eliminated by institutional controls, including the proposed deed restriction prohibiting the use of groundwater as drinking water and residential use of the property. Therefore, any risk assessment methodology changes would not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at the Shepley's Hill Landfill during this review period. An Ecological Risk Assessment (ERA) and a Human Health Risk Assessment (HHRA) will be performed in accordance with CERCLA, off-site plume investigation, and a landfill cap assessment are planned for fall 2005 as part of the CSA.

3.6.1 Summary of Technical Assessment

Based on the data collected to date, the required incremental reduction in risk was not achieved and the Army and regulatory agencies decided to implement the contingent element of the selected remedy (Alternative SHL-9, Groundwater Extraction and Discharge to the Town Ayer POTW).

The MCL for arsenic (50 µg/L at the time of the ROD) was selected as a cleanup goal for groundwater. Arsenic was present on site at concentrations greater than its MCL (50 µg/L) during the remedial investigation and was a primary risk driver for the ingestion of groundwater exposure pathway at Shepley's Hill Landfill. The MCL for arsenic has been updated since the 1995 ROD. The MCL for arsenic was lowered to 10 µg/L, effective January 2006. Based on the fact that the remedy includes prohibiting the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the implemented remedy.

Toxicity characteristics, reference doses and cancer slope factors have been updated for manganese, arsenic and benzene; however, since the remedy includes prohibiting the use of groundwater as drinking water, changes to the evaluation of the toxicity of the groundwater contaminants do not affect the protectiveness of the remedy.

3.6.2 Applicable or Relevant and Appropriate Requirements Review

ARARs are applicable or relevant and appropriate requirements under federal or state environmental or facility sitting laws that address hazardous substances, pollutants, remedial actions, locations, or other circumstances at a CERCLA site. Location-specific ARARS "set restrictions upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations." Chemical-specific ARARs are usually health- or risk-based standards that limit the concentration of a chemical found in or discharged to the environment. Action-specific ARARs set controls or restrictions on activities related to the management of hazardous waste. Identified ARARs for the Shepley's Hill Landfill Operable Unit are listed below. ARARs are presented in Table 9 of the ROD and are reprinted in Appendix B.

Action-specific ARARs for landfill post-closure requirements would be met by Alternatives SHL-2 and SHL-9. Alternative SHL-9, if implemented, would be required to meet the federal Clean Water Act General Pretreatment Requirements to discharge to the Devens POTW. Federal and state air quality regulations would be met by Alternatives SHL-2 and SHL-9. Dust suppression techniques would be used, when necessary, to meet air quality regulations.

The following ARARs, listed in Appendix B, have been modified since signing of the ROD and the first Five-Year review and that may affect the protectiveness of the implemented remedial action:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

    a) ***The analyses and determination of compliance with 50 µg/L MCL for arsenic use the requirements of 141.23.

    b) The MCL for arsenic is 50 µg/L for community water systems until January 23, 2006.

  On January 22, 2001 USEPA adopted a new standard for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L (66FR6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 µg/L standard is January 23, 2006.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 µg/L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.
- 310 CMR 30.00 "Hazardous Waste" was updated February 27, 2004. There are no revisions 310 CMR 30.660-30.679 "Groundwater Protection" that affect the protectiveness of the remedy.
- USEPA RfD and Health Advisories (HA) are requirements designated as TBC. These requirements were updated in the USEPA 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.
- 310 CMR 10.00 Massachusetts Wetlands Protection Act.
- 314 CMR 4.00 Massachusetts Surface Water Quality Standards.
- 310 CMR 19.00 Massachusetts Solid Waste Management Regulations.

3.7 Issues

There continues to be ponding on the northern half of the landfill, with ponding also present in the swales located to the south and northwest of the landfill. This appears to be an issue that is ongoing and has been documented in Long Term Monitoring Reports. A Draft Cap Drainage Report was issued in January 2003 detailing corrective actions for the landfill. Areas of poor drainage and ponding will be addressed by a Landfill Cap Maintenance Contract during fall 2005. Fencing, vehicle gates, and gas monitoring probes will also be installed as part of this contract.

Elevated concentrations of arsenic in groundwater continue to be detected at the Shepley's Hill Landfill. A new arsenic MCL standard of 10 µg/L was promulgated in January 2001 and public water systems must comply with this new standard by January 2006. Although ROD clean-up goals have not changed, to date, it is anticipated that they will change to be responsive to this new standard while incorporating knowledge of the known ranges of background arsenic concentrations in groundwater at Devens. This change in the standard will be an added difficulty in achieving cleanup goals. Attainment of the proposed standard would increase the stringency of the groundwater cleanup, and would reduce the potential residual risk from exposure to groundwater.

Based on the most recent landfill gas monitoring, performed in November 2004, lower explosive limits ranged from 0% to over 100% in several vents and the percentage of oxygen was greater than 5% at several of these vents. When this condition is observed (LEL nearing 100% and high oxygen readings indicating a potentially explosive condition) there is an immediate reporting and action requirement in accordance with MADEP regulations. The potential explosive conditions should also be noted in the LTMP and the site specific HASP.

Based on the data collected to date, the required incremental reduction in risk was not achieved and the Army and regulatory agencies decided to implement the contingent element of the selected remedy (Alternative SHL-9, Groundwater Extraction and Discharge to the Town of Ayer POTW). The contingency extraction treatment and discharge system has been constructed and operation depends on final selection and approval of system effluent discharge location. Modifications to the implementation of the contingency remedy were detailed in the ESD, (CH2M Hill, 2004a) and included; 1) change the POTW from Ayer to Devens, and 2) provide pretreatment to meet Devens POTW discharge limitations. The current objective of the project is groundwater pump, treatment, and discharge to the Devens POTW using a pretreatment system. An ESD specifying the changes for discharge to the Devens POTW from the ROD was finalized in June 2005.

Although numerous studies have been performed to date, data gaps may exist regarding the lateral extent, flow directions, discharge points, importance of potential run-under, and nature of the arsenic plume. In order to identify these data gaps and to evaluate risk associated with the remedies in place at the landfill, a CSA and CAAA will be performed for the Shepley's Hill Landfill. The CSA will include an offsite groundwater plume investigation, human health and ecological risk assessments and a landfill cap assessment. The CAAA will review all prior feasibility study alternatives, revise and/or validate the alternatives based on new data and develop any new alternatives as necessary. Additionally, the CAAA will address recommend action for a final closure strategy for Shepley's Hill Landfill and remedial approaches for areas that may have been adversely effected by its contamination.

On August 23, 2004, the MADEP drafted a letter to USEPA Region 1 requesting that the ROD be amended based on the data generated as part of the long term monitoring program and observations made during a MADEP inspection in August 2004. The MADEP concluded that the selected remedy, SHL-2, has proven to be ineffective in controlling risk and the contingency remedy, SHL-9, should not be considered the final remedy for the site because it would not satisfy the requirements of the applicable Massachusetts Solid Waste Laws.

BCT meeting minutes, dated July 14, 2005, indicated that the USEPA will be conducting an arsenic study at Red Cove of Plow Shop Pond with a focus on arsenic in groundwater and sediment. This study is planned to begin in September 2005.

Issues	Affects Protectiveness (Y/N)	
	Current	Future
Areas of poor drainage and ponding on the northern, half of the landfill, also present in the swales located to the south and northwest of the landfill.	Y	Y
Achieving cleanup goals with continued elevated concentrations of arsenic in groundwater and complying with new arsenic MCL standard of 10 μg/L, January 2006.	Y	Y
Evaluate discharge options for treated water from the extraction treatment and discharge system, operation depending on final selection and approval of system effluent discharge location.	Y	Y
Evaluate risk associated with the remedies in place at the landfill, conduct a Comprehensive Site Assessment (CSA) and Corrective Action Alternative Analysis (CAAA) for the Shepley's Hill Landfill.	Y	Y

3.8 Recommendations and Follow-up Actions

Annual landfill inspections and landfill gas sampling, and semi-annual groundwater sampling with annual reporting should continue. Landfill maintenance should continue as recommended in the Long Term Monitoring and Maintenance Plan and in annual reports.

The list of parameters monitored as part of the long term sampling program should be reviewed as recommended in the 2000 Five-Year review with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry. These include copper, lead, nickel, selenium, silver, BOD_5, and cyanide. Since the interaction of groundwater beneath the Shepley's Hill Landfill with the Plow Shop Pond continues to be evaluated, the significance of these chemicals should be considered before revision of the long term monitoring analyte list (especially cadmium, chromium and mercury as they relate to sediment adjacent to Plow Shop Pond).

The manganese cleanup level was updated in the LTMP (SWET, 1996c) to 1,715 μg/L, based on risk-based concentrations. This value has been used since 1996 as the cleanup level. New risk-based values have been calculated for adults and children as explained above in Section 3.6 based on the recently updated RfD. Until these risk-based values are approved, the more stringent background value of 291 μg/L should be utilized as a cleanup goal for manganese.

The groundwater extraction, treatment, and discharge system shall continue to sampled in accordance with the Performance Monitoring Plan. Monitoring to be performed to evaluate system performance shall include hydraulic and geochemical monitoring and influent/effluent monitoring.

In the spring of 2005, MADEP published new draft groundwater standards for RDX and HMX which are military explosives. Explosive concentrations were noted in the ROD for monitoring well SHL-24. Based on the emerging concern for these mission-related constituents as reflected in the development of the draft standards, it is recommended that this well be re-sampled for these constituents.

Areas of poor drainage and ponding will be addressed during the landfill cap maintenance work in the fall of 2005.

Although landfill-gas readings are within the parameters of a mature landfill and landfill-gas vents do not appear to be damaged, because of high landfill-gas measurements during routine sampling, the Army should continue to assess whether subsurface migration of landfill gas is occurring. The CSA/CAAA will include an assessment of landfill gas migration. Additional gas probes will be installed on the southern portion of the landfill as part of the cap maintenance work scheduled for the fall of 2005.

Based on the noted conditions and issues, the following actions are planned for the Shepley's Hill Landfill:

Recommendations/Follow Up Actions	**Party Responsible**	**Oversight Agency**	**Milestone Date**	**Do Follow-Up Actions: Affect Protectiveness (Y/N)**	
				Current	**Future**
Start up of extraction and treatment system	Army, BRAC	USEPA Region 1	September 2005	Y	Y
Performance monitoring of the extraction and treatment system	Army, BRAC	USEPA, Region 1	September 2005	Y	Y
Complete Landfill Cap Maintenance	Army, BRAC	USEPA, Region 1	Spring 2006	Y	Y
Complete CSA/CAAA	Army, BRAC	USEPA, Region 1	Fall 2007	Y	Y

3.9 Protectiveness Statement

A protectiveness determination of the remedy at the Shepley's Hill Landfill cannot be made at this time until further information is obtained through completion of the recommendations and follow up actions detailed in Section 3.8. It is expected that these actions will take approximately 2 years to complete (mostly dependant on the CSA and CAAA), at which time a protectiveness determination will be made. Pending the availability of adequate funding, the Army will implement the remedy identified by the CSA/CAAA to achieve protectiveness within a reasonable time period.

3.10 Next Review

The Shepley's Hill Landfill Operable Unit is a statutory site that requires ongoing Five-Year reviews. This is the third five-year review that has been performed at this operable unit. The first was performed in 1998 according to the schedule in the ROD. The 2000 Five-Year Review was performed to have a completed review for all Devens sites at one time. The next review will be performed within five years of the completion of this third Five-Year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for non-concurrence.

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4.0 AOC 57 FIVE-YEAR STATUTORY SITE REVIEW

4.1 Chronology

The following tables outline the chronology of site events at Areas 1, 2, and 3:

Table 4-1 Chronology of Site Events – Area 1

EVENT	DATE
Initial discovery of problem and contamination	February 13, 1977
Site Inspection (SI), Preliminary Risk Evaluation (PRE)	1992
Area Requiring Environmental Evaluation (AREE)	1994
Soil Removal Action	1997
Remedial Investigation (RI) completed	2000
Record of Decision (ROD) Signed	September 28, 2001
First Five-Year Review	September 2005

Table 4-2 Chronology of Site Events – Area 2

EVENT	DATE
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 petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and lead.	1995-1998
USACE conducted additional soil/ground water investigations.	2000
Completed a Feasibility Study (FS)	2000
ROD signed for AOC 57 Areas 1, 2, and 3.	September 28, 2001
USACE completed additional soil removal actions.	January-February 2003
Remedial Action Work Plan Start	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
Explanation of Significant Differences (ESD) issued	March 10, 2004
Long Term Monitoring Plan (LTMP)	2003/2004
First Five-Year Review	September 2005

Table 4.3: Chronology of Site Events – Area 3

EVENT	DATE
Four test-pits excavated east of Area 2, results indicated petroleum hydrocarbons and chlorinated volatile organic compounds (VOCs), area designated Area 3.	1995
RIs conducted, identified most significant soil contaminants to be petroleum hydrocarbons, polychlorinated biphenyls (PCBs), some semi-volatile organic compounds (SVOCs) and arsenic, lower concentrations of VOCs.	1996-1998
USACE conducted soil removal actions, 1,860 cubic yards of TPH and PCB contaminated soil removed.	1999
USACE performed additional Soil Sampling.	2000
Feasibility Study (FS) completed	2000
Groundwater monitoring points installed	2000
USEPA and MADEP collected groundwater samples.	April 3, 2001
Record of Decision (ROD) Signature	September 28, 2001
Additional Soil Removal Action Completed	2002
Remedial Action Report/Remedial work completed	2002-2003
ROD Amendments of Explanation of Significant Differences (ESDs)	March 2004
Long Term Monitoring Plan (LTMP)	2003/2004
First Five-Year Statutory Review	September 2005

4.2 Background

Area of Concern (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 the Devens Reserve Forces Training Area (RFTA) in the Town of Harvard, Massachusetts (Figure 1-1). Refer to the Introduction in Section 1.0 for general enforcement activities at Devens RFTA (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

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 (Figure 2 reprinted from the ROD and presented in Appendix C). These sub-areas received stormwater runoff and wastes from vehicle maintenance activities conducted at the storage yards. These yards were eventually abandoned in 1998, and the pavement and fencing were removed. The former storage yards are now soil and grass-covered areas. Areas 2 and 3 are located within Lease Parcel A6a that the Army plans to transfer to the Massachusetts Government Land Bank. Area 1 is not part of the Long Term Monitoring (LTM) program, as discussed later in this section.

Areas 1, 2, and 3 include an upland area (elevations between 228 feet and 240 feet mean sea level [msl]) that slopes downward to a delineated wetland area (elevations lower than 228 feet msl) which is part of the wetland system and feeder stream know as Lower Cold Spring Brook. At Area 2 the wetland boundary is located approximately 250 feet from Cold Spring Brook, and at Area 3 the wetland boundary is located approximately 500 feet from Cold Spring Brook. The upland area is forested with trees and scrub brush. The wetland area is densely vegetated with brush and contains small areas of standing water.

The AOC 57 ROD, dated September 2001, determined that Area 1 required No Further Action and remedies were selected for Area 2 and Area 3 to protect human health and the environment under current and future land use scenarios. "Alternative II-3, Excavation (For Possible Future Use) and Institutional Controls" was the selected remedy for Area 2 and "Alternative III-2a, Excavation (To Accelerate Groundwater Cleanup) and Institutional Controls" was the selected remedy for Area 3. Public access to Area 2 and Area 3 is not restricted, but the presence of floodplain/wetlands conditions and existing zoning currently prevents residential use/exposure.

Data obtained and observations made at Area 2 during both the January 2002 soil removal work and subsequent investigations between 2002 and 2003 for petroleum waste recovery efforts, resulted in discovery of site conditions at AOC 57 Area 2 that are different than conditions upon which the September 2001 ROD were based. Therefore, an Explanation of Significant Differences (ESD), dated March 2004, expanded the ROD recommendations to include LTM of Extractable Petroleum Hydrocarbons (EPH) C11-C12 aromatics and PCBs for Area 2.

4.2.1 AOC 57 Area 1 Background

Area 1 consists of a former storm water outfall and drainage area for runoff from paved areas proximal to former Building 3713. Drainage from Area 1 meanders and eventually flows into Cold Spring Brook. 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 use of containment dikes and absorbent booms in 1977, and approximately 25 cy of petroleum contaminated soil were removed in 1997. Available data indicates that the contamination associated with the fuel oil spill has been removed, and a risk assessment indicates that there are no unacceptable risks for unrestricted use (Final Remedial Investigation Report, Harding Lawson Associates, 2000). On September 28, 2001, a ROD was signed for AOC 57 Areas 1, 2, and 3 determining Area 1 requires No Further Action or remedies as part of the LTM program.

4.2.2 AOC 57 Area 2 Background

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 yards associated with former Buildings 3757 and 3758. Initially, it was believed that contamination in Area 2 was the result of a fuel oil release in Area 1; however, subsequent investigations determined that Area 2 was separate from Area 1. Following a soil removal action in 1994, Area 2 was regraded and a permanent drainage swale was installed. Runoff drains into the swale and discharges east into Cold Spring Brook. Subsequent activities included subsurface investigations with soil sampling and monitoring well installations, removals 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 Site Investigation (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 the soil contamination extending below the water table and well beyond the area limits originally estimated. A total of 1,300 cubic yards of contaminated soil was removed during this 1994 removal action.

During 1995 through 1998, the Army conducted site Remedial Investigations (RIs) at AOC 57 Areas 2 and 3. The most significant soil contaminants identified at Area 2 included petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and lead. The Army performed additional soil and groundwater investigations in 2000, and completed a Feasibility Study (FS) for selection of final remedies at AOC 57 Areas 2 and 3. On September 28, 2001 a ROD was signed for AOC 57 Areas 1, 2, and 3.

Soil excavation conducted (in Area 2) as a ROD remedy was initiated in January 2002 and discontinued in February 2003 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 ESD dated March 2004 expanded the ROD Contaminants of Concern (COC) to include long term monitoring of EPH C11-C12 aromatics and PCBs for Area 2.

4.2.3 AOC 57 Area 3 Background

It should be noted that portions of Areas 2 and 3 are located within the 100-year floodplain of Cold Spring Brook. A portion of Area 1 is located outside the lease parcel A6a and outside of the 100-yr floodplain, (i.e. at an elevation > 228' msl.). The selected remedy for Area 1 is no further action.

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 petroleum hydrocarbons and chlorinated volatile organic compounds (VOCs). The area was designated AOC 57 Area 3. Area 3 is located approximately 600 ft. to the northeast of Area 2, south of former vehicle maintenance motor pools.

During 1996 through 1998, RI field investigations were performed to better characterize the nature and extent of contamination at Area 3. The most significant soil contaminants identified at Area 3 included petroleum hydrocarbons, PCBs, some semi-volatile organic compounds (SVOCs), and arsenic. Lower concentrations of VOCs were detected at some locations.

The Army conducted a soil removal action in 1999, which targeted soils with TPH and PCB concentrations exceeding soil standards published under the MCP. A total of 1,860 cubic yards of material was removed for off-site disposal.

During 2000, the Army performed additional soil and groundwater investigations, and completed a FS for selection of final remedies at AOC 57 Areas 2 and 3. On September 28, 2001, a ROD was signed for AOC 57 Areas 1, 2 and 3.

Soil excavation conducted as a ROD remedy 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 to 4 feet. All confirmatory samples met the ROD cleanup criterion for EPH, and Area 3 was backfilled and the extent of removal was documented.

4.3 Remedial Action

A ROD was signed on September 28, 2001 for AOC 57 presenting selected remedial actions for soil and groundwater contamination at Areas 1, 2 and 3. The selected remedy for Area 1 is No Further Action. The selected remedy for Area 2 is "Alternative II-3, Excavation (For Possible Future Use), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls". The selected remedy for Area 3 is "Alternative III-2a, Excavation (To Accelerate Groundwater Cleanup), Groundwater Monitoring, Surface Water Monitoring and Institutional Controls". Key components of the selected remedies are summarized in the sections 4.3.3 and 4.3.4.

4.3.1 Remedial Action Objectives at AOC 57 Area 2

The remedial action objectives at AOC 57 Area 2 were developed in the FS for those exposure scenarios where human health risks exceed the USEPA points of departure. Based on the results of the risk assessment, the following Remedial Action Outcomes (RAOs) were developed for AOC 57:

Area 2 - Possible Future Use Scenario (Construction Worker)

- Protect potential construction workers that might work within future recreational (wetland) areas at Area 2 from ingesting soils containing Aroclor-1260 and lead in excess of preliminary remediation goal (PRG) concentrations considered protective of human health (3.5 and 600 milligrams per kilograms (mg/kg), respectively).

Area 2 - Unrestricted Land Use Scenario (Residential)

- Prevent potential residential receptors from coming in dermal contact with and ingesting Area 2 wetland soils containing Aroclor-1260, arsenic, chromium, lead, and the extractable petroleum hydrocarbons (EPH) C11-C22 aromatic carbon range in excess of PRG concentrations considered protective of human health (0.5, 21, 550, 400, and 930 mg/kg, respectively).

- Prevent residential potable use of Area 2 wetland groundwater containing arsenic and tetrachloroethylene (PCE) in concentrations that exceed federal Maximum contaminant level (MCL)/Massachusetts maximum contaminant level (MMCL) drinking water standards (50 and 5 micrograms per liter (μg/L), respectively).

4.3.2 Remedial Action Objectives at AOC 57 Area 3

The remedial action objectives at AOC 57 Area 3 were developed in the FS for those exposure scenarios where human health risks exceed the USEPA points of departure. Based on the results of the risk assessment, the following RAOs were developed for AOC 57:

Area 3 - Possible Future Use Scenario (Commercial/Industrial Worker)

- Protect potential future commercial/industrial receptors from ingesting upland Area 3 groundwater that contains arsenic, cadmium, and 1,4-dichlorobenzene (1,4-DCB) at concentrations that exceed MCLs and MMCLs for drinking water.

Area 3 - Unrestricted Land Use Scenario (Residential)

- Prevent unrestricted residential potable use of Area 3 groundwater containing arsenic, cadmium, and 1,4-DCB at concentrations that exceed MCLs and MMCLs for drinking water.

- Prevent unrestricted residential dermal contact and ingestion of 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 floodplain groundwater containing arsenic and PCE at concentrations that exceed MCLs and MMCLs for drinking water.

4.3.3 Selected Remedy

The selected remedies at AOC 57 Areas 1, 2, and 3 addressed long term commercial/industrial exposure to contaminated groundwater, the principal known threat at Areas 1, 2 and 3. The selected remedy at Area 1 is No Further Action. The selected remedial alternative for both Areas 2 and 3 included excavation and treatment/disposal, wetland protection, institutional controls (ICs), and long term groundwater monitoring to evaluate the effectiveness of the alternative at controlling groundwater contamination and site risk. The remedy is to mitigate existing groundwater contamination through natural attenuation and remediation and reduce the potential risk of future commercial/industrial exposure to contaminated groundwater. The major components of the selected remedy for both Areas 2 and 3 are as follows:

- Soil excavation and treatment/disposal.
- Wetlands protection: Inclusion of these wetlands as part of the Lower Cold Spring Brook wetland habitat.
- Institutional controls.
- Long term groundwater and surface water monitoring.
- Institutional control inspections.
- Five-year site reviews.

In March 2004, the USEPA published an ESD for AOC 57. The ESD was required because data obtained and observations made during the contaminated soil removal action initiated in January 2002 by Conti Environmental, Inc. (Conti) resulted in discovery of site conditions at AOC 57 Area 2 that were different than conditions upon which the September 2001 ROD were based. These differences are listed below.

- Increased volume and cost of contaminated soil requiring removal to attain cleanup levels at Area 2.

- Inclusion of EPH as a contaminant of concern for soil at Area 2, in the September 2001 AOC 57 ROD, to monitor the presence of petroleum was encountered during contaminated soil removal.

- Inclusion of EPH and PCBs as contaminants of concern for Area 2 groundwater in the September 2001 AOC 57 ROD for groundwater at Area 2.

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 C11-C22 aromatic hydrocarbons quantified by EPH (MADEP EPH Method) as a COC. As a result of the addition of C11-C22 as a COC, the ROD adopted the more stringent S3/GW-1 cleanup level of 200 mg/kg EPH C11-C22 aromatic fraction for Area 2 soils. Subsequently, PCBs were added as a COC because of their association with the petroleum waste oil. Final cleanup levels for Area 2 at AOC 57 are presented in the table below.

Table 4-4 Area 2 COC: Cleanup Levels in Soil

Contaminant of Concern	Final Cleanup Levels
PCB (Aroclor-1260)	3.5 mg/kg dry weight by USEPA Method 3540C/8082
Lead	600 mg/kg dry weight by USEPA Method 3050B/6010B
C11-C22 Aromatic Hydrocarbons	200 mg/kg dry weight for EPH using MADEP method

Table 4–5 Area 2 COC: Cleanup Levels in Groundwater

Contaminant of Concern	Final Cleanup Levels
Arsenic	50 µg/L
Cadmium	5 µg/L
1,4-Dichlorobenzene	5 µg/L
Tetrachloroethylene	5 µg/L
EPH C11-C22 Aromatics	200 µg/L
PCB (total of all Aroclors)	0.5 µg/L

The Area 3 soil cleanup objective was to remove organic material impacted by storm water runoff and wastes from vehicle maintenance at storage yards. The cleanup goal of 930 mg/kg EPH was selected as a target goal to help evaluate the removal of a sufficient quantity of organic material. The ROD established cleanup levels for one COC in soil, EPH C11-C22 Aromatic Hydrocarbons, at AOC 57 Area 3, as presented in the table below.

Table 4-6 Area 3 COC: Cleanup Levels in Soil

Contaminant of Concern	Final Cleanup Levels
C11-C22 Aromatic Hydrocarbons	930 mg/kg dry weight for EPH using MADEP method

The ROD identifies groundwater COCs at Area 3 as arsenic, cadmium, 1,4 dichlorobenzene, and PCE, with the following cleanup goals. The MCL for arsenic (50 μg/L), in effect at the time of the ROD, was selected as a cleanup goal for groundwater. The MCL for arsenic has been updated since the 2001 ROD. The MCL for arsenic was lowered to 10 μg/L, effective February 2002.

Table 4-7 Area 3 COC: Cleanup Levels in Groundwater

Contaminant of Concern	Final Cleanup Levels
Arsenic	50 μg/L
Cadmium	5 μg/L
1,4-Dichlorobenzene	5 μg/L
Tetrachloroethylene	5 μg/L

4.3.4 Remedy Components Specified by the ROD

The selected remedy for AOC 57 Area 2 Alternative II-3 contains components to reduce potential human-health risks associated with contaminated soil and groundwater at the Area 2 floodplain. A detailed description of Area 2 Alternative II-3 is presented in Section 12.1.2 of the ROD; the key components of the ROD are summarized below.

4.3.4.1 Area 2 Selected Key Components

Soil Excavation and Treatment/Disposal at an Off-site Treatment, Storage, or Disposal Facility. As presented in Section 12.1.2 of the ROD, Alternative II-3 included excavation of soil with Aroclor-1260 and lead concentrations in excess of PRGs protective for construction workers. The actual extent of excavation and volume of soil removed was to be determined by field screening methods. The ROD estimated an average excavation depth of 4 ft and approximately 640 cubic yards of soil would be removed and treated/disposed of at an approved off-site treatment, storage, or disposal facility. Implementation of the soil removal action is discussed in Section 4.3.5 of this report

Wetland Protection. As presented in the ROD Section 12.1.2, soil excavated within the 100-yr floodplain (220 ft. msl) and within delineated bordering vegetated wetlands (based on a 1993 wetlands delineation), would likely require wetland protection in accordance with the Massachusetts Wetland Protection Act and Regulations at 310 CMR 10.55.

Prior to any excavation activities, a new wetland delineation would be performed at Area 2 to define the construction area limits located within the delineated vegetated wetlands. A pre-construction mitigation study would be performed to determine the impact to the affected area and the compensatory mitigation required as a result of the excavation activities. Once the extent of anticipated impacts was known, a mitigation/restoration plan would be prepared for regulatory agency review and concurrence.

Compensatory mitigation and monitoring would be implemented according to the mitigation plan. A wetland scientist would monitor wetland restoration for a period of five years, beginning the year after the wetland creation. Implementation of the wetland monitoring plan is discussed in Section 4.3.5 of this report.

Institutional Controls. As presented in the ROD Section 12.1.2, in the event of future property transfer, the Army would include deed covenants to prohibit potable use of Area 2 groundwater and unrestricted use of floodplain property. All ICs would be stated in full or by reference within deeds, easements, mortgages, leases, or other instruments of property transfer. These controls would be drafted, implemented and enforced in cooperation with federal, state, and local governments. These covenants would be maintained as long as soil and groundwater contaminants remained at concentrations above cleanup levels. If future land use at AOC 57 is inconsistent with these ICs, then the site exposure scenarios for human health and the environment would be reevaluated to assess whether this response action remains appropriate.

Institutional Control Inspections. As presented in the ROD Section 12.1.2, the Army would prepare and submit an Institutional Control Monitoring Plan for regulatory agency review and concurrence as part of the site Draft Long Term Monitoring Plan (LTMP) (USACE, 2004), to detail the ICs to be incorporated/referenced within instruments of property transfer and ensure that the institutional control requirements were met. The plan would include a checklist of elements to be assessed during regularly scheduled on-site inspections and interviews with the site property owner, manager, or designee. If future land use at AOC 57 is inconsistent with these ICs, then the site exposure scenarios for human health and the environment would be re-evaluated to assess whether this response action is appropriate.

Environmental Monitoring. As presented in the ROD Section 12.1.2, environmental monitoring includes performing long-term groundwater and surface water sampling. Long-term groundwater sampling would assess for groundwater COCs (arsenic, cadmium, 1, 4-dichlorobenzene, PCE, EPH C11-C12 aromatics and PCBs) migration and monitor for the decrease of the groundwater COCs to concentrations that are protective of residential receptors.

Surface water sampling would be a component of environmental sampling to assess for off-site migration of human-health COCs in excess of PRGs via the groundwater to surface water pathway. The purpose of the surface water sampling would not be to collect additional ecological risk assessment data.

Sampling frequency, location, analytes, sampling procedures, and action levels for environmental monitoring would be detailed in the Draft LTMP and submitted to USEPA and MADEP for review and concurrence prior to implementing the environmental monitoring component of this alternative. Following attainment of groundwater cleanup levels, monitoring would be discontinued in accordance with the time frame specified in the Draft LTMP.

Five-Year Site Reviews. As presented in the ROD Section 12.1.2, since Alternative II-3 would result in contaminants remaining on site above concentrations allowing unrestricted use and to the extent required by law, the Army would review the site at least once every five years to ensure that the remedial action remains protective of human health and the environment. Five-year reviews would be performed as long as hazardous substances, pollutants, or contaminants remain onsite above concentrations that allow for unrestricted exposure and unlimited use.

4.3.4.2 Area 3 Selected Remedy Specific Components

The selected remedy for AOC 57 Area 3 Alternative III-2a contains components to reduce potential human-health risks associated with exposure to contaminated soil (floodplain) and groundwater (upland and floodplain) at the Area 3. A detailed description of Area 3 Alternative III-2a is presented in Section 12.2.2 of the ROD; the key components are summarized below.

Soil Excavation and Treatment/Disposal at an Off-site Treatment, Storage, or Disposal Facility. As presented in Section 12.2.2 of the ROD, Alternative III-2a included excavation of floodplain soil with elevated concentrations of organics that were believed to contribute to reducing (i.e., anaerobic) conditions and the release of naturally occurring arsenic to groundwater. In lieu of other site-specific data that related concentrations of soil organics to arsenic in groundwater, the ROD assumed that EPH C11-C22 aromatic range concentrations would be used as an indicator of organic concentrations. Because this alternative relies on ICs to achieve protection of human health under anticipated future land use scenarios, the ROD did not identify PRGs or cleanup criteria for the soil removal. The criteria would be developed during the design phase of the remedy.

It was anticipated that the excavation would occur in the floodplain around the southern edge of the 1999 soil excavation where concentrations of organics were believed to be greatest. The ROD estimated an average excavation depth of 3 ft and approximately 640 cubic yards of soil would be removed to be treated/disposed of at an approved off-site treatment, storage, or disposal facility. Implementation of the soil removal action are discussed in Section 4.3.5 of this report.

Wetlands Protection. As presented in the ROD Section 12.2.2, soil excavated within the 100-yr floodplain (220 ft. msl) and within delineated bordering vegetated wetlands would likely require wetland protection in accordance with the Massachusetts Wetland Protection Act and Regulations at 310 CMR 10.55. Wetland Protection activities would be performed as described for Alternative II-3, Section 4.3.4.1.

Prior to any excavation activities, wetlands delineation would be performed at Area 3. If the proposed construction area was confirmed to be within delineated vegetated wetlands, a pre-construction mitigation study would be performed to determine the impact to the affected area and the compensatory mitigation required as a result of the excavation activities. Once the extent of anticipated impacts was known, a mitigation/restoration plan would be prepared for regulatory agency review and concurrence. The primary goal of wetland restoration activities would be to restore affected fresh-water wetlands within the excavation area and disturbed during remedial activities.

Institutional Controls. As presented in Section 12.2.2 of the ROD, to protect possible future commercial workers and unrestricted use residents from exposure to groundwater and future unrestricted use residents from exposure to contaminated flood-plain soil in the event of future property transfer, the Army would include deed covenants to prohibit potable use of Area 3 groundwater and residential use of floodplain property.

Institutional Control Inspections. As presented in Section 12.2.2 of the ROD, the Army would prepare and submit an Institutional Control Monitoring Plan for regulatory agency review and concurrence as part of the site Draft LTMP to detail the ICs to be incorporated/referenced within instruments of property transfer and ensure that the institutional control requirements were met. The plan would include a checklist of elements to be assessed during regularly scheduled on-site inspections and interviews with the site property owner, manager, or designee. If future land use at AOC 57 is inconsistent with these ICs, then the site exposure scenarios for human health and the environment would be re-evaluated to assess whether this response action is appropriate.

Environmental Monitoring. As presented in Section 12.2.2 of the ROD, environmental monitoring would consist of performing long term groundwater and surface water sampling. Long term groundwater sampling would be performed to assess for decreases in arsenic; maintenance of PCE, cadmium, and 1, 4-DCB concentrations (upland and flood-plain COCs) at or below cleanup levels; and for the need for continued groundwater ICs to protect human receptors.

Surface water sampling would also be a component of environmental sampling to assess for off-site migration of human-health COCs in excess of PRGs via the groundwater to surface water pathway. The purpose of the surface water sampling would not be to collect additional ecological risk assessment data.

Sampling frequency, location, analytes, sampling procedures, and action levels for environmental monitoring would be detailed in the Draft LTMP and submitted to USEPA and MADEP for review and concurrence prior to implementing the environmental monitoring component of this alternative. Following attainment of groundwater cleanup levels, monitoring will be discontinued in accordance with the time frame specified in the Draft LTMP.

Five-Year Site Reviews. As presented in Section 12.2.2 of the ROD, Alternative III-2a would result in contaminants remaining on site above concentrations allowing unrestricted use and to the extent required by law, the Army would review the site at least once every five years to ensure that the remedial action remains protective of human health and the environment. Five-Year Reviews would be performed as long as hazardous substances, pollutants, or contaminants remain onsite above concentrations that allow for unrestricted exposure and unlimited use.

4.3.5 Remedy Implementation

Soil Excavation and Treatment/Disposal at an Off-site Treatment, Storage, or Disposal Facility
Contaminated soil removal was initiated in January 2002 based on the selected remedy in the ROD for Areas 2 and 3. The Army completed soil removal in January-February 2003 at A0C 57 Areas 2 and 3 under a Remedial Action Work Plan 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 between 2 to 4 feet. All confirmatory samples met the ROD cleanup criterion for EPH, and Area 3 was backfilled and the extent of removal was documented.

Soil removal actions were discontinued at Area 2 in February 2003 due to contamination apparently extending beyond the limits identified in the ROD and observed persistent seepage of petroleum waste into the open excavation after the removal work. 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 further delineate the extent of the contaminated soils, and to identify the source of the petroleum waste seepage. The additional soil sampling was conducted by the Army at the request of USEPA and MADEP, and 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 remaining 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 by Conti 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:

- 4,361 tons of contaminated material was excavated from Area 2 and approximately 197 tons were removed from Area 3. All contaminated soils were transported off-site for treatment/recycling in a thermal desorption process at Environmental Soils Management, Inc. (ESMI) in Loudon, NH.

- Twenty four (24), 55-gallon drums containing contaminated absorbent materials and personal protective equipment (PPE). These drums were transported to Onyx facility, TX for thermal destruction.

- Two (2), 55-gallon drums (an estimated 80-gallons) containing petroleum-contaminated liquids from skimming operations.

- One (1), 20 cubic-yard container of plastic liner co-mingled with contaminated soils.

- Two(2), 30 cubic-yard trash containers of construction wastes and decontaminated liner/cover materials

- 94,000-gallons of contaminated water from the excavations discharged to the Devens sewer system under a temporary discharge permit.

Current action consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, surface water monitoring, wetlands protection, ICs, IC inspections, annual reporting, and Five-Year site Reviews. These components enable continued assessment for compliance with established performance standards and reporting of the remedial progress. Performance standards were established in the Final Work Plan and consist of contaminant migration and remedial duration assessments. The performance standards are being used during long term groundwater monitoring to ensure that the effectiveness criteria set forth in the ROD continue to be met and remedial objectives are ultimately achieved.

Wetlands Protection

The removal contractor, 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 Draft Long-Term Monitoring Plan prepared by the USACE in March of 2004. The objectives of the wetlands restoration and monitoring plan are 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 and long-term monitoring and compliance with performance standards presented in the Draft 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.

The USACE inspected the wetland in June 2004 to monitor the habitat restoration sites. The results of that inspection indicated that Area 2, a seeded upland, was observed to be 75% well covered with grass/herbs, 20% with spotty cover and 5% bare/eroded. Vegetation of the Area 2 wetland exceeded the 75% indigenous wetland cover criterion. The Area 3 wetland showed mild erosion and that oaks planted on the upland slope had leafed out and reseeded. The inspection of Area 3 showed a successful wetland migration with greater than 75% of the cover established by native wetland plants.

Area 2 consists of an upland site that slopes downward to the restored wetland. Based on the 2004 inspections, it was concluded that the upland site met the Performance Standards. Seven red maples are at the base of the slope where the upland grades into the wetland. Thirty-four red maples have survived on the upland slope. Ground cover on the slope consisted of rabbit's foot clover, cow thistle and other grasses and herbs. Wanderers and colonizers seeding from off site, such as tree species like red maple and black birch with colonizing shrubs such as sweet fern are growing into the site. During the June-August observations, there was a small amount of erosion limited to the rock-lined drainage swale at the east side of the restoration. A silt barrier was present at the top of the slope. During the 2004 observations, silt from the adjacent upgradient un-vegetated upland area from construction activities related to the storm water detention pond being constructed for MassDevelopment had started to top the silt barrier and flow down the restored slope. This uncontrolled erosion and sedimentation resulted in additional erosion within the drainage swale and deposition of fine silt within the wetland and covering of vegetation.

Based on the above findings it was concluded that wetland restoration exceeded the Performance Standards. Soft rush, broad-leaved cattail, burr reed, cotton grass, tussock sedge, silky dogwood and alder are a partial list of species identified during the several monitoring visits. One small patch of phragmites was treated and no additional growth was noticed at the October site visit. Amphibian and/or reptile activities were evident such as turtle egg-nesting sites on the upland slope, and green/bull frogs in the small pools at the edge of the wetland. The silt fence was removed from the periphery of the wetland restoration prior to winter.

Based on the findings of the inspections it was recommended to divert uncontrolled drainage and resulting erosion and sedimentation from the upland area (up gradient of AOC 57) from construction activities related to the storm water detention pond from flowing onto AOC 57 Area 2. In May 2005, at a Restoration Advisory Board (RAB) on-site meeting, after the effects of drainage and erosion during the winter 2004-2005, the silt had directly impacted the restored wetland. There was a layer of silt covering the base of the wetland vegetation. The conclusions were that if this continues, the wetland will eventually be filled with the fine silt, negatively impacting the vegetation along with compromising restored wetland values and functions.

The red oaks growing on the upland slope and red maples at the wetland/upland interface are demonstrating the negative effects of deer browsing and vole damage. It was suggested wire cages be constructed and installed to prevent deer browse damage and plastic vole shields be installed to prevent girdling at the base of the tree. The wire cages can remain for several years and be removed when the trees can survive the browsing. The vole protectors are made of degradable plastic.

It was concluded that Area 3, consisting of upland slope and wetland restoration, more than exceeded the Performance Standards. The upland plant cover, ground and tree cover, is similar to AOC 57 Area 2. The wetland restoration also contains similar wetland vegetation as Area 2. As of October 2004, there was no evidence of erosion from the adjacent upland onto Area 2. Silt fence was removed October 2004 in order not to impact the migration of animals from the upland into the wetland for winter habitat. The installation of deer browse and vole protectors on the red maples and red oaks was recommended for Area 3.

Institutional Controls
In accordance with the ROD, ICs that prohibit the use of groundwater as a potable source and residential use of floodplain property are currently in effect at AOC 57. ICs are included in the Lease In Furtherance of Conveyance (LIFOC) currently in affect for all leased parcels including the AOC 57. The LIFOC agreement identifies the general restrictions and required actions that are in place to protect the remedy for AOC 57. Administrative ICs would be developed and detailed in the finding of suitability to transfer (FOST) and included with the Deed prior to transfer of the land parcels associated with AOC 57.

Institutional Controls Inspections
IC inspections were developed as part of Draft LTMP (USACE, 2004). The plan includes a checklist of elements to be assessed during regularly scheduled on-site inspections and interviews with the site property owner, manager, or designee. If future land use at AOC 57 is inconsistent with the ICs, then the site exposure scenarios for human health and the environment will be re-evaluated to assess whether this response action is appropriate. As part of the inspections, information about whether any excavations that would involve soil or groundwater are planned, and any proposed plans for sale or development of the property, will be gathered from personnel knowledgeable of the site and the ICs in place. The ICs in place are in effect and public access to both Areas 2 and 3 is unrestricted.

Environmental Monitoring
Long term monitoring is being performed by the USACE, New England District (NAE), Concord, Massachusetts. The first long term groundwater monitoring round was performed in December 2003 and the second groundwater monitoring round was completed in November 2004. Work is being performed in accordance with the Draft LTMP (USACE, 2004). Subsection 4.3.5.1 describes the performance standards for evaluation of alternatives that have been established for the long-term groundwater monitoring program. Subsection 4.3.5.2 summarizes the long-term groundwater monitoring program for Areas 2 and 3 and the wetland. These performance standards were developed as part of the Draft LTMP prepared by the USACE in March 2004. The Draft LTMP is currently under review and approval is pending.

Five-Year Site Reviews
Since the selected remedies for Area 2 and 3 result in contaminants remaining on site above concentrations allowing unrestricted use and to the extent required by law, review of the site is required every five years to ensure that the remedial action remains protective of human health and the environment. This is the first Five-Year Review for AOC 57. Five-Year Reviews will be performed as long as hazardous substances, pollutants, or contaminants remain on site above concentrations that allow for unrestricted exposure and unlimited use.

4.3.5.1 Evaluation of Alternative Performance

If there is indication that contaminants are migrating downgradient from the former source area, the Army, in conjunction with MADEP and USEPA representatives, will evaluate the need for additional action. Contaminants will be deemed to be migrating downgradient if any COCs are detected above their respective action levels in designated sentry wells. The groundwater and brook elevation data will be reviewed to determine if flow direction remains constant and if the monitoring locations continue to be strategically located for detecting off-site migration of COCs. The Draft LTMP will be revised if groundwater flow direction appears to differ from RI interpretations. Similarly, if the future proposed land use at AOC 57 is inconsistent with implemented ICs, then the site exposure scenarios to human health and the environment will be re-evaluated to ensure that the response action at AOC 57 is appropriate. More frequent reviews will be performed if site conditions change significantly.

Monitoring will continue until all monitored wells are below action levels for two consecutive sampling rounds and the Army, MADEP, and USEPA agree that the site can be administratively closed out. At this time it is too early in the LTMP to predict when groundwater contamination will all be below their cleanup goals.

Assessment of Monitoring and Site Inspection Data

Groundwater and surface water monitoring, wetland inspection and ICs inspection data will continue to be reported in the Annual Reports. Data will continue to be evaluated for detection of COCs concentrations that exceed action levels at the downgradient sentry wells. Data at source area wells will also be evaluated through time to observe trends in contaminant concentrations. It is expected that, once sufficient data are available, the data will be tracked using a linear regression or other useful approach. As data accumulate, it may become apparent that other regression analyses or statistical tests may become more appropriate for analysis of the distribution of the data. Proposal for the modification of assessment of the data will be presented in the annual report for review and approval by the regulatory agencies prior to implementing a change. The results of the IC checks will continue to be assessed and reported in the Annual Reports.

4.3.5.2 Draft Long Term Monitoring Plan Summary

Draft Long Term Monitoring Plan Summary

In 2005, a Draft LTMP was submitted to the USEPA. The Draft LTMP stipulated the monitoring wells and surface water locations to be sampled, in addition to wetland restoration and IC inspections. Salient points of these plans for each area are summarized for convenience in the following paragraphs.

Groundwater samples are collected from eight monitoring wells, three surface water locations and 4 sump locations. Water levels are measured at nine monitoring wells and five piezometers to determine groundwater flow directions. Two of the surface water locations are located in Area 2 at the fringe of the marsh very close to the edge of the remedial action excavation limit. One surface water location is located at Area 3 downstream of the remedial action excavation. Groundwater flow direction at Areas 2 and 3 is to the southeast, toward the Cold Spring Brook wetland.

Area 2 As part of the Draft LTMP, six monitoring wells and two surface water locations, (located within the site boundaries) will be sampled for VOCs, EPH, PCBs, target analyte list (TAL) metals, general inorganics, and general water quality parameters. The COCs are arsenic, tetrachloroethylene, EPH C11-C22 aromatics, and PCBs. Water level measurements will be collected from remaining wells and piezometers (USACE-NAD, 2004).

Recently installed monitoring wells include 57M-03-01X, 57M-03-02X, 57M-03-03X, 57M-03-04X, 57M-03-05X and 57M-03-06X. Refer to Figure 3 presented in Appendix C for monitoring well locations.

Existing monitoring wells include 57M-95-05X, 57M-95-06X and 57M-95-07X (water levels only).

Recently installed piezometers include 57Z-03-02X, 57Z-03-03X, 57Z-03-04X, 57Z-03-05X and 57Z-03-06X.

Surface water locations SW-1 and SW-2 will be monitored for decrease in COC concentration and decrease in the potential for off-site migration.

The four sumps located within the groundwater interception trench installed by the remediation contractor between the soil excavation area and the wetlands are checked semi-annually and serviced as needed.

Area 3. As part of the Draft LTMP two existing monitoring wells and one surface water location (located within the site boundaries) will be sampled for VOCs, EPH, PCBs, target analyte list (TAL) metals, general inorganics, and general water quality parameters. The COCs are arsenic, cadmium, 1,4-dichloroethylene, tetrachloroethylene, EPH C11-C22 aromatics, and PCBs (USACE-NAE, 2004).

Existing monitoring wells include 57M-95-03X, 57M-96-11X and 57M-96-12X and 57M-96-13X (water levels only). Refer to Figure 3 presented in Appendix C for monitoring well locations.

The surface water location SW-1 will be monitored for decrease in COC concentration and decrease in the potential for off-site migration.

Long term monitoring is being performed by the USACE, NAE, Concord, Massachusetts. The first long term groundwater monitoring round since completion of the remedial action completion report was performed in May 2004 and a second round was completed in November 2004. The Annual Report summarizes the data from the May 2004 round. Sampling was performed using low-flow collection procedures in accordance with USEPA Region I Low-Flow Sampling Procedures (USEPA, 1996) on a semi-annual basis in spring and fall. The number of monitoring wells sampled and parameters to be analyzed will be assessed for each round and any changes will be recommended in the Annual Report or at the five-year site reviews.

4.3.6 System Operations/Operation and Maintenance

Groundwater monitoring is being performed in accordance with the Draft LTMP (USACE, 2004) for AOC 57. Estimated O&M costs for groundwater monitoring at AOC 57 Areas 2 and 3 based on actual costs for 2004 are estimated as $100,000 per year for groundwater monitoring, wetland monitoring, IC inspections, and reporting.

4.4 Progress Since The Last Five-Year Review

This is the first Five-Year Review for AOC 57. Therefore, there are no follow-up actions to be assessed to achieve or to continue to ensure the protectiveness of human health.

4.5 Five-Year Review Process

4.5.1 Document Review

The following documents were reviewed for this five-year review:

- AOC 57 Record of Decision (ROD) prepared by Environmental Protection Agency, 2001.
- Explanation of Significant Differences (ESD) prepared by USACE-NAE, March 2004
- Draft Long Term Monitoring Plan (LTMP) prepared by USACE-NAE, March 2004.
- Remedial Action AOC 57 prepared by Conti Environmental, September 2004.
- 2003 Annual Report AOC 57 prepared by USACE-NAE, October 2004.

4.5.2 Data Review

The 2003 Annual Report (USACE, October 2004) presented data from the November 2002 and December 2003 monitoring rounds. The Annual Report (USACE, December 2004) presented data from the May 2004 monitoring round. A report summarizing the data from November 2004 monitoring round was not yet issued at the time that this Five-Year Site Review Report was prepared. However, preliminary results from the November 2004 round were available for review. Exceedances of target parameters detected during these monitoring rounds are summarized below. Complete summary tables from the applicable documents are presented in Appendix C.

Historic trends indicate that arsenic concentrations are increasing at Area 2 well 57M-03-04X and Area 3 well 57M-95-03X. Arsenic concentrations decreased steadily at Area 3 well 57M-96-11X with concentrations of 270 μg/l, 210 μg/l and 120 μg/l in December 2003, May 2004 and November 2004, respectively. Trichloroethene has increased steadily at Area 2 well 57M-03-02X with concentrations of 3.9 μg/l, 4.3 μg/l and 5.3 μg/l in December 2003, May 2004, and November 2004, respectively. Spring 2004 (May) results showed an exceedance of arsenic in Area 2 Sump 1, while results for Fall 2004 (November) showed an exceedance of arsenic in Area 2 Sump 4.

A review of the data also indicates that the elevated arsenic levels appear to be associated with locations where there are reducing conditions (negative ORP values). Reducing conditions can cause naturally occurring arsenic in the native soils to be mobilized, by converting it to the more soluble form. Reducing conditions may be related to the anaerobic wetland environment.

Table 4-8. Summary of Exceedances for AOC 57

Sampling Location	November 2002	December 2003	May 2004	November 2004 (1)
57M-95-03X Area 3	1,4-Dichlorobenzene (6.8 μg/L) Arsenic (180 μg/L)	No Exceedances	No Exceedances	1,4-Dichlorobenzene (13 μg/L – estimated) Arsenic (230 μg/L)
57M-96-11X Area 3	Arsenic (160 μg/L)	Arsenic (270 μg/L)	Arsenic (210 μg/L)	Arsenic (120 μg/L)
57-Area2-SW3 Surface Water	Arsenic (71μg/L)	No Exceedances	No Exceedances	No Exceedances
Sump 1 Area 2	No Exceedances	No Exceedances	Arsenic (55 μg/L)	No Exceedances
57M-03-04X	No Exceedances	No Exceedances	No Exceedances	Arsenic (50 μg/L)
Sump 4 Area 2	No Exceedances	No Exceedances	No Exceedances	Arsenic (62 μg/L)

Note (1): Data from November 2004 monitoring was obtained from available summary tables. A report, validating this data, was not reviewed.

4.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOC 57. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s (degrees Fahrenheit).

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 (Figure 2 reprinted from the ROD and presented in Appendix C). Area 1 consists of a former storm water outfall and drainage area for runoff from paved areas proximal to former Building 3713. Drainage from Area 1 meanders and eventually flows into Cold Spring Brook. Area 2 is located approximately 700 feet north of Area 1 and Area 3 is located approximately 600 feet to the northeast of Area 2.

Areas 1, 2, and 3 include an upland area that slopes downward to a delineated wetland area. At Area 2 the wetland boundary is located approximately 250 feet from Cold Spring Brook, and at Area 3 the wetland boundary is located approximately 500 feet from Cold Spring Brook. The upland area is forested with trees and scrub brush. The wetland area is densely vegetated with brush and contains small areas of standing water. Cold Spring Brook is described as a 4 to 6 foot wide meandering stream channel surrounded by 40 to 60 feet of scrub and emergent cattail marsh.

A major stormwater management structure was constructed immediately southwest of AOC 57 and was completed in 2004. The potential hydrologic impacts on the AOC 57 were considered in the design of the retention basin associated with this system.

Observed monitoring well protective casings were intact and secured. No evidence of excavation was noted at the site. MADEP noted that soil erosion, caused by surface water runoff, had entered the site from a rip-rap swale. Silt was observed in the swale due to the erosion of an upgradient source. In addition, orange staining was observed at groundwater breakouts at the toe of the slope near the Cold Spring Brook wetland at AOC 57.

4.5.4 Interviews

The following individuals were interviewed as part of the five-year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit. None of the personnel interviewed were aware of any reported problems with the selected remedy.

Mr. Tada indicated that the stormwater detention basin, located to the southwest of the AOC was lined and outfalls were constructed in a manner that would avoid potential impact to AOC 57 and the previously completed excavation areas.

4.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 57.

On February 23, 2001, the Army issued the Proposed Plan (PP) for AOC 57. In accordance with the PP, the Army, published public notices and held a public information meeting on March 8, 2001. The PP was also made available for review at local libraries and a formal 30-day public comment period was conducted from February 23 through April 25, 2001.

Currently, the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public.

Prior to finalization of the ESD in 2004, notifications were released to local newspapers for review and comment. Public site tours of AOC 57 were performed in June 2002, August 2004, and May 2005.

4.6 Technical Assessment

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

Remedial Action Performance: The initial rounds of groundwater monitoring have been performed following the Draft LTMP (USACE, 2004) as an interim measure, pending revision and approval. The Draft LTMP details the site monitoring that will be performed in order to meet the remedial goals for the site. Long term monitoring commenced December 2003 and the second round was collected in November 2004. Long term monitoring will continue to be performed until remedial goals are obtained to observe that remedial effectiveness criteria and objectives are achieved.

The Draft LTMP also details the assessment and reporting of the site inspections and monitoring to be completed at AOC 57. Data will be evaluated for detection of COC concentrations that exceed action levels at the downgradient sentry wells. Data at source area wells will also be evaluated twice per year to observe trends in contaminant concentrations and off-site migration. Proposed modifications to the assessments will be presented in the Annual Reports for review and approval by the regulatory agencies prior to implementation. The Army will prepare an Operating Properly and Successfully (OPS) demonstration for AOC 57 during fall 2005.

System Operations/Operation and Maintenance (Long Term Groundwater Monitoring): Groundwater monitoring is being performed in accordance with the Draft LTMP for both Areas 2 and 3. Estimated O&M costs for groundwater monitoring, reporting, and wetlands inspections at AOC 57 Areas 2 and 3 are $100,000 per year.

Opportunities for Optimization: No reduction in sampled locations or sampling frequency, (currently performed in the spring and fall of each year), is recommended at this time.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. Recommendation for further assessment/remedial action will be provided in the Annual Report should analyses indicate that cleanup criteria will require greater than 30 years. Results of the Annual Report (USACE 2004) reports will be reviewed in the next five-year review.

Implementation of Institutional Controls and Other Measures: In accordance with the ROD, ICs prohibiting the potable use of groundwater and residential use of floodplain property are currently in effect at AOC 57. ICs are included in the Lease in Furtherance of Conveyance (LIFOC) currently in effect for all leased parcels, including the AOC 57. The LIFOC agreement identifies the general restrictions and required actions that are in place to protect the remedy for AOC 57. Administrative ICs would be developed and detailed in the Finding of Suitability to Transfer (FOST) and included with the Deed prior to transfer of the land parcels associated with AOC 57. There are no current or future plans for installation of potable water wells at either Area 2 or 3.

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

Changes in Standards and To Be Considered: As part of this five-year review, ARARs and TBC guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed. See Section 4.6.2, ARARs.

Excavation activities at AOC 57 were completed in October 2003. The RAOs for soil specified in the ROD have been permanently achieved. There are no current ARARs that apply to soil contaminants at the site. Following 2002 removal work and 2003 additional investigation work, the Army prepared an ESD adding EPH and PCBs as COCs in soil. These cleanup goals also have been met. Because the cleanup goals for soil at AOC 57 were based on human health risk assessment 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.

The MCLs are health-based guidelines established by the USEPA. The MCL for arsenic (50 μg/L) in effect at the time of the ROD was selected as a cleanup goal for groundwater. Arsenic was present on site at concentrations greater than its MCL (50 μg/L) during the remedial investigation and was a primary risk driver for the ingestion of groundwater exposure pathway at

AOC 57. The MCL for arsenic has been updated since the 2001 ROD; it was lowered to 10 µg/L, effective February 2002. Because the remedy prohibits the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the implemented remedy.

Since the MADEP Surface Water Standards are taken from the USEPA National Recommended Water Quality Criteria (Office of Water, Office of Science and Technology – 4304T, 2004) this document is considered applicable to AOC 57. This document establishes Criteria Maximum Concentrations (CMCs) and Criteria Continuous Concentrations (CCCs). CMCs are an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The CCCs are an estimate of the highest concentration of material to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect.

Review of the available data from December 2003 indicates that cadmium was estimated in Area2/SW-2 (0.33J µg/L) and Area3/SW-1 (0.75J µg/L) at concentrations slightly above the respective CCC of 0.25 µg/L. Lead was detected in Area3/SW-1 at a concentration of 34 µg/L and at an estimated concentrations of 2.6J µg/L in Area2/SW-3. The lead concentrations exceed the CCC for lead of 2.5 µg/L. No exceedances of CMCs were observed during the December 2003 sampling round and no exceedance of CMCs or CCCs were observed during the November 2004 sampling round. The surface water samples submitted for analysis of metals were analyzed for total metals. The elevated concentrations may be the result of particulates present in the surface water sample. In future sampling rounds, the surface water samples should be analyzed for dissolved metals. These criteria should continue to be evaluated during future monitoring events to ensure compliance.

Changes in Exposure Pathways: No current risks exist at the Site because there are no exposures. The ROD identified unacceptable risks from the following exposure pathways in Area 2 Wetland Area: ingestion, dermal contact, and inhalation of dust from subsurface soils by future construction workers and from surface and subsurface soils by future residents, and ingestion of groundwater as the primary drinking water source by future residents. The ROD identified unacceptable risks from the following exposure pathways in Area 3 Industrial Area: ingestion of groundwater as the primary drinking water source by future commercial/industrial workers and future residents. The ROD identified unacceptable risks from the following exposure pathways in Area 3 Wetland Area: ingestion, dermal contact, and inhalation of dust from subsurface soils and ingestion of groundwater as the primary drinking water source by future residents. Based on indications from analytical results of confirmatory soil samples collected from excavated areas, the excavation and removal of contaminated soil from AOC 57 have eliminated the potential soil exposure pathways. ICs prohibiting the use of site groundwater as drinking water at AOC 57 have eliminated the potential groundwater exposure pathways. Zoning restrictions prohibit residential use of the wetland areas of AOC 57. Land use at the Site has not changed since the ROD. Potential future uses remain consistent with potential future uses evaluated in the risk assessment supporting the ROD. Current land use is in compliance with proposed deed restrictions. No new contaminants, sources, or routes of exposure were identified. There is no indication that hydrologic/hydrogeologic conditions are not adequately characterized.

Changes in Exposure Assumptions: The risk assessments supporting the RODs for AOC 57 used exposure assumptions that were conventional at the time. Since that time, USEPA has updated some of the recommended dermal contact exposure assumptions. The 1998 draft guidance for evaluating dermal contact exposures used in the RI was finalized in July 2004 (*Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E,* *Supplemental Guidance for Dermal Risk Assessment – Final*). The final guidance includes slight changes in some dermal exposure assumptions. Because the remedy includes prohibiting the use of groundwater as drinking water and excavation of contaminated soils has been performed, changes to the exposure parameters do not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: Since the groundwater cleanup goals are based on drinking water standards and not on risk-based calculated concentrations, changes to the toxicity values do not impact the protectiveness of the groundwater cleanup goals. In addition, because the remedy includes prohibiting the use of groundwater as drinking water, changes to the toxicity values for groundwater contaminants do not affect the protectiveness of the remedy. Because the cleanup goals for soil at AOC 57 were based on human health risk assessment levels determined specifically for the site, changes in the toxicity values for soil contaminants could impact soil cleanup goals; however, since contaminated soil has been removed, changes to soil contaminant toxicity do not affect the protectiveness of the implemented remedy.

Changes in Risk Assessment Methodologies: The human health and ecological risks discussed in the ROD have been prevented by the excavation and removal of soils and the ICs, including the proposed deed restriction prohibiting the use of groundwater as drinking water and residential use of floodplain property. Therefore, any risk assessment methodology changes would not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at AOC 57 during this review period.

4.6.1 Summary of Technical Assessment

No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. Excavation activities at AOC 57 were completed in October 2003. The RAOs for soil specified in the ROD have been permanently achieved.

While the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOC 57, these risk assessment methodology changes do not affect the protectiveness of the remedy, since the use of groundwater as drinking water has been prohibited.

Future surface water results should be compared to National Recommended Water Quality Criteria to ensure compliance and to determine if an impact to the protectiveness of the remedy has occurred.

4.6.2 Applicable or Relevant and Appropriate Requirements Review

The ARARs presented in Tables 14 through 19 of the ROD are reprinted and appended in Appendix C. These standards and regulations were current at the signing of the ROD, and for the five-year site review, have been reviewed for changes that could affect protectiveness. Separate

ARARs were selected for Area 2 and Area 3 of AOC 57. Since the remedy selected for Area 1 was No Further Action, no ARARs were specified for this remedy in the ROD.

The ARARs identified in the ROD for Areas 2 and 3 are identical, with the exception of Action-Specific ARARs pertaining to Area 2, which also include management of PCB-contaminated soil in accordance with 40 CFR Part 761 Subparts D and G [Toxic Substances Control Act (TSCA)].

Based upon available data, remedial actions completed at Areas 2 and 3 including soil and wetland excavation, excavation dewatering, soil disposal, wetland restoration, and continued long term monitoring were completed in accordance with the ROD-cited ARARs. It should be noted that no soil chemical-specific ARARs were cited in the ROD and all soil samples collected after excavation exhibited COC concentrations below their respective PRGs.

Changes and modifications to ARARs and TBCs other than those associated with the excavation activities are cited below:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

    a) The analyses and determination of compliance with 50 µg/L MCL for arsenic use the requirements of 141.23.

    b) The MCL for arsenic is 50 µg/L for community water systems until January 23, 2006.

    On January 22, 2001, USEPA adopted a new standard for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L (66 FR 6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 µg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 µg\L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- 310 CMR 30.00 "Hazardous Waste" was updated February 27, 2004. There are no revisions to 310 CMR 30.660-30.679 "Groundwater Protection" that affect the protectiveness of the remedy.

- 310 CMR 10.00 "Massachusetts Wetland Protection Regulations" were revised in February/March 2005. As part of this review, the March 2004 Draft LTMP for AOC 57 was examined for compliance with the revised regulations. The revisions to the regulations do not appear to impact the protectiveness of the remedy, as the Draft LTMP requires wetland restoration monitoring that is in accordance with the current Massachusetts regulations. It should be noted that according to the Draft LTMP, the delineated wetland boundary in Area 3 was outside of the area of excavation, and did not require replication activities.

4.7 Issues

Based on the findings of this review, the remedial actions performed at AOC 57 are compliant with the ROD and are considered to be protective to human health and the environment. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

Existing land use and site conditions will be assessed during the regularly scheduled on-site inspections to ensure that the IC requirements are still being met. If the future proposed land use at AOC 57 is inconsistent with these ICs, then the site exposure scenarios to human health and the environment will be re-evaluated to ensure that this response action is appropriate.

4.8 Recommendations And Follow Up Actions

Continue current remedial action activity, which consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, surface water monitoring, wetlands protection, ICs, IC inspections, annual reporting, and Five-Year site Reviews. These components enable continued assessment for compliance with performance standards and reporting of the remedial progress. Follow performance standards established in the Draft LTMP (USACE-NAE, 2004) and continue to assess for contaminant migration and remedial duration.

Long term monitoring should continue as specified in the AOC 57 Areas 2, and 3, Draft LTMP. The long-term monitoring is currently performed on a semi-annual basis (Spring and Fall each year). It is recommended that the reducing conditions observed at AOC 57 be assessed by the Army by plotting and contouring arsenic concentrations, as well as ORP and DO. The assessment would evaluate the relationship between arsenic levels and DO/ORP. Given the low and sparse detection of EPH at Area 3, and the fact that EPH is not a COC for this Area, it is recommended that no further analysis of EPH be conducted for Area 3 samples. It is recommended that piezometer 57P-98-04X be repaired and re-surveyed prior to the spring 2006 sampling event. It is also recommended that piezometer 57P-98-03X be re-surveyed, as there is no existing elevation data for the location.

Future surface water samples should be analyzed for dissolved metals (instead of total metals), and results should continue to be compared to National Recommended Water Quality Criteria to ensure compliance and to determine if an impact to the protectiveness of the remedy has occurred.

Based on the noted conditions and issues, the following follow up actions are planned for the AOC 57:

Recommendations/Follow Up Actions	Party Responsible	Oversight Agency	Milestone Date	Do Follow-Up Actions: Affect Protectiveness (Y/N)	
				Current	Future
Update Long-Term Monitoring Plan	Army, BRAC	USEPA	Spring 2006	Y	Y
Repair and Re-survey piezometer 57P-98-04X	Army Corps of Engineers	USEPA, Region 1	Prior to Spring 2006	N	N
Re-survey piezometer 57P-98-03X	Army Corps of Engineers	USEPA, Region 1	Prior to Spring 2006	N	N

4.9 Protectiveness Statement

The remedies at AOC 57 are protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled. Excavation activities at AOC 57 were completed in 2003.

A Health and Safety Plan (HASP) and Investigative Derived Waste (IDW) handling procedures are in place and are being properly implemented during groundwater and surface water sampling. The HASP and IDW procedures are sufficient to control risk to on-site workers and the public. Human health is currently not at risk at AOC 57 because groundwater at the AOC is not being used for potable use nor proposed for potable use and contaminated surface soils at AOC 57 have been excavated and removed from the site.

4.10 Next Review

This is the first Five-Year Review that has been performed at AOC 57. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for non-concurrence.

4.11 References

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5.0 AOC 43G AND 43J FIVE-YEAR POLICY SITE REVIEW

5.1 Site Chronology

The following tables outline the chronology of site events at Areas of Concern (AOCs) 43G and 43J:

Table 5-1 Chronology of Site Events for AOC 43G

Event	Date
Five gasoline Underground Storage Tanks (USTs) removed at Area 2	October 1990
One Waste oil UST removed at Area 3	May 1992
Site Investigation (SI) Report issued	August 1992
Supplemental Site Investigation (SSI) completed – No further action for Area 1, Study Area (SA) 43G designated as an AOC	January 1994
Remedial Investigation (RI)/ Feasibility Study (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
Record Of Decision (ROD) signature	October 1996
Devens Public Water Supply Zone II and III were finalized	September 1997
Intrinsic Remedial Assessment completed	November 1999
Long term groundwater monitoring	December 1999 to Present
First Five-Year Review	September 2000
Second Five-Year Review	September 2005

Table 5-2 Chronology of Site Events for AOC 43J

Event	Date
Abandoned gasoline Underground Storage Tank (UST) discovered	May 1992
Waste oil UST removed	May 1992
Gasoline UST removed	August 1992
Site Investigation (SI) Report complete	May 1993
Supplemental Site Investigation (SSI) completed –SA 43J designated as an AOC	January 1994
Remedial Investigation and Feasibility Study (RI/FS) completed	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
Long term groundwater monitoring	December 1999 to Present
First Five-Year Review	September 2000
Second Five-Year Review	September 2005

5.2 Background

Both Areas of Concern (AOCs) 43G and 43J are historic gas stations located within the Devens Reserve Forces Training Area (RFTA) in the Town of Harvard, Massachusetts (refer to Figure 1-1). AOC 43G is located on Queenstown Road in the central portion of the former Main Post. AOC 43J is located on Patton Road in the southern portion of the former Main Post.

These sites were combined administratively under one Record of Decision (ROD), but are described separately in the following subsections for clarity. Subsections 5.2.1 and 5.2.2 provide the site description and history for AOCs 43G and 43J, respectively. Refer to the introduction for general enforcement activities at Devens RFTA (i.e., initiation of a Master Environmental Plan (MEP), placement on the National Priority List (NPL), and signing of the Federal Facility Agreement (FFA).

5.2.1 AOC 43G Background

AOC 43G consists of an inactive Army Air Force Exchange Service (AAFES) gas station and historic gas station G. For purpose of field investigations, AOC 43G was divided into three areas (Figure 1-2 reprinted from the 2003 Annual Report and presented in Appendix D). Area 1 is the former location of historic gas station G. Areas 2 and 3 are associated with the AAFES gas station and are at the locations of former gasoline underground storage tanks (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 G, 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 1940's or early 1950's. 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 (Figure 1-2). Based on the results of the 1992 Site Investigation (SI) and 1993 Supplemental Site Investigation (SSI), no further action 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 feet 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 (installed as replacement USTs in 1990 within Area 2), associated pump islands, and a sand and gas trap (Area 3).

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 further define the distribution of contamination detected during the removal of three former 9,000-gallon and two former 10,000-gallon gasoline USTs (removed in 1990 within Area 2). Contaminants had also been detected during the removal of a 500-gallon waste oil UST (completed in 1992 within Area 3). The excavation for the UST removals was extended only 20 feet downward, because of the limited reach of the excavator. Although soil samples were collected from the walls of the excavation, no samples were collected from the base of the excavation. The waste oil UST removal was stopped prior to the removal of all contaminated soil because of concerns that Building 2008 would be undermined.

The 1993 SSI detected fuel related compounds, principally benzene, toluene, ethylbenzene, xylenes (BTEX), in site soil and groundwater because of leaking USTs and the sand and gas trap within Area 2 and 3. Due to the presence of soil and groundwater contamination, a Remedial Investigation (RI) and subsequent Feasibility Study (FS) were recommended for Areas 2 and 3.

The human-health risk assessment performed during the RI revealed that the estimated human-health risk from exposure to soils did not exceed the United States Environmental Protection Agency (USEPA) carcinogenic target risk range or non-carcinogenic target level. However, the RI Report concluded that an FS should be prUSEPAred to analyze potential remedial alternatives to reduce human-health risks associated with potential future commercial/industrial exposure to groundwater. In 1996, the Army completed a FS to analyzed potential remedial alternatives that addressed the groundwater contamination at AOC 43G.

All identified USTs at Areas 2 and 3 have been removed. The replacement 10,000-gallon gasoline USTs, and associated piping, were removed by United States Army Corps of Engineers – New England District (USACE-NAE) in July/August 1996. In addition, the sand and gas trap and residual soil contamination in Area 3 were removed during this removal action. In October 1996, the ROD was signed.

AAFES management of the station has been discontinued but the property has continued to be used for Army Reserve operations.

5.2.2 AOC 43J Background

At the time of base closure in 1996, the area around the location of AOC 43J was used as a vehicle storage yard and maintenance facility (former Building T-2446) for a Special Forces Unit of the U.S. 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 is paved with asphalt and surrounded by a chain-link fence with a locked gate located at the northern side of the yard (Figure 1-3 reprinted from the 2003 Annual Report and presented in Appendix D). AOC 43 J is within the Shebokin Supply Well Zone III.

Prior to construction of the Special Forces Unit vehicle maintenance facility, this area was historically used as a gas station/motor pool (historic gas station J) during the 1940's and 1950's. The structures of this historic gas station at AOC 43J consisted of a pump island and a small gasoline pump house. This gas station was reported to be a Type A station which had one 5,000-gallon (or possibly 5,140-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 1940's or early 1950's. No records were available on the decommissioning of this motor pool or the removal of the associated UST.

During the 1992 SI, an abandoned 5,000-gallon UST was detected at historic gas station J. This UST was added to the Fort 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 soil was removed and disposed of by the Army. Based on the collected soil data and the findings of the 1992 SI within the vicinity of the former USTs, additional investigations were recommended for historic gas station 43J.

In 1993, a SSI was performed, to further define the soil contamination detected during the SI and to install groundwater monitoring wells. The 1993 SSI investigations detected fuel related compounds, principally BTEX, in site soil and groundwater as a result of leaking USTs. 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 human health risk assessment performed during the RI revealed that the estimated human-health risk from exposure to soils did not exceed the USEPA carcinogenic target risk range or non-carcinogenic target level. However, the RI Report concluded that an FS should be prepared to analyze potential remedial alternatives to reduce human-health risks associated with potential future commercial/industrial exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives that addressed the groundwater contamination at AOC 43J. In October 1996, the ROD was signed.

The property has continued to be used for Army Reserve operations.

5.3 Remedial Actions

A ROD was signed in October 1996 documenting intrinsic remediation as the final selected cleanup remedy at both AOCs 43G and 43J (United States Army Environmental Center (USAEC), 1996). Remedial action objectives for the selected cleanup remedy at AOCs 43G and 43J are discussed in Subsections 5.3.1 and 5.3.2, respectively. Although Remedial Goals (RGs) are provided for both organic and inorganic Contaminants of Concern (COCs), groundwater remediation at both sites focuses on organic contamination. This is based on the premise that the naturally occurring inorganic chemicals within the groundwater have become more soluble because of microbial induced oxidation-reduction processes. Removal of the organics will return the groundwater quality (oxygen content, oxidation-reduction potential (ORP) pH to upgradient conditions resulting in less soluble inorganic fractions.

If manganese concentrations continue to exceed the Devens RFTA background concentration of 291 micrograms per liter (µg/L, and organic COCs are reduced to RGs at the site, the Army will consider establishing a new RG for manganese, based on current Reference Doses (RfD). This will be considered during the evaluation of the Long Term Monitoring Plan (LTMP) in the spring of 2006

5.3.1 Remedial Action Objectives at AOC 43G

The remedial action objectives pertaining to groundwater at AOC 43G are to:

- Protect potential commercial/industrial receptors located on the Army Reserves Forces Tranining Area (RFTA) property from exposure to groundwater having chemicals in excess of the following RGs: iron (9,100 µg/L), manganese (291 µg/L, nickel (100 µg/L.), benzene (5 µg/L, ethylbenzene (700 µg/L, and xylenes (10,000 µg/L).
- Protect potential commercial/industrial receptors located off the Army RFTA property from exposure to groundwater having chemicals in excess of the above RGs.

The RGs for benzene, ethylbenzene, xylenes, and nickel are the Maximum Contaminant Levels (MCLs) and Massachusetts Maximum Contaminant Levels (MMCLs). The RGs for iron and manganese are Devens RFTA inorganic background concentrations, because background concentrations exceeded the risk-based concentrations derived from available RfD values at the time of the RI/FS.

5.3.2 Remedial Action Objectives at AOC 43J

The remedial action objectives pertaining to groundwater at AOC 43J are to:

- Protect potential commercial/industrial receptors located on the RFTA property from exposure to groundwater having chemicals in excess of the following RGs: arsenic (50 μg/L, iron (9,100 μg/L), manganese (291 μg/L), benzene (5 μg/L), ethylbenzene (700 μg/L), toluene (1,000 μg/L), and carbon tetrachloride (5 μg/L).

- Protect potential commercial/industrial receptors located off the Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the above RGs.

The RGs for benzene, carbon tetrachloride, ethylbenzene, toluene, and arsenic are the MCLs and MMCLs. The RGs for iron and manganese are Devens RFTA inorganic background concentrations because background concentrations exceeded the risk-based concentrations derived from available RfD values.

5.3.3 Selected Remedy

The selected remedy at each site addresses long-term commercial/industrial exposure to contaminated groundwater, the principal known threat at both AOC 43G and 43J. Both of these sites are upgradient or within Zone IIIs that directly connect to Zone IIs of public water supplies. AOC 43J is situated within the Shebokin Supply Well Zone III. The selected remedial alternative for both AOC 43G and 43J relies on intrinsic remediation, groundwater and contaminant modeling, and long-term groundwater monitoring to evaluate the effectiveness of the alternative at controlling groundwater contamination and site risk. The remedy will mitigate existing groundwater contamination through natural attenuation and remediation and reduce the potential risk of future commercial/industrial exposure to contaminated groundwater. The major components of the selected remedy for both AOC 43G and 43J include:

1) Intrinsic bioremediation.
2) Intrinsic bioremediation assessment data collection and groundwater modeling.
3) Installing additional groundwater monitoring wells.
4) Long-term groundwater monitoring.
5) Annual data reports to USEPA and MADEP.
6) Five-Year Reviews.

The ROD states that 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 then 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 at either AOC above drinking water standards (MCLs/MMCL or risk-based concentration [i.e., groundwater cleanup levels]) and/or if the Five-Year Review indicates that the intrinsic remediation alternative is not protective of human health, the Army will implement an additional cleanup action to protect human health and the environment as required under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Should the Army change the use of either AOC, additional assessment and/or possible remedial action may be needed. In addition, if the Army transfers either AOC by lease or deed, an Environmental Baseline Survey (EBS) will be performed, and a determination will be made by the Army and USEPA whether the remedy remains protective of human health and the environment.

The general description of the alternative, Intrinsic Remediation, that is presented below applies to both AOCs 43G and 43J.

5.3.4 Remedy Components Specified by the ROD

The following text describes the remedial components as presented in the ROD for comparison with the activities completed at the site that are described in sub-section 5.3.5. The remedial action addresses long-term commercial/industrial exposure to contaminated groundwater, the principle known threat at both AOC 43G and 43J. The selected remedial alternative for both AOC 43G and 43J will mitigate existing groundwater contamination through natural attenuation and bioremediation and reduce the potential risks of future commercial/industrial exposure to contaminated groundwater. The major components of the selected remedy include:

- Intrinsic Bioremediation
- Intrinsic Bioremediation Assessment Data Collection and Groundwater Modeling.
- Installing Additional Groundwater Monitoring Wells
- Long-Term Groundwater Monitoring
- Annual Data Reports
- Five-Year Reviews

Intrinsic Bioremediation. As presented in the ROD Section 10.B.1, Intrinsic bioremediation was listed as the principal component in the selected remedy to meet the cleanup criteria specified in the ROD (Component No. 1). Based upon organic and inorganic speciation in the aquifer, it appears that biological degradation of the petroleum hydrocarbons is naturally occurring at both AOCs. Alternatives 2A (AOC 43G) and 2 (AOC 43J) allow the natural biological degradation (intrinsic remediation) of the COCs to continue at the site without interruption. To assess the effectiveness of biological degradation at the site, groundwater monitoring would be performed on a scheduled basis.

Intrinsic bioremediation would continue at both AOCs until the remedial action objectives are achieved. FS solute transport calculations, based upon degradation rates from literature, indicated that contaminants would not migrate off Army property.

Intrinsic Bioremediation Assessment (IRA) Data Collection and Groundwater Modeling. As presented in the ROD Section 10.B.1, prior to installation of additional groundwater monitoring wells and refinement of a LTMP (LTMP), additional data collection and modeling was required. A work plan would be perpared detailing the proposed activities of the intrinsic remediation assessment and would be submitted to the USEPA and Massachusetts Department of Environmental Protection (MADEP) for review prior to implementation. The additional data collection would consist of supplemental soil sampling and free product assessment in bedrock below the former gasoline USTs (at AOCs 43G), and installation of additional bedrock groundwater monitoring wells (at AOC 43J). Additional rounds of groundwater sampling and analysis to refine estimates of intrinsic remediation effectiveness in protecting downgradient receptors would be performed at both AOCs. Collected data would include groundwater elevation, intrinsic remediation indicators, and COC concentrations. Groundwater elevation data would supplement the existing Devens RFTA water level data base for both sites and would be used to refine groundwater flow direction. Intrinsic remediation indicator data (e.g., electron acceptor concentrations, nutrient concentrations, and ORP) would be used to verify occurring intrinsic remediation and determine future intrinsic remediation potential. COC concentration data would assist directly in estimating site-specific degradation rates and the effectiveness of intrinsic remediation in achieving groundwater cleanup levels. Criteria for contaminant evaluations will use risk-based concentrations, MCLs and/or MMCLs.

Data collected from the intrinsic remediation assessment groundwater sampling would be incorporated into fate and transport modeling. This modeling would assess the degradation and migration of the organic COCs and refine current estimates of intrinsic remediation effectiveness. Initial intrinsic remediation modeling would be performed as part of the alternative long term monitoring. The existing and the new groundwater information would be examined to determine the best location for additional groundwater monitoring wells and to finalize site-specific indicator data as required for the long term monitoring program. As additional monitoring data are collected during long term monitoring (see Long-Term Groundwater Monitoring in this subsection), the fate and transport modeling would be updated to allow the most accurate depiction of current and future groundwater conditions. The fate and transport model used for monitoring intrinsic remediation (such as Bioplume II or III) would be selected based upon the type of groundwater monitoring information gathered and market availability. Details of the model would proposed as part of the intrinsic remediation assessment work plan.

Installing Additional Groundwater Monitoring Wells. As presented in the ROD Section 10.B.1, additional groundwater monitoring wells would be required to improve data collection coverage in the overburden and bedrock within and downgradient of the AOCs. The ultimate number and location of additional groundwater monitoring wells for monitoring intrinsic remediation at the site would depend upon the fate and transport modeling results. These monitoring wells would be used to monitor contaminant plume location and concentration on Army property in the overburden and bedrock and to collect intrinsic biodegradation indicators. Final monitoring well locations and details would submitted for regulatory review and concurrence.

Long Term Groundwater Monitoring. As presented in the ROD Section 10.B.1, long term groundwater monitoring was proposed to enable assessment of the intrinsic remediation progress and permit detection of any potential migration of contaminants that exceed groundwater cleanup levels beyond Army property. Dependent upon the results of the fate and transport modeling, groundwater monitoring would be performed on an annual basis until three consecutive sampling rounds indicate that cleanup objectives have been met. The last two years of monitoring (confirmation) would be for only the COCs.

Annual Data Reports. As presented in the ROD Section 10.B.1, annual reports would be submitted to USEPA and MADEP which would include a description of site activities, a summary of the long term groundwater monitoring program results, and any modeling updates. The final detailed LTMP shall include performance standard that would determine the effectiveness of the remedial action. The final detailed LTMP would be developed in conjunction with regulatory agency review and comment.

Five-year Reviews. As presented in the ROD Section 10.B.1, under CERCLA, any remedial action that results in contaminants remaining on site in excess of levels that allow for unrestricted reuse must be reviewed at least every five years. During the Five-Year Reviews, an assessment is made of whether the implemented remedy continues to be protective of human health and the environment or whether the implementation of additional remedial action is appropriate.

The Five-Year Review will evaluate the alternative's effectiveness at reducing potential human-health risk from exposure to groundwater on-site and downgradient considering current and potential future receptors. This evaluation will be based on how successful the alternative is at attaining groundwater cleanup levels at the long term monitoring wells.

Specific criteria for evaluating the alternative's progress and effectiveness will be established upon completion of the intrinsic remediation assessment data collection and groundwater modeling to permit refinement of contaminant transport and biodegradation estimates.

If the data generated from the modeling or the long term groundwater monitoring efforts indicate that groundwater cleanup cannot be met within 30 years, a more aggressive remedial action will take place to enhance the intrinsic remediation alternative.

5.3.5 Remedy Implementation

Remedial Component 2 (the IRA and groundwater modeling) and Component 3 (installation of additional groundwater monitoring wells) were completed by Stone & Webster Environmental Technology & Services (SWETS) and HLA between 1998 and 1999 under contract with the USACE. The results of the intrinsic remediation assessment and associated field efforts are detailed in a Final Intrinsic Remediation Assessment (IRA) Report for each site (SWETS, 1999a, 1999b). These reports were the culmination of field efforts and numerous interim deliverables documenting that intrinsic remediation will effectively remediate the groundwater at AOCs 43G and 43J.

The IRA performed at both sites demonstrated that intrinsic remediation is working and the Army does not need to conduct additional cleanup actions. Based on modeling and statistical predictions, COCs will be less than the groundwater cleanup levels in less than 30 years and COCs will not migrate off the Army property. It should be noted that although modeling of data trend, performed for the MNA assessment indicated that the target cleanup timeframe would be met, there were some ambiguities noted during this assessment. The conditions noted included the apparent recalcitrance of heavier hydrocarbon fractions and an uncertain timeframe for the evolution of redox conditions (and consequently, inorganic concentrations). The IRA methodology and results are presented below.

5.3.5.1 IRA Lines of Evidence

The IRA utilized two lines of evidence to evaluate the effectiveness of intrinsic remediation as recommended by the protocol published by the U.S. Air Force Center for Environmental Excellence (AFCEE) including:

- Statistically significant historical trends in contaminant concentrations to show that a reduction in the total mass of concentrations is occurring at the site.
- Chemical analytical data in mass balance concentrations to show that electron acceptor concentrations in groundwater (oxygen, nitrate, sulfate, or iron) are sufficient to facilitate degradation of dissolved contaminants.
- A solute fate and transport model to predict future migration of contaminants and estimate concentrations at potential receptor locations.

5.3.5.2 IRA Field Activities

AOC 43G. Field work commenced in March 1997, and entailed soil sampling and assessment of free product on the groundwater below the former USTs that were removed in 1990. Field activities included advancement of three soil borings and sampling of soil and one groundwater monitoring well.

Sampling results from the March 1997 fieldwork identified several contaminants exceeding Massachusetts Contingency Plan (MCP) Method 1 S-3/GW-1 standards. However, statistical and modeling assessments performed as part of the intrinsic remediation assessment suggested that source groundwater contamination had been substantially reduced by UST and soil removal activities in this area. The Army installed a monitoring well in the area of the former gasoline USTs for monitoring and sampling during intrinsic remediation.

Eight rounds of groundwater sampling were conducted quarterly during 1997 and 1998 for the months of March, June, September, and December. Results of the eight rounds of groundwater sampling indicated a decrease in BTEX concentrations over time since the early SI/RI rounds.

AOC 43J. Field work commenced in March 1997 and entailed installation of one bedrock monitoring well at the source area and two bedrock monitoring wells at downgradient locations. The objective was to measure the hydraulic gradient between the overburden and bedrock aquifer to determine whether a vertical gradient exists. Additionally the data would provide information on whether volatile organic compounds (VOCs) and chlorinated solvents were present in bedrock groundwater at these three locations. Results of the vertical gradient monitoring suggested that seasonal downward/upward gradients may occur.

Eight rounds of groundwater sampling were conducted quarterly during 1997 and 1998 for the months of March, June, September, December. Results of the eight rounds groundwater sampling indicated a decrease in BTEX concentrations over time since the early SI/RI rounds.

5.3.5.3 Statistical Analysis

The Mann-Kendall test for trends was used as the first line of evidence to assess statistically, at the 95 percent confidence level, whether contaminant concentrations at AOC 43G and AOC 43J have been decreasing throughout the Groundwater Sampling Program. Data used in the statistical analyses were collected from the seven quarterly IRA groundwater sampling rounds (June 1997 through December 1998), the IRA groundwater sampling round (March 1997) and from up to four rounds of historical data (SSI/RI September 1993, January 1994, December 1994, and March 1995 rounds).

Input parameters, variables, and the statistical approach considered during the Mann-Kendall test are included in the Final IRA Report (SWETS, 1999a, 1999b).

AOC 43G. The statistical results for BTEX showed that all but four well/contaminant pairs evaluated (or 28 of 32 combinations) exhibit a statistically significant downward trend at the 95 percent confidence level. The four well/parameter pairs that do not meet this confidence level exhibit a decreasing trend in concentration, but at the 80 to 90 percent confidence level. Only two of these four pairs have had MCL exceedances in 1997 though 1998 (AAFES 6/benzene and XGM-97-12X/benzene). Using the most conservative data set, the regression models predict that benzene concentrations in all selected wells will be at or below the MCL by October 2011, which follows the signing of the ROD by only 15 years. This duration is within the 30-year remedial duration (year 2026) specified in the ROD. It was noted that uncertainties involved in predicting the course of contaminant reduction exist and the estimates are dependant upon the assumption that concentrations will continue to decline at rates consistent with the historical data. As a result, long term monitoring was proposed to evaluate the predicted decline in contaminant concentrations.

Statistical trends within VPH data were not as evident as with the BTEX data. Three of the eight wells evaluated exhibited a statistically significant downward trend at the 95 percent confidence level for only one of the three VPH carbon chain groups. However, VPH performance standards were being met at the time of the analysis. The Army will develop risk-based VPH values if MCP Method 1 GW-1 concentrations for VPH are exceeded at the boundary or other compliance point. Groundwater sampling during intrinsic remediation assessment revealed that there is not an imminent possibility of VPH concentrations that exceed MCP criteria reaching the RFTA boundary. Long-term groundwater monitoring for VPH was recommended to continue assessment of VPH trends. These trends were not used to assess progress towards meeting on-site remediation goals. Rather, the data was used in assessing the potential for off-site migration of VPH concentrations that exceed boundary performance standards.

AOC 43J. The Mann-Kendall test results for BTEX trends reveal that the source area overburden groundwater monitoring wells at AOC 43J exhibit a statistically downward trend at the 95 percent confidence level for almost all the well/contaminant pairs that historically have exceeded MCLs. The only exception in the source area occurred in XJM-97-05X for ethylbenzene and toluene. Although a statistically downward trend at the 95 percent confidence level is achieved for benzene in XJM-97-05X, a downward trend is distinguishable at a slightly lower (92 to 94 percent) confidence level for ethylbenzene and toluene. However, consideration of seasonal effects (i.e. changes in groundwater elevation) resulted in the finding that the ethylbenzene concentrations in XJM-94-05X have been significantly decreasing since 1994, a result not identified in the less powerful, non-parametric Mann-Kendall trend analysis.

With the exception of monitoring well 2446-02, the regression model predicted that the MCLs would be achieved by the end of 2004. This is only 8 years following the signing of ROD and within the 30-year monitoring period defined by the ROD. The regression analysis for well 2446-02 predicted that all MCLs would be achieved by the year 2001. However, because of the relatively weak correlation coefficients for the three regression models for well 2446-02 (and the large unexplained variance terms; i.e., mean square errors), no meaningful conservative upper bound estimate of cleanup duration could be derived at the time of the IRA for well 2446-02. The COC concentrations detected in well 2446-02 during the December 1998 sampling event deviated greatly from the generally decreasing trend observed in during the previous six years, contributing to the weak correlation in the regression analysis. It was premature to determine whether the recent analytical results were factual or not. Additional sampling of this well was required as part of the long-term monitoring program to refine cleanup duration estimated and to enable continued assessment and reporting of the remedial process.

The bedrock well XJM-97-12X, within the source area, did not show a decreasing statistical trend for benzene and ethylbenzene using the Mann-Kendall test, primarily because of elevated concentrations detected in the previous three groundwater sampling rounds (performed in 1998). These concentrations are expected to decrease with degradation of the overburden plume. Further sampling should improve statistical analysis of variability in vertical gradients and flow direction. Consideration of seasonal effects (i.e., changes in groundwater elevation) resulted in the finding that the ethylbenzene concentrations in XJM-97-12X have been significantly decreasing since 1997, a result not identified in the less powerful non-parametric Mann-Kendall trend analysis.

Statistical trends of the VPH data were not as evident as the BTEX data, but VPH performance standards were being met at the time of the IRA. As detailed in the IRA Work Plan (SWETS, 1997a), the Army will develop risk-based VPH values if MCP Method 1 GW-1 concentrations are exceeded at the boundary or other compliance point. Groundwater sampling during the IRA revealed that VPH concentrations exceeding MCP criteria at the RFTA boundary were unlikely.

Long-term groundwater monitoring for VPH was recommended to continue assessment of VPH trends.

Overall, the trend and regression analysis for BTEX in the source area wells strongly supported the finding that degradation is occurring, and that concentrations above groundwater cleanup levels, MCLs, or MMCLs were not likely to expand or migrate to established compliance points. Furthermore, subject to refinement of the cleanup period for well 2446-02, MCLs were believed to be achievable with the 30-year period specified in the ROD. It should be noted, however, that uncertainties in predicting the contaminant reduction were dependant upon the assumption that concentrations will continue to decline at historical rates. Long term groundwater monitoring will be performed to verify these statistical predictions.

5.3.5.4 Assimilative Capacity Calculations

The second line of evidence to document the occurrence of intrinsic remediation is assimilative capacity (mass balance) calculations using collected chemical analytical field data. The calculations verified that electron acceptor concentrations in groundwater (i.e., primarily sulfate, manganese, iron and oxygen at AOC 43G and sulfate and oxygen at AOC 43J) are sufficient to facilitate degradation of dissolved contaminants. BIOSCREEN modeling further supports the conclusions of the adequacy of intrinsic remediation. It suggests that even with possibly continuing residual sources (both sites have undergone substantial removal actions) the extent of the plume as defined by the remediation goal would be limited to about 25 feet from one of the source area wells at AOC 43G and to about 90 feet from the assumed source centriod at AOC 43J. These distances put the furthest extent of the plumes (above RGs) well with the existing Devens RFTA boundary. This modeling was supportive of the third evaluation criteria as set forth in the ROD: that plumes with concentrations exceeding MCLs would not increase in size and migrate off the Army property.

5.3.5.5 Fate and Transport Modeling

Solute fate and transport modeling was used as part of the second line of evidence, in conjunction with assimilative capacity calculations, to support the viability of intrinsic remediation as an acceptable remedial alternative. Results from the BIOPLUME II modeling were used to estimate remedial duration and plume migration potential. Modeling demonstrated an unlikely potential for benzene plume 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 at each site. 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. Benzene criterion at AOC 43J is predicted to be achieved between 7 and 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.

5.3.6 Remedial LTM Status Since the June 2000 Five-Year Review

This is the second Five-Year Review for AOCs 43G and 43J. The IRA Report (SWETS, 1999a, 1999b), the final deliverable of the intrinsic remediation assessment, supports the conclusion that the selected remedy will effectively remediate groundwater at AOCs 43G & 43J. Through submission and approval of the IRA Report, Components 2 and 3 of the selected remedy were achieved. No contingency action was required at the time of the IRA at either AOC.

Current action consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, annual reporting, and Five-Year site Reviews (Components No. 4, 5 and 6 respectively). These Components enable continued assessment for compliance with established performance standards and reporting of the remedial progress. Performance standards were established in the intrinsic remediation assessment, consisting of contaminant migration and remedial duration assessments. The performance standards are being used during long-term groundwater monitoring to ensure that the effectiveness criteria set forth in the ROD continue to be met and remedial objectives are ultimately achieved.

Long term monitoring is being performed by the USACE-NAE, Concord, Massachusetts. The first long term groundwater monitoring round since completion of the intrinsic remediation assessment was performed in December 1999. Annual sampling rounds have been performed by the USACE each year since 1999 to 2004. The next sampling round is scheduled for November or December 2005.

5.3.6.1 Groundwater Performance Standards

Groundwater performance standards, regression analysis are used to ensure that the effectiveness criteria set forth in the ROD and presented in the LTMP (SWETS, 1999a,b) continue to be met and remedial objectives are ultimately achieved. Both the statistical analysis and modeling suggest that organic COCs will likely be reduced to cleanup levels within the duration criteria specified in the ROD. The modeling further supports the position that the groundwater plume with concentrations exceeding MCLs will not increase in size and migrate off Army property. Two sets of performance standards are presented below for use in the long-term monitoring program:

Contaminant Migration Assessment. Intrinsic remediation at AOCs 43G and 43J will continue to be considered effective if the groundwater plume with concentrations exceeding MCLs will not increase in size and migrate off Army property.

Performance Standard: Additional field actions will be implemented if: MCL exceedances are detected in the sentry wells. Sentry wells are identified in the LTMP (SWETS, 1999a, b). Refer to Subsection 5.3.6.3 for a summary of this plan.

The additional field actions will depend upon the degree of exceedance (i.e., how elevated the exceedance is, how many wells have exceedances, characteristic of the exceedance in comparison with historical data, proximity of the exceedance to the Army boundary). The time frame for implementing the field action will be commensurate with the severity of the degree of exceedance. If the exceedance is out of characteristic with historical data (i.e., no previous exceedances), likely field actions (in order of increasing severity of the exceedance) are:

1) Resample the affected well for the COC prior to the next sampling round.
2) Immediately sample adjacent downgradient/crossgradient wells for the COC if not already included in the long term groundwater-sampling event.
3) Sample all wells prior to the next scheduled sampling round for intrinsic remediation assessment parameters and COCs for comparison with intrinsic remediation assessment sampling results.

4) Immediately install additional groundwater monitoring wells downgradient/ crossgradient of the affected well(s) and sample.

Recommendations for the field action will be made within the Annual Report for review and approval. Following approval, the Annual Report will be followed up with an Interim Field Action Memorandum detailing the results of the approved field actions and, if needed, recommendations for revised remedial action (i.e. - increased sampling frequency, modeling refinement, initiate additional cleanup actions).

Remedial Duration Assessment. Intrinsic remediation at AOCs 43G and 43J will continue to be considered effective if COCs will be reduced to cleanup levels within the duration criteria specified in the ROD.

Performance Standard: The need for additional assessment/remedial action will be evaluated if source area well data indicate that COCs will not be reduced within 30 years. Source area wells to be sampled are included in the LTMP (SWETS, 1999a, b). Refer to Subsection 5.3.6.3 for a summary of this plan.

Data evaluation will be performed for source area well/COC pairs that currently exceed cleanup concentrations and results will be included in the Annual Report. The need for updating the fate and transport model will also be evaluated based on the sampling results. Recommendation for further assessment/remedial action will be provided in the Report should analyses indicate that cleanup criteria would require greater than 30 years.

5.3.6.2 VPH Boundary Standard.

The Army also uses the MCP Method 1 GW-1 concentrations for VPH boundary performance standards. RGs within the plume are not established for VPH. However, if Method 1 GW-1 concentrations are exceeded at the boundary or compliance point, the Army will develop risk-based VPH concentrations. As concluded in the IRA, migration of VPH concentrations in exceedance of Method 1 GW-1 standards is not probable, and no risk-based concentrations are required at this time.

5.3.6.3 LTMP Summary

The LTMPs for each AOC are detailed in Appendix D of the Final Intrinsic Remediation Assessment Reports (SWETS, 1999a, b). Figures 1-2 and 1-3 from the LTMP, identifying the long-term monitoring (LTM) well network, are included in Appendix D. Sampling will be performed using low-flow collection procedures in accordance with USEPA Region I Low-Flow Sampling Procedures (USEPA, 1996) on an annual basis in November or December. The number of monitoring wells sampled and parameters to be analyzed will be assessed for each round and any changes will be recommended in the Annual Report or at the Five-Year Reviews. Salient points of these plans for each AOC are summarized for convenience in the following paragraphs.

AOC 43G

As part of the LTMP, nine existing monitoring wells (four source wells and five sentry wells located on the site perimeter) will be sampled for BTEX, VPH, iron, nickel and manganese.

Source wells include AAFES-2, AAFES-6, XGM-93-02X, and XGM-97-12X. Source well AAFES-6 was damaged and subsequently not sampled in the fall of 2002, November 2003 or October 2004. The damage to Source Well AAFES-6 has not compromised the overall effectiveness of the remedy; however, it is recommended that this source well be repaired or replaced.

Sentry wells include AAFES-5, XGM-94-04X, XGM-94-07X, XGM-94-08X and XGM-94-10X. Sentry wells XGM-94-07X, XGM-94-08X and XGM-94-10X are considered downgradient wells.

AOC 43J

Twelve existing monitoring wells (four source wells and eight sentry wells located on the site perimeter) will be sampled for BTEX, VPH, arsenic, iron, and manganese.

Source wells include 2446-02, 2446-03, XJM-94-05X, and XJM-97-12X.

Sentry wells include 2446-04, XJM-93-02X, XJM-93-03X, XJM-94-06X, XJM-94-08X, XJM-94-10X, XJM-97-11X, and XJM-97-13X. Sentry wells XJM-94-08X, XJM-94-10X, XJM-97-11X, and XJM-97-13X are considered downgradient perimeter wells.

LTM is performed by the USACE-NAE, Concord, Massachusetts. The first long-term groundwater monitoring round was performed in December 1999. Work is performed in accordance with the approved LTMP (SWETS, 1999 a, b).

5.3.7 System Operations/Operation and Maintenance

Groundwater monitoring is performed in accordance with the LTMP (SWETS 1999a, b) for AOCs 43G and 43J. Yearly Operation & Maintenance (O&M) costs for implementation of the remedy are not readily available for review.

5.4 Progress Since the Last Five-Year Review

This is the second Five-Year Review for AOCs 43G and 43J. The first Five-Year Review recommended the continuation of long-term groundwater monitoring, annual reporting, and Five-Year Reviews as specified in the ROD. It was recommended that the LTM continue in accordance with the LTMP (SWETS, 1999a, b), with the exception of the need to analyze for iron and nickel as COCs. This recommendation was not implemented, and the analysis of iron and nickel as COCs continues to be performed as part of the LTM since the last Five-Year Review. Otherwise, long-term monitoring is being performed as specified in the LTMP.

The 2000 Five-Year Review concluded that the remedies for AOC 43G and 43J were expected to protective to human health and the environment upon completion, and that immediate threats were addressed.

5.5 Five-Year Review Process

5.5.1 Document Review

The following documents were reviewed for this Five-Year Review:

- Final Remedial Investigation – AOC 43G prepared by ABB Environmental Services, Inc., February 1996.
- Final Remedial Investigation – AOC 43J prepared by ABB Environmental Services, Inc., February 1996.
- Final Record of Decision prepared by U.S. Army Environmental Center, October 17, 1996.
- First Five-Year Review prepared by Harding Lawson Associates, September 2000.
- 2003 Annual Report prepared by the U.S. Army Corps of Engineers, April 2004.

5.5.2 Data Review

The Annual Report summarizing the data from the October 2004 long-term groundwater monitoring round was not yet issued at the time this second Five-Year Review Report was prepared. However, preliminary results for AOCs 43G and 43J are presented in Appendix D as Tables 4-2 and 4-3 provided by the USACE. The 2003 and historical groundwater data are presented in Appendix D as Tables 4-2 through 4-6 reprinted from the 2003 Annual Report.

5.5.2.1 AOC 43G Data Review

Exceedance results for AOC 43G are summarized in the following tables. The following notes apply to these tables:

-	=	Results not available in reviewed data reports.
J	=	Estimated value detected below the practical quantitation limit (PQL).
U	=	Analyte is undetected at the laboratory PQL.
B	=	Analyte was detected in the associated laboratory blank.
NA	=	Not Applicable.
NS	=	Not Sampled.

Cleanup values as developed in the ROD (unless otherwise noted).

Table 5-3 Benzene – 5 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
AAFES-2	**62**	**36**	**43**	**26**	**9**	**6.6**
XGM-93-02X	**81**	**32**	**12**	**140**	**24**	**39**
XGM-97-12X	**270**	**550**	**700**	**780**	**290**	**260**

- Benzene has continually exceeded the cleanup goal in three source wells AAFES-2, XGM-93-02X and XGM-97-12X throughout the long-term monitoring program.

Table 5-4 Toluene – 1,000 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
XGM-97-12X	970	**1,100**	870	**1,000**	610	460

- Toluene was detected in source well XGM-97-12X at or above the cleanup goal in November 2000 and 2002. Concentrations of toluene were below the cleanup goal in 1999, 2001, 2003 and October 2004. There are no exceedances of toluene in any other wells.
- Toluene remains below the goal in all the sentry wells.

Table 5-5 C5-C8 Aliphatics 400 µg/L Cleanup Goal *

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
AAFES-2	ND	**1,400**	ND	**1,200**	**1,200**	**1,100U**
AAFES-6	370	420	290	ND	NS	NS
XGM-93-02X	ND	**570**	270	**790**	**410**	**570U**
XGM-97-12X	**970**	**1,300**	**1,100**	**1,100**	**1,100**	**1,100U**
Sentry Wells						
XGM-94-04X	ND	**420**	140	ND	ND	100U

Note: * C5 - C8 Aliphatic cleanup goal based on MCP Method 1 GW-1 Standards.

- Aliphatic concentrations have exceeded the cleanup goal in source wells AAFES-2, XGM-93-02X and XGM-97-12X throughout the long-term monitoring program.
- Aliphatic concentrations in all the sentry wells remain below the cleanup goal, with the exception of the results of 420 µg/L in XGM-94-04X detected in 2000.
- It should be noted that the C5–C8 Aliphatic detection limit for the 2004 source well samples was higher than the cleanup goal. Therefore, it is not known if the C5–C8 Aliphatics concentration in these exceed the cleanup goal.

Table 5-6 C9-C10 Aromatics 200 µg/L Cleanup Goal *

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
AAFES-2	**9,400**	**7,200**	**5,300**	**13,000**	**6,600**	**6,700**
XGM-93-02X	**510**	**2,300**	**1,100**	**3,600**	**1,600**	**3,700**
XGM-97-12X	**4,500**	**5,500**	**5,400**	**7,500**	**8,700**	**7,400**
Sentry Wells						
XGM-94-04X	**200**	**570**	170	28	ND	25U

Note: * C9–C10 Aromatic cleanup goal based on MCP Method 1 GW-1 Standards.

- Aromatic concentrations in source well AAFES-2, XGM-93-02X and XGM-97-12X have exceeded the cleanup goal throughout the long-term monitoring program.

- Aromatic concentrations in sentry wells XGM-94-08X exceeded the cleanup goal in the 2000 round only.

Table 5-7 Iron 9,100 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
AAFES-2	**24,000**	**20,000**	**27,000**	**26,000**	**14,000**	**20,000**
AAFES-6	**11,000**	**9,200**	**13,000**	**9,400**	NS	NS
XGM-93-02X	**30,000**	**18,000**	**11,000**	**24,000**	**15,000**	**28,000**
XGM-97-12X	**32,000**	**26,000**	**33,000**	**46,000**	**33,000**	**32,000**
Sentry Wells						
XGM-94-08X	4800	**13,000**	4,500	4,600	3,200	2,500

- Iron has continually exceeded the cleanup goal in three source wells AAFES-2, XGM-93-02X and XGM-97-12X throughout the long-term monitoring program. Concentrations of iron above the cleanup goal were historically detected in source well AAFES-6 before it was damaged.
- Iron concentrations in sentry well XGM-94-08X exceeded the cleanup goal in the October 2004 round. XGM-94-08X is considered a downgradient well.

Table 5-8 Manganese 291 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
AAFES-2	**4,600**	**3,900**	**4,800**	**3,700**	**3,100**	**4,000**
AAFES-6	**2,900**	**9,200**	**3,400**	**3,000**	NS	NS
XGM-93-02X	**3,900**	**2,500**	**1,900**	**2,500**	**1,900**	**2,600**
XGM-97-12X	**6,300**	**4,100**	**4,200**	**3,900**	**4,100**	**3,000**
Sentry Wells						
AAFES-5	**710**	180	190	27	21	89
XGM-94-04X	**2,900**	**2,200**	**3,400**	**2,000**	**1,400**	**790**
XGM-94-07X	**5,700**	**3,700**	**6,100**	**4,500**	**3,600**	**1,000**
XGM-94-08X	**4,500**	**4,600**	**4,900**	**3,600**	**3,600**	**3,800**
XGM-94-10X	**830**	**2,000**	**2,600**	31	120	**960**

- Manganese has continually exceeded the cleanup goal in three source wells (AAFES-2, XGM-93-02X and XGM-97-12X) and three sentry wells (XGM-94-04X, XGM-94-07X, and XGM-94-08X) throughout the long-term monitoring program. Concentrations of manganese above the cleanup goal were historically detected in source well AAFES-6 before it was damaged.
- Concentrations of manganese in sentry well XGM-94-10X were detected below the cleanup goal in November of 2002 and 2003. The concentration of manganese was detected above the cleanup goal again in October 2004.
- Sentry wells XGM-94-08X and XGM-94-10X are considered downgradient wells.

AOC 43G Regression Analysis

Regression analyses were conducted for source well/COC combinations for AOC 43G wells AAFES-2 and XGM-93-02X (USACE, 2004). These analyses provided an assessment tool to predict anticipated cleanup duration.

In the logarithmic model for AOC 43G, benzene concentrations were regressed against time for a period of 124 months beginning in September 1993. The trend shows that the concentrations have decreased by two orders of magnitude in AAFES-2 and XGM-93-02X. The model shows that the ideal dilution curve already reached the cleanup goal of 5 µg/L. The field results suggested that benzene concentrations are likely to persist for some time slightly above the cleanup goal. It should be noted that the analysis was only performed for benzene and other COCs do not show the same demonstrable decline. A more thorough review of remedial duration estimates will be performed as part of the LTMP update.

Nickel, ethylbenzene, and xylenes have historically been and continue to be below the cleanup goals of 100 µg/L, 700 µg/L and 10,000 µg/L respectively in all wells.

5.5.2.2 AOC 43J Data Review

Exceedances for AOC 43J are summarized in the following tables. The following notes apply to these tables:

- \- = Results not available in reviewed data reports.
- J = Estimated value detected below the PQL.
- U = Analyte is undetected at the laboratory PQL.
- B = Analyte was detected in the associated laboratory blank.
- NA = Not Applicable.
- NS = Not Sampled.

Cleanup values as developed in the ROD (unless otherwise noted).

Table 5-9 Benzene – 5 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**34**	**20**	**40**	**21**	**6.3**	**14**
2446-03	ND	1.2	**5.8**	0.8	1.0	2.2
XJM-94-05X	**16**	ND	**13**	ND	ND	2.0U
XJM-97-12X	**27**	**24**	**31**	**25**	**21**	**19**
Sentry Wells						
XJM-93-02X	**22**	0.59	ND	ND	1.3	3.8
XJM-97-11X	ND	ND	**13**	3.5	ND	2.0U

- Benzene continually exceeded the cleanup goal in source wells 2446-02 and XJM-97-12X throughout the LTM program.

- Benzene concentrations decreased below the cleanup goal in source wells 2446-03 and XJM-94-05X in November 2002 and have remained there through October 2004.
- Benzene decreased in sentry well XJM-97-11X to below the cleanup goal in November 2002 and has remained there through October 2004.

Table 5-10 Toluene – 1,000 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**2,400**	**2,600**	**1,900**	**1,200**	430	700

- Toluene was detected in source well 2446-02 above the cleanup goal through November 2002. Concentrations of toluene were below the cleanup goal in November 2003 and October 2004. In the October 2004 toluene was detected in source wells XJM-94-12X, XJM-94-05X, and 2446-03 below the cleanup goal. There are no exceedances in any other source wells.
- Toluene remains below the cleanup goal in all the sentry wells.

Table 5-11 Ethylbenzene 700 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**2,600**	**3,100**	**2,600**	**2,700**	**1,200**	**2,500**
2446-03	**780**	0.50	**1,100**	160	210	410
XJM-94-05X	110	150	**1,300**	7.3	58	6
XJM-97-12X	620	**720**	**1,800**	**840**	**1,000**	**1,500**
Sentry Wells						
2446-04	7.7	**720**	0.88	ND	ND	2.0U

- Ethylbenzene has continually been detected above the cleanup goal in source well 2446-02
- Ethylbenzene was continually detected above the cleanup goal in source well XJM-97-12X from 2000 through 2004
- Ethylbenzene decreased in sentry well 2446-04 to below cleanup goal in November 2001 and has remained below the cleanup goal through October 2004.

Table 5-12 C5-C8 Aliphatics 400 μg/L Cleanup Goal *

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**2,800**	**5,400**	**ND**	**2,100**	**2,700**	**4,600**
2446-03	ND	360	**ND**	**1,200**	**950**	**1,900**
XJM-97-12X	**2,100**	**5,100**	**6,700**	**5,700**	**6,900**	**8,500**
XJM-94-05X	240	**<1000**	**2800U**	100U	100U	**480**
Sentry Wells						
2446-04	ND	**1,900**	ND	240	110	320
XJM-97-11X	110	290	ND	**1,100**	ND	100U

Note: * C5 - C8 Aliphatic cleanup goal based on MCP Method 1 GW-1 Standards.

- Aliphatics concentrations have exceeded the cleanup goal in source wells 2446-02, 2446-03, and XJM-97-12X throughout the LTM program. Source well XJM-94-05X had an exceedance for the first time in October 2004.
- Aliphatics concentrations in sentry well XJM-97-11X dropped below the cleanup goal in November 2003 and remains below the goal in the remaining sentry wells.

Table 5-13 C9-C10 Aromatics 200 μg/L Cleanup Goal *

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**7,100**	**9,400**	**4,300**	**6,400**	**4,500**	**8,100**
2446-03	**3,600**	**330**	**3,300**	**1,500**	**1,300**	**2,900**
XJM-94-05X	**1,200**	**330**	**3,900**	38	**240**	**1,800**
XJM-97-12X	**4,400**	**6,300**	**4,000**	**4,700**	**5,000**	**6,500**
Sentry Wells						
2446-04	**430**	**4,600**	**350**	170	170	**310**
XJM-97-11X	33	**260**	**590**	**380**	ND	25U

Note: * C9--C10 Aromatic cleanup goal based on MCP Method 1 GW-1 Standards.

- Aromatic concentrations in source wells 2446-02, 2446-03, XJM-94-05X, and XJM-97-12X continue to exceed the cleanup goal throughout the LTM program.
- Aromatic concentrations in sentry well 2446-04 dropped below the cleanup goal in November 2002 and were again above the cleanup goal in October 2004. In November 2003, concentrations in sentry well XJM-97-11X dropped below the cleanup goal and remained below the clean up goal in October 2004.

The concentrations remain below the cleanup goal in the remaining sentry wells.

Table 5-14 Iron 9,100 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**33,000**	**30,000**	**26,000**	**31,000**	**35,000**	**34,000**
2446-03	**33,000**	**10,000**	**21,000**	**16,000**	**26,000**	**38,000**
XJM-94-05X	**13,000**	**14,000**	**31,000**	**550**	**36,000**	**15,000**
XJM-97-12X	**18,000**	**17,000**	**12,000**	**16,000**	**15,000**	**15,000**
Sentry Wells						
2446-04	**7,600**	**32,000**	**19,000**	**10,000**	**13,000**	**25,000**

- Iron has continually exceeded the cleanup goal in three source wells 2446-02, 2446-03, and XJM-97-12X throughout the LTM program. Iron decreased to below the cleanup goal in XJM-94-05X in November 2002, but has increased to above the cleanup goal in October 2004.
- Iron continues to exceed the cleanup goal in sentry well 2446-04.

Table 5-15 Manganese 291 µg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	17,000	16,000	11,000	13,000	7,700	12,000
2446-03	11,000	4,800	6,600	4,500	7,400	10,000
XJM-94-05X	5,400	6,600	5,800	340	2,100	6,400
XJM-97-12X	6,400	6,300	5,800	5,500	5,000	5,100
Sentry Wells						
2446-04	**6,400**	**11,000**	**4,900**	**4,000**	**5,400**	**4,300**
XJM-93-02X	**3,100**	61	**630**	200	**330**	**12,000**
XJM-93-03X	**110**	45	**1,200**	23	67	**660**
XJM-94-08X	**540**	**780**	**3,400**	**1,000**	**1,200**	**640**
XJM-94-10X	**330**	58	**3,400**	240	120	33
XJM-97-11X	**390**	**1,300**	**2,800**	**2,800**	**690**	**640**

- Manganese continues to exceed the cleanup goal in the four source wells.
- Manganese continues to exceed the cleanup goal in three sentry wells and has fluctuated in sentry wells XJM-93-02X and XJM-93-03X.
- XJM-93-08X, XJM-93-10X, and XJM-97-11X are considered downgradient wells.

Table 5-16 Arsenic 50 μg/L Cleanup Goal

Well Number	1999	2000	2001	2002	2003	2004
Source Wells						
2446-02	**80**	**150**	**110**	**110**	**150**	**93**
2446-03	**69**	48	**110**	31	46	**78**
XJM-94-05X	32	**73**	**130**	4.5	13	40
XJM-97-12X	**54**	**130**	**94**	**87**	**72**	**78**
Sentry Wells						
2446-04	17	**110**	**70**	24	30	100
XJM-93-02X	ND	**54**	ND	4.7	ND	5.0U
XJM-94-08X	25U	49	5.0U	16	5.0U	5.8
XJM-97-11X	25U	35	5.2	3.9J	5.0U	2.7J

- Arsenic has continually exceeded the cleanup goal in source wells 2446-02 and XJM-97-12X, and fell below the cleanup goal in source well XJM-94-05X. Concentrations increased from below the cleanup goal in source well 2446-03 in October 2004.
- Arsenic decreased below the cleanup goal in sentry well 2446-04 in November 2002, but has increased to above the goal in October 2004. The concentrations in the remaining sentry wells are below the cleanup goal.
- XJM-93-08X is considered a downgradient well.

AOC 43J Regression Analysis

The regression analysis for AOC 43J covers a period of 124 months beginning in September 1993 (USACE, 2004). In the regression model, the dependent variables were benzene and ethylbenzene concentrations regressed against the independent variable of time.

The trend for benzene in well 2446-02 shows that the concentrations have decreased by two orders of magnitude in the period through November 2003. The model shows that the ideal dilution curve already reached the cleanup goal of 5 μg/L. The field results suggest that benzene concentrations are likely to persist for some time slightly above the cleanup goal.

The trend for ethylbenzene in well 2446-02 shows that the concentrations are undulating from below the cleanup goals of 700 μg/L in the months of March 1997 and March through September 1998, but overall is above the cleanup goal. The present dataset is too variable to predict a future contaminant trend at the source. However, concentrations are likely to remain above the cleanup goal for some time. A more thorough evaluation of remedial duration estimates will be preformed as part of the LTMP update.

Seasonal fluctuations in groundwater elevations may be contributing to the observed variation in well chemistry and potentially mask the identification of a contaminant trend over time.

Exceedances of carbon tetrachloride were not reported at AOC 43J since sampling began in 1993.

5.5.2.3 VPH Boundary Standards

The analytical data from December 1999 through October 2004 was reviewed with respect to the VPH Boundary Standard described in the intrinsic remediation assessment and summarized in

Subsection 5.3.5.3. RGs within the plume are not established for VPH. However, if Method 1 GW-l concentrations are exceeded at the boundary or compliance point, the Army will develop risk-based VPH concentrations.

At AOC 43G, there were exceedances of VPH Method 1 GW-1 concentrations in sentry well XGM-94-04X, the C5-C8 aliphatic (420 μg/L) and C9-Cl0 aromatic (570 μg/L), in November 2000. Sentry well XGM-94-04X has not had an exceedance since that time. There have been no exceedances of the VPH Method 1 GW-1 concentrations in the other four sentry wells from December 1999 to October 2004. Sentry well XGM-94-04X is downgradient of the source are but is not located at the site perimeter. As summarized in Section 5.3.6.3, of the five sentry wells at AOC 43G, three are downgradient wells located at the site perimeter (XGM-94-07X, XGM-94-08X, and XGM-94-10X).

At AOC 43J, the only exceedance of VPH Method 1 GW-l concentrations within the sentry wells occurred for C9-C10 aromatic hydrocarbons in October 2004 at monitoring well 2446-04. The detected concentrations are consistent with historical observations. As shown in Figure 5-3, sentry well 2446-04 is located approximately 50 feet to the southeast of the former waste oil UST. Well 2446-04 is downgradient of the former waste oil UST, but is not located on the perimeter of AOC 43J.

A review of historical data for this well reveals that the Method 1 GW-1 standards have been exceeded in eight of thirteen groundwater-sampling rounds for C5-C8 aliphatics, and nine of thirteen groundwater sampling rounds for C9-C10 aromatics. VPH concentrations were below detection limits in XJM-94-06X, located approximately 100 feet farther downgradient, as well as in sentry wells XJM-93-02X, XJM-93-03X, XJM-94-08X, XJM-94-10X, and XJM-97-13X (in bedrock). Sentry well XJM-97-11X had VPH detections from November 2000 through November 2002 in exceedance of the Method 1 GW-1 standards. There have been no detections of VPH in this well in November 2003 and October 2004.

5.5.2.4 Remedial Duration Assessment

The 2003 Annual Report (USACE, 2004) concluded that benzene concentrations have decreased by two orders of magnitude since at both AOCs. However, analytical results suggest that benzene concentrations are likely to persist for some time, slightly above the cleanup goal. A more thorough evaluation of remedial duration estimates will be preformed as part of the LTMP update.

5.5.2.5 Contaminant Migration Assessment

The analytical data from December 1999 through October 2004 was reviewed with respect to the Contaminant Migration Assessment Performance Standard described in the intrinsic remediation assessment and summarized in Subsection 5.3.6.1. This standard states that additional field actions will be implemented if MCL exceedances are detected in the sentry wells and if concentrations are out of characteristic with historical data.

<u>AOC 43G</u>

An overall decreasing trend in benzene and toluene concentrations has been observed since 1999 in source area wells. The highest benzene concentration was 780 μg/L in source well XGM-97-12X in 2002. The benzene concentration detected in this well in the 2004 round was 260 μg/L. The highest toluene concentration was 1,100 μg/L in source well XGM-97-12X in 2002. The toluene concentration detected in this well in the 2004 round was 460 μg/L. Benzene and toluene have not been detected above their respective cleanup goals in sentry wells at AOC 43G.

Remaining COC concentrations have been fluctuating, but consistent with historical results in source and sentry wells. VPH compounds were detected in sentry wells above their respective cleanup goals, but have not been detected in downgradient wells above cleanup goals since 2000. Iron has been detected in source wells at concentrations above its cleanup goal. Iron has not been detected above its cleanup goal in a sentry well since 2000.

Since 1999, exceedances of manganese were observed in several sentry wells at AOC 43G. Two of the wells (XGM-94-08X and XGM-94-10X) are considered downgradient wells. Other than manganese, no other exceedances of COCs were observed in sentry wells over the past two years at AOC 43G; Area 3 is located approximately 600 ft. to the northeast of Area 2, south of former vehicle maintenance motor pools; however, fluctuations in contaminant results do exist.

<u>AOC 43J</u>

COC concentrations observed in AOC 43J have been fluctuating, but are consistent with historical results in source and sentry wells. Benzene has not been detected above its cleanup goal in sentry wells since 2001 (13 μg/L in 2001 to 3.8 μg/L in 2004). Ethylbenzene has not been detected above its cleanup goal in sentry wells since 2000 (720 μg/L to ND in 2004). The highest toluene concentration was 2,600 μg/L in well 2446-02 in 2000. The observed concentration in this well in 2004 was 700 μg/L, which is below the toluene cleanup goal.

The last exceedance of VPH compounds in sentry wells was observed in 2002 in well XJM-97-11X. VPH compounds were not observed above the detection limit in this well in 2003 and 2004.

Iron has routinely been detected in one sentry well (which is not a downgradient/perimeter well) above its cleanup goal. Arsenic was detected in one sentry well, above its cleanup goal in 2004. This well is considered a downgradient well, but it is not located on the perimeter of AOC 43J.

Since 1999, exceedances of manganese were observed in several sentry wells at AOC 43J. Three of the wells (XJM-94-08X, XJM-94-10X and XJM-97-11X) are considered downgradient wells. Manganese concentrations have been fluctuating in source area wells, but have been decreasing over the past several sampling rounds in the downgradient wells. The highest concentrations of manganese in the sentry wells were observed in 2002 (2,800 μg/L to 3,400 μg/L). The observed concentrations in these wells in 2004 ranged from 33 μg/L to 640 μg/L. Other than manganese, no other exceedances of COCs were observed in downgradient wells over the past two years at AOC 43J.

Arsenic has been detected above the cleanup goal in source area wells. The concentrations observed in 2004 were lower than the maximum concentrations detected in previous rounds in each respective well. Arsenic was detected in well 2446-04 at a concentration of 100 μg/L in 2004. The two previous results in this well were 30 μg/L in 2003 and 24 μg/L in 2002. This well is not considered a perimeter well. All arsenic concentrations in sentry wells have been less than 10 μg/L since 2002.

Overall, the analytical results indicated that intrinsic bioremediation is occurring; however, some COC concentrations have been fluctuating over the past several sampling rounds. Based on the most recent analytical results, it appears that manganese (above the cleanup goal of 291 μg/L may be migrating off AOC 43G and AOC 43J. The highest concentration of manganese in a downgradient well at AOC 43G was 3,800 (13 times the cleanup goal). The highest concentration of manganese in a downgradient well at AOC 43J was 640 (2.2 times the cleanup goal).

5.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOCs 43G and 43J. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s. AOC 43G consists of an inactive gas station and car wash, with paved and wooded areas. AOC 43J consists of two, one-story wood buildings with paved, landscaped and wooded areas.

No major changes to the site were noted during the site inspection at AOC 43G. The gas station remains inoperative, but the building is used by janitorial staff as office/storage space. Chemicals used for cleaning purposes are stored in metal cabinets located outside the building on the easterly side. Monitoring wells XGM-97-11X and XGM-97-12X are full of bricks and debris. However, XGM-97-12X was sampled in November 2004. Monitoring well AAFES-6 was damaged and has not been sampled for the past two groundwater sampling rounds (2003 and 2004). The remaining well protective casings and flush mounts were intact and secured. No evidence of excavation was noted at the site.

There were no signs of excavation within or near the pavement at AOC 43J. The fence surrounding the yard was intact and locked at both gates. All monitoring well casings and flush mounts were intact and secured.

5.5.4 Interviews

The following individuals were interviewed as part of the Five-Year Review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit. None of the personnel interviewed were aware of any reported problems with the monitored natural attenuation remedy.

5.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 43G and 43J.

In 1996, the Army issued the Proposed Plan (PP) for AOC 43G and 43J. In accordance with the PP, the Army published public notices and held a public information meeting on September 5, 1996. The PP was also made available for review at local libraries and a formal 30-day public comment period was conducted from August 25 through September 26, 1996.

Currently the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public.

5.6 Technical Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Remedial Action Performance: Long-term groundwater monitoring is performed on an annual basis to determine if contaminants are migrating off the site and to ensure that the intrinsic remediation remains protective of human health and the environment. Groundwater monitoring results are elevated in some sentry wells; this is an indication that contaminants might be migrating off-site. Issues associated with off-site migration are potential impacts to a public water supply Zone III for AOC 43G and potential wetlands/surface water impacts for AOC 43G.

System Operations/Operation and Maintenance (Long-term Groundwater Monitoring): Groundwater monitoring is being performed in accordance with the approved LTMP (SWETS, 1999a,b) for AOCs 43G and 43J. Yearly O&M costs for implementation of the remedy at each AOC are not yet available for review. Since iron exceedances have been noted in source area wells, above its respective cleanup goal, sampling for iron should continue.

Opportunities for Optimization: Based on review of historical data, the removal of nickel and carbon tetrachloride from the sampling program should be considered. Exceedances of nickel have not been observed since 1998 in AOC 43G and no exceedances of carbon tetrachloride were reported at AOC 43J since sampling began in 1993.

Early Indicators of Potential Remedy Failure: Manganese was detected in downgradient wells in both AOCs. No other COCs were detected above cleanup goals in downgradient wells. Overall, groundwater monitoring results have been generally consistent with expectations. The Army should develop more accurate projections of cleanup durations and re-evaluate the LTM network to assure that off-site contaminant migration is not taking place.

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells at AOCs 43G and 43J. There are no current or future plans for transfer of AOCs 43G and 43J from the RFTA at this time. If property transfer occurs in the future, ICs will be incorporated into the property deed or other instrument of property transfer. Until that time, the Installation Master Plan (IMP) (R&K Engineering, Inc., June 1999) will cover IC restrictions. The IMP identifies known environmental conditions, restrictions and required actions that are in place for AOCs 43G and 43J. The Army is currently updating the IMP, which will be finalized in spring 2006.

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

Changes in Standards and To Be Considered: As part of this Five-Year Review, ARARs and TBC guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed. See Section 5.6.2, ARARs.

The MCLs are health-based guidelines established by the Environmental Protection Agency. The MCL for arsenic (50 µg/L, in effect at the time of the ROD, was selected as a cleanup goal for groundwater. Arsenic was present on site at concentrations greater than 50 µg/L during the remedial investigation and as such was a primary risk driver for the ingestion of groundwater exposure pathway at AOC 43G and 43J. The MCL for arsenic has been updated since the 1997 ROD. In February 2002, the MCL for arsenic was lowered to 10 μg/L effective January 2006.

In September of 1997, MassDEP finalized the Zone II and III protection areas for Devens Public Supply wells. These were not available when the ROD was signed in 1996. AOC 43J is within the Shebokin Well Zone III. Zone III areas include the upgradient extent of the sand aquifer contributing to a Zone II.

Changes in Exposure Pathways: The ROD identified unacceptable risks from the following exposure pathway: ingestion of groundwater as the primary drinking water source for commercial/industrial workers at both AOC 43G and AOC 43J. Groundwater at the Site is not currently used as drinking water at either AOC 43G and AOC 43J. Thus, the ingestion of groundwater exposure pathway is of concern to future Site workers only. Land use at the Site has not changed from the industrial use evaluated prior to the ROD and is not expected to change. No new contaminants, sources, or routes of exposure were identified. There is no indication that hydrologic/hydrogeologic conditions are not adequately characterized. Groundwater monitoring data at each AOC suggest that organic COC concentrations are decreasing at source wells, but likely will remain above cleanup goals for some time. Groundwater data from sentry wells support the position that the BTEX groundwater plume with concentrations exceeding MCLs is not expanding or migrating off RFTA property.

Changes in Exposure Assumptions: The risk assessments supporting the RODs for AOC 43G and AOC 43J used exposure assumptions consistent with standard practice at the time. Those assumptions remain consistent with current risk assessment guidance.

Changes in Toxicity and Other Contaminant Characteristics: Iron was identified as a COC in the ROD because non-cancer health hazards from exposures to iron in groundwater exceeded a HI of 1. USEPA Region I has since indicated that the agency does not support evaluations of risk from exposures to iron because the RfD developed for iron is based on concentrations needed to protect against a nutritional deficiency (USEPA Region I Risk Updates, November 1996). Based on this guidance, non-cancer health risks would not be calculated for iron. Consequently, iron would not be considered a COC and total Site hazard indices would be lower.

USEPA issued a Lifetime Health Advisory of 0.3 mg/L for manganese in January 2004. This Health Advisory is protective of formula-fed infants younger than 6 months for exposures of up to 10 days. The advisory is To Be Considered (TBC). USEPA Region I currently supports an oral RfD for manganese of 0.07 mg/kg/day for ingestion of soil, sediments or food. USEPA Region I supports an oral RfD of 0.024 mg/Kg/day for manganese in drinking water. A revised cleanup goal is being considered based on the updated RfD value for water intake of (0.024 mg/kg/day). The revised risk-based cleanup goal is 876 μg/L for adults and 375 μg/L for children. Until the revised cleanup goals are approved, the more stringent background value of 291 μg/L should be utilized as the cleanup goal for manganese in groundwater.

USEPA's IRIS database currently lists a slightly lower oral cancer slope factor for arsenic (1.5) than the oral cancer slope factor used for arsenic in the risk assessments (1.75). Therefore, risks from exposure to arsenic may be overestimated.

USEPA's IRIS database currently lists a range of oral cancer slope factor for benzene ($1.5x10^{-2}$ to $5.5x10^{-2}$). Since the risk assessment used a cancer slope factor within the current range ($2.9x10^{-2}$), risks from exposure to benzene would be higher if the cancer slope factor from the high end of the range was used and lower if the cancer slope factor from the low end of the range was used.

Therefore, cancer risks from exposure to benzene may be over or under estimated. The USEPA's IRIS database currently lists a higher oral RfD for benzene ($4x10^{-3}$) than the oral RfD used for benzene in the risk assessments ($3x10^{-4}$). Therefore, non-cancer health risks from exposure to benzene may be overestimated.

Since the cleanup goals are based on drinking water standards and not on risk-based calculated concentrations, changes to the toxicity values do not impact the protectiveness of the cleanup goals.

Changes in Risk Assessment Methodologies: The methods for evaluating groundwater ingestion exposures have not substantially changed since the time of the risk assessments supporting the RODs for AOC 43G and AOC 43J. Therefore, risk assessment methodology changes do not affect the protectiveness of the remedy.

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

Groundwater monitoring results are elevated in some sentry wells; this is an indication that contaminants might be migrating off-site. Issues associated with off-site migration are potential impacts to a public water supply Zone III for AOC 43G and potential wetlands/surface water impacts for AOC 43G.

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at AOC 43G/43J during this review period.

5.6.1 Summary of Technical Assessment

Manganese was detected in downgradient wells in both AOCs. No other COCs were detected above cleanup goals in downgradient wells. Overall, groundwater monitoring results have been generally consistent with expectations.

USEPA Region I currently supports an oral RfD for manganese of 0.07 mg/kg/day for ingestion of soil, sediments or food. USEPA Region 1 supports an oral RfD of 0.024 mg/Kg/day for manganese in drinking water. USEPA issued a Lifetime Health Advisory of 0.3 mg/L for manganese in January 2004.

The MCL for arsenic (50 µg/L at the time of the ROD) was selected as a cleanup goal for groundwater. Arsenic was present at AOC 43J at concentrations greater than its MCL (50 µg/L. The MCL for arsenic has been updated since the 1995 ROD. The MCL for arsenic was lowered to 10 µg/L in February 2002, and is effective January 2006. The remedial goal for arsenic should be updated to reflect the MCL change.

There are no current or future plans for installation of potable water wells at AOCs 43G and 43J. Until the time of property transfer, institutional control restrictions will be covered by the Installation Master Plan.

5.6.2 Applicable or Relevant and Appropriate Requirements Review

The ARARs presented in Tables 10, 11 and 12 of the ROD are reprinted and appended in Appendix D. The standards and regulations, current at the signing of the ROD and for the first Five-Year Review, have been reviewed for changes that could affect protectiveness.

The following ARARs been modified since signing of the ROD that may affect the protectiveness of the implemented remedial action:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

  a) *** The analyses and determination of compliance with 50 µg/L MCL for arsenic use the requirements of 141.23.

  b) The MCL for arsenic is 50 µg/L for community water systems until January 23, 2006.

  On January 22, 2001 USEPA adopted a new standard for arsenic in drinking water at 10 µg/L replacing the old standard of 50 µg/L (66 FR 6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 µg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals were updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 µg\L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- USEPA RfD and HAs are requirements designated as TBC. These requirements were updated in the USEPA 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.

- 310 CMR 10.00 Massachusetts Wetlands Protection Act.

- 314 CMR 4.00 Massachusetts Surface Water Quality Standards

In February 1995, USEPA and the Nickel Development Institute (a nickel trade association) filed a joint motion for a voluntary remand of the nickel MCL. In the same month, the court granted the motion, and vacated and remanded the MCL for nickel (0.1 mg/L). The updated USEPA

Office of Water Drinking Water Regulations and Health Advisories, dated October 1996, now lists the MCL for nickel as "being remanded". This means that while many water suppliers continue to monitor nickel concentrations in their drinking water, there is currently no USEPA legal limit on the amount of nickel in drinking water. USEPA is reconsidering the limit on nickel. The Commonwealth of Massachusetts followed similar action. Drinking Water Standards and Guidelines for Chemicals in Massachusetts Drinking Water issued by the MADEP Office of Research and Standards (ORS) and dated Spring 2000 and 2004, lists 0.1 mg/L as a guideline with a footnote that "the MCL for Nickel has been remanded and is no longer in effect". However, the current USEPA IRIS chronic oral reference dose for soluble salts of nickel support the value of 0.1 mg/L and this also is the currently listed USEPA Lifetime HA value.

Several other regulations were updated since the ROD and/or the first Five-Year Review, but do not affect the protectiveness of the remedy. These updated regulations include:

- Appendix A of 310 CMR 7.00 Massachusetts Air Pollution Regulations was updated in 2002. These revisions do not affect the protectiveness of the remedy and only pertain should an SVE system be required as a contingency measure at AOC 43G.

- 310 CMR 7.18 "Volatile and Halogenated Organic Compounds" was in effect May 1, 1998 (updated 2002) and applicable to facilities that emit VOCs. These revisions do not affect the protectiveness of the remedy and only pertain should an SVE system be required as a contingency measure at AOC 43G.

- 310 CMR 30.00 "Hazardous Waste" was updated February 27, 2004. There are no revisions 310 CMR 30.660-30.679 "Groundwater Protection" that affect the protectiveness of the remedy.

In addition, a search was performed for any newly promulgated standards, which could affect protectiveness at the site. No new ARARs were identified that would affect the protectiveness of the remedy.

5.7 Issues

Although manganese has been detected in downgradient wells at AOC 43G and 43J, a decreasing trend for other COCs has been observed and COC concentrations of other COCs in sentry wells have not been increasing. It is suspected that the source of the manganese in the downgradient wells is due to potential redox conditions at the site. These conditions should be evaluated as part of the LTMP update. No other COCs have been detected above cleanup goals in downgradient locations.

It is believed that these issues would not make the remedial actions at AOCs 43G and 43J non-compliant with the ROD, or sufficient to warrant a finding of not protective. However, the models used, as part of the IRA, to assess off-site migration and remedial duration did not take into account all factors that could impact the results of those studies. Currently, the downgradient areas from AOC 43G and 43J include undeveloped land and commercial properties and groundwater is not used for drinking water purposes in these locations. Since municipal water is available in these areas, it is unlikely that future properties would utilize groundwater as a potable water source.

5.8 Recommendations and Follow-up Actions

Continue current remedial action activity, which consists of implementing the remaining three components specified in the ROD: a long-term groundwater monitoring program, annual reporting, and Five-Year Reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with performance standards and reporting of the remedial progress. Follow performance standards established in the intrinsic bioremediation assessment and continue to assess for contaminant migration and remedial duration. Based on the findings of this review, it is recommended that a reassessment of the LTMP be made. As part of the LTMP reassessment the following recommendations should be considered:

- Development of the risk-based remedial goal for manganese be updated utilizing recently updated reference doses from the USEPA. However, until those updated risk-based values are approved, the more stringent background value of 291 μg/L should be utilized as a remedial goal for manganese (as discussed in Section 5.3).
- Removal of nickel and carbon tetrachloride from the sampling program should be considered.
- The damaged wells observed at AOC 43G should be prepared for future monitoring.
- The long-term monitoring frequency should be evaluated as part of the reassessment of the LTMP.
- Re-evaluate, the IRA modeling assumptions and predictions, Zone II and III pathways, potential off-site migration of manganese, redox conditions and remedial duration estimates.

Recommendations/ Follow Up Actions	Party Responsible	Oversight Agency	Milestone Date	Do Follow-Up Actions: Affect Protectiveness (Y/N)	
				Current	Future
Update Long Term Monitoring Plan.	U.S. Army, BRAC	USEPA, Region 1	Spring 2006	Y	Y
Replace damaged well AAFES-6 at AOC 43G	U.S. Army, BRAC	USEPA, Region 1	Spring 2006	Y	Y
Incorporate ICs in revised IMP	U.S. Army, BRAC	Army, BRAC	Spring 2006	Y	Y

5.9 Protectiveness Statement

The remedies at AOCs 43G and 43J are 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 AOCs 43G and 43J because groundwater is not used as a drinking water source.

A health and safety plan (HASP) and investigative derived waste (IDW) handling procedures are in place and are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOCs 43G and 43J because groundwater at the AOCs is not being used for potable use, and organic COCs exceeding drinking water standards are not migrating off RFTA property.

Review of the groundwater sampling data from 1999 through October 2004 indicate that groundwater concentrations of organic COCs are decreasing at source locations at AOCs 43G and 43J and that the plumes are not expanding or migrating off RFTA property. Groundwater sampling results from sentry well locations are below cleanup goals for organic COCs and most metals, with the exception of manganese at AOC 43G and arsenic, manganese, and iron at AOC 43J. Concentrations of VPH aromatics C9-C10 have exceeded cleanup goals in one sentry well during the October 2004 sampling round. No further field action is warranted at either site before the next scheduled sampling round in November or December 2005.

Analytical results are supportive of the intrinsic remediation assessment conclusion that migration of VPH concentrations in exceedances of GW-1 standards off RFTA property is not probable. Installation of groundwater monitoring wells and groundwater modeling has been completed, as stipulated in the ROD, and groundwater monitoring is ongoing.

5.10 Next Review

This is the second Five-Year Review that has been performed at either AOC. The next review will be performed within five years of the completion of this Five-Year Review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

5.11 References

Air Force Center for Environmental Excellence (AFCEE), Wiedemeyer, T., et. al., 1995. "Technical Protocol for Implementing Intrinsic Remediation with Long term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater". Brooks Air Force Base, San Antonio, TX; Rev. 0, November 11, 1995.

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Stone and Webster Environmental Technology & Services (SWETS), and ABB Environmental Services, Inc., 1997a. "Final Work Plan Intrinsic Remediation Assessment, AOCs 43G and 43J, Historic Gas Stations, Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England Division, Waltham, Massachusetts; April 1997.

Stone and Webster Environmental Technology & Services (SWETS), and Harding Lawson Associates (HLA), 1999a. "Final Intrinsic Remediation Assessment Report Area of Contamination 43G, Historic Gas Station Devens, Massachusetts' (Volumes I and II); and Appendix D - "Long Term Monitoring Plan" (Volume III). Contract DACA33-94-D-0007, Delivery Order No. 0027; prepared for U.S. Army Corps of Engineers, New England District, Concord, Massachusetts; November 1999.

Stone and Webster Environmental Technology & Services (SWETS), and Harding Lawson Associates (HLA), 1999b. "Final Intrinsic Remediation Assessment Report Area of Contamination 43J, Historic Gas Station Devens, Massachusetts" (Volumes I and II); and

Appendix D - "Long Term Monitoring Plan" (Volume III); Contract DACA33-94-D-0007, Delivery Order No. 0027; prepared for U.S. Army Corps of Engineers. New England District, Concord. Massachusetts; November 1999.

U.S. Army Corps of Engineers (USACE), 2004. "2003 Annual Report", AOC 43G and 43J Long Term Groundwater Monitoring, Devens, Massachusetts; April 2004.

U.S. Army Environmental Center (USAEC), 1996. "Record of Decision, Areas of Contamination, Devens, Massachusetts"; October 1996.

U.S. Environmental Protection Agency Region 1, 1996. "Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells". SOP # GW 0001; Revision Number: 2; July 30, 1996.

6.0 SOUTH POST IMPACT AREA, AOCs 25, 26, 27, & 41 (GROUNDWATER) STATUTORY FIVE-YEAR SITE REVIEW

6.1 Site Chronology

The following tables outline the chronology of site events at Area of Concern (AOCs) 25, 26, 27, and 41:

Table 6-1 Chronology of Site Events for 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 – Present
Monitoring well installation	1992 – 1997
Remedial Investigation (RI)	1996
Record of Decision (ROD) signed	1996
Long Term Monitoring Plan (LTMP) issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005

Table 6-2 Chronology of Site Events for 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
Remedial Investigation (RI)	1996
Record of Decision (ROD) signed	1996
Long Term Monitoring Plan (LTMP) issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005

Table 6-3 Chronology of Site Events for 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
Remedial Investigation (RI)	1996
Record of Decision (ROD) signed	1996
Long Term Monitoring Plan (LTMP) issued	May 1997
First Five-Year Review	September 2000
Second Five-Year Review	September 2005

Table 6-4 Chronology of Site Events for AOC 41

Event	Date
Groundwater Measurements	1992 – 1998
Groundwater Sampling	1992 – Present
Monitoring well installation	1992 – 1997
Remedial Investigation (RI)	1996
Record of Decision (ROD) signed	1996
Long Term Monitoring Plan (LTMP) issued	May 1997
Groundwater Measurements	1992 – 1998
First Five-Year Review	September 2000
Waste debris removed to Devens Consolidated Landfill	2002
Second Five-Year Review	September 2005

6.2 Background

The South Post Impact Area (SPIA) covers approximately 1,500 acres and is located within the 4,800-acre South Post section of the former Fort Devens (Figure 1-1). The SPIA is an active weapons and ordnance discharge area used by the Army, the Massachusetts National Guard, and law enforcement agencies for training purposes. The area is roughly bounded by Old Turnpike Road, Firebreak Road, southern portion of Harvard Road, Trainfire Road, and Dixie Road. The SPIA covers four Area of Concerns (AOCs) 25, 26, 27, and 41 (Figures 1-3, 2-1, 4-5, 4-6, 4-7 and 4-8 are reprinted from the 2004 Annual Report and presented in Appendix E) as well as several Study Areas (SAs), and a number of other firing ranges along Dixie Road and Trainfire Road that are not designated as AOCs. The portion of the SPIA covered by the Record of Decision (ROD) encompasses the 964 acres north and west of New Cranberry Pond. This area is referred to as the SPIA monitored area. AOC 25, the Explosive Ordinance Discharge (EOD) Range, is currently operating under a Resource Conversation and Recovery Act (RCRA) emergency permit, and is, used once or twice a year for disposal of waste ordnances.

The groundwater at Devens Reserve Facility Training Area (RFTA) occurs primarily in the permeable glacial-deltaic outwash deposits of sand and gravel. In the area of the South Post, groundwater is found at depths of 0 to 60 feet. A number of springs can be found throughout the boundary of the SPIA. Groundwater in the region of the ranges discharges to surface water before it leaves the South Post. More than 50 percent of the SPIA overlies a medium yield aquifer that is a potential source of drinking water. Measurements of hydraulic head in the groundwater and in streams and ponds within the South Post show that the streams around SPIA are gaining streams (i.e., groundwater discharges into the streams). Groundwater flow direction can be locally complex. At the EOD Range (AOC 25), overall groundwater flow discharge is to the east from the north end of the disposal area. At the Zulu Ranges (AOC 26), groundwater moves north toward a wetland and Slate Rock Brook. At the Hotel Range (AOC 27), groundwater flow is east to Cranberry Pond. Groundwater flow near the dumping site at AOC 41 is the most complex of the AOCs, with the controlled water level of New Cranberry Pond being a significant factor, although the majority of groundwater flow is north-northeast toward the Nashua River. The SPIA is drained primarily by two streams, Slate Rock Brook north and west of the SPIA, and an unnamed stream in the southeast portion of the site.

The predominant soil in the South Post, including areas covered by the ROD, is the Hinkley Merrimac-Windsor Association. This soil consists of barns or sandy barns, loamy fine sands, and other sands over sand or sand and gravel. Natural soils are disturbed within the ranges. A soil mapping of the SPIA found that, almost without exception, the soils are sandy and well drained. The exceptions are within wetland areas located outside of the ranges.

The physical setting and a brief history of each AOC is provided below. Refer to Section 1.0 for general enforcement activities at Fort Devens (i.e., initiation of a Master Environmental Plan (MEP), placement on the National Priority List (NPL), and signing of the Federal Facility Agreement (FFA). Remedial Investigations (RIs) were performed for the EOD, Zulu, Hotel Ranges, and AOC 41 to characterize the nature and extent of site-related contamination. Samples from groundwater, surface water, sediments, and soil were collected as part of these efforts. Results of the previous investigations are summarized in the following subsections.

6.2.1 AOC 25 EOD Range

The EOD Range is located east of Firebreak Road, approximately two miles south of the main entrance to the South Post. The site is rectangular and measures approximately 600 feet by 1,500 feet. From 1979 to 1992, approximately 1,200 pounds per year of explosives and munitions were disposed of in the disposal area by open burning/open detonation. The range was closed as part of the 1996 ROD. Refer to Figure 4-5, reprinted from the 2004 Annual Report and presented in Appendix E.

6.2.1.1 Groundwater

Results of the developed groundwater model from groundwater elevation results collected during the RI, performed in 1994, depict the hydraulic gradient moving to the north-northeast away from Slate Rock Brook. The topographic depression at the impact area could potentially influence possible contaminants that are located in the EOD Range. Unfiltered samples collected from the EOD Range during the RI indicated concentrations of iron, aluminum, and other metals above established background concentrations. Filtered samples showed concentrations several orders of magnitude lower than in the unfiltered samples. Four explosives or explosive-related organic compounds were also detected in the samples. Only the RDX exceeded the screening value. It should be noted that screening values are not available for all explosive-related compounds.

6.2.1.2 Surface Water

Surface water runoff within the EOD Range is limited to seasonal events such as snowmelts, frozen ground, or during exceptional storms. Under such circumstances, accumulation of surface water is reported to enter the groundwater. Evidence of surface water has not been reported to be present within or adjacent to the EOD Range.

6.2.1.3 Sediment

Analytical results from the RI indicated numerous metals in the EOD Range sample exceeded established background concentrations.

6.2.1.4 Soil

Surface and subsurface soil samples collected during the RI at the EOD Range in November 1993 were analyzed for Target Analytes List (TAL) metals, explosives, and total petroleum hydrocarbon compounds (TPHCs). Several metals were detected at concentrations above background in at least one sample. Copper and zinc exceeded the background concentration in three surface samples. Two explosives were also detected in EOD Range surface soil samples: nitrocellulose (detected in two samples) and nitroglycerine (detected in one sample). Low concentrations of TPHC were detected (maximum concentration of 45.2 μg/g). None of the substances detected exceeded the health-based soil screening criteria established for the RI.

6.2.1.5 Investigative Conclusions and Recommendations

Soils at the EOD Range ordnance detonation area significantly exceeded background in beryllium, cobalt, copper, iron, manganese, mercury, nickel, selenium, and zinc, although only zinc and copper exceeded background three times, and only beryllium, manganese, and selenium exceeded background twice. The remaining four metals exceeded background in only one sample, which was significantly higher in silt and clay than other samples from the site. Nitrocellulose, nitroglycerine, and TPHC were also found in surface soils. TPHC and a trace of Tetrachloroethylene (PCE) were noted in subsurface soils. The two Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) soil samples showed no concentrations exceeding soil toxicity characteristics. Metals in filtered groundwater samples showed increased concentrations and increased frequency of detection in downgradient wells when compared to a local background well, but only manganese exceeded its site health based screening value as presented in the ROD. Manganese concentrations are probably natural because they cannot be correlated to site activities, and manganese is above the cleanup goal in many Devens RFTA wells. Several explosives were noted in groundwater within the AOC, but only Cyclonite exceeded its screening value. This occurred only in one well.

The EOD Range will continue to be part of the SPIA under Army control. Groundwater will not be available to the public for human consumption and will not be a completed pathway of exposure. As such, the risk of groundwater consumption was not estimated. Other pathways of exposure examined gave reasonable maximum exposures resulting in the assessed risks being below those deemed acceptable by the U.S Environmental Protection Agency (USEPA) under current Superfund policy.

The completed ecological risk assessment concluded that there were potential risks to small mammals and to plants in the ordnance detonation area, under reasonable maximum exposures, but not under average exposures. Based on the marginal exceedances of toxicity reference values, the potential for adverse ecological toxicological effects are minimal. The EOD range has not adversely affected the ecosystems in the general vicinity of the site, and the analytes detected are not ecologically significant. The ecological risk assessment concluded that no further action is necessary at the EOD range to further investigate or mitigate ecological risks from soil or other media in which analytes were detected.

From the extensive environmental investigations and ecological and human-health risk assessments performed on the EOD range, it was concluded that no further investigation or remediation is warranted at AOC 25, due to the continued use of this land by the military.

6.2.2 AOC 26 (Zulu Ranges)

These ranges are located 2,000 feet north of the EOD Range, approximately 1.6 miles southwest of the main entrance to the South Post. 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. From 1979 to the present, Zulu 1 has been primarily used for demolition training. 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 eastern end of Zulu 2 and consists of two concrete bunkers, which are used for cover and protection, and two sand pits that are used for receiving grenades. Refer to Figure 4-6, reprinted from the 2004 Annual Report and presented in Appendix E.

6.2.2.1 Groundwater

Based on groundwater elevation data, the general groundwater movement in the Zulu range is south to north towards a wetland area and Slate Rock Brook. Consistently higher recorded water level readings have been observed in well 26M-92-04X suggesting a continual groundwater flow in a northern direction. Similar to EOD, metals concentrations at the Zulu ranges wells have exceeded established background concentrations. Filtered samples showed much lower concentrations. The explosive and explosive related compounds RDX, HMX, and TNT were detected in Zulu Range samples. Only RDX was detected above its health-based screening value. Monitoring wells located where grenade throwing and demolition were practiced continually show the most significant concentrations of explosive-related substances.

6.2.2.2 Surface Water

Thirteen surface water samples were collected during the RI. Analytes detected above Ambient Water Quality Criteria (AWQC) included the metals arsenic and lead and the pesticide 2,2-bis(para-chlorophenyl)-1 , 1-dichloroethane (DDD). In addition, the explosives RDX and HMX, as well as several organic compounds were detected in Zulu Range surface water samples.

6.2.2.3 Sediment

Most metals in the Zulu Range samples collected during the RI were detected above background concentrations in at least one sample. Explosives, pesticides, volatile organic compounds (VOCs), and TPHC were also detected.

6.2.2.4 Soil

Results of data collected during the RI suggest that soils in AOC 26 are very well drained. It was suggested that, due to the permeability of soils in AOC 26, contaminants could be leached to groundwater. Surface and subsurface soil samples were collected at the Zulu Ranges as part of the SI and RI. These samples were analyzed for Target Compound list (TCL) organics, TAL metals, explosives, and TPHC. Results indicated several metals exceeded background concentrations in at least one surface and subsurface sample, none of the metals detected exceeded the health-based screening values. Polynuclear Aromatic hydrocarbons (PAHs) were detected in up to three surface and subsurface samples. One of the PAHs, benzo(b)fluoranthene (0.81 μg/g), exceeded the screening concentration (0.7 μg/g). RDX and TPHC were also detected. The maximum concentration of RDX in subsurface soil (38 μg/g) exceeded the health-based screening level (26 μg/g).

6.2.2.5 Investigative Conclusions and Recommendations

Results of the RI indicated soils at AOC 26 were found to be contaminated with several chemicals, the most important of which were explosives, primarily Cyclonite; pesticides, primarily 2,2.bis(para-chlorophenyl)-1 ,1,1 -trichioroethane (DDT); some PAHs; and traces of PCBs and volatiles. TCLP testing for surface soils showed only barium and chloroform present, both below RCRA toxicity characteristic concentrations. Lead, zinc, antimony, arsenic, beryllium, and cadmium exceed background, but only lead and zinc could be related to possible site activities. Groundwater was contaminated with explosives, mainly Cyclonite (exceeding a Drinking Water Health Advisory level used as a screening value) and HMX, and by bis(2-ethylhexyl)phthalate, also at concentrations exceeding a screening value. Groundwater discharges to surface water and sediment in the wetland north of the ranges and probably to Slate Rock Brook north of the ranges. Unfiltered groundwater showed several elevated metals, but filtered groundwater only showed exceedances of site specific health-based screening values for manganese. Surface water showed explosives, mainly Cyclonite, and methylphenol and traces of VOCs. Contaminants of Potential Concern (COPCs) were found in the wetlands both south and north of the ranges. Sediments in the wetlands showed explosives, pesticides, and traces of volatiles. Many metals exceeded background and were selected as COPCs. Because the ranges will remain active as a training facility and under Department of Defense jurisdiction for the foreseeable future, risk from groundwater consumption was not assessed although there is a drinking water well, D-1, in the SPIA. Estimated human-health risks of exposure under any probable scenario do not exceed the upper boundary of acceptable risks use by the USEPA under current Superfund guidance. The upper limit is a one in 1,000,000 excess lifetime risk of cancer, and a noncancer hazard index (HI) of one.

The ecological risk assessment found that some soils data exceed reference values for plants, small mammals, and songbirds, but those exceedances are of such limited extent and the habitat is so disturbed at those locations from ongoing military training activities as to be ecologically insignificant. Concentrations of lead in surface water exceed water quality criteria, but site-specific toxicity testing indicated no toxicity attributed to lead for an aquatic invertebrate and a fish that was tested. Substantial uncertainty exists in extrapolating from avian toxicity to reptilian toxicity, but the site-specific toxicity test indicates that toxicity is unlikely for turtles. The ecosystems at AOC 26 do not appear to be adversely affected, as indicated by the thriving communities of benthic invertebrates and wildlife observed during the field surveys.

6.2.3 AOC 27 (Hotel Range)

Hotel Range is located adjacent to Cranberry Pond and is located approximately one mile south of the main entrance to the South Post. The Hotel Range covers approximately 23 acres and is currently used exclusively for firing small caliber weapons. The area of concern is located exclusively south of Old Turnpike Road. Before 1979, the Hotel Range was used for OB/OD of small arms, smoke grenades, and pyrotechnics. After 1979, the Hotel Range was modified and extended to the north side of the Old Turnpike Road and used for M16s and small caliber weapons. Prior to 1989, the range was used as an M-70 range but after 1989 the range was modified to an M60-SAW range. Refer to Figure 4-7, reprinted from the 2004 Annual Report and presented in Appendix E.

6.2.3.1 Groundwater

RI results indicate general groundwater flow is heading north and west away from Cranberry Pond towards the wetland (north of Old Turnpike Road). Metals concentrations were similar to AOCs 25 and 26. All wells in this area indicated some level of explosives contamination. RDX and 1,3-dinitrobenzene exceeded their screening values.

6.2.3.2 Surface Water

The 2004 Annual Report describes the center of AOC 27 as generally flat but slopes up gently to the south and is surrounded on the east, south, and west by natural ridges that are steeply graded in the general shape of an amphitheater. AOC 27 and the surrounding area south of Old Turnpike Road lack surface streams, which reflects the nature of well-drained soils. Generally, any surface water in the area enters the groundwater. Nine surface water samples were collected for the RI within Cranberry Pond, adjacent to Hotel Range. Several metals were detected in the samples, but only lead exceeded the AWQC. Trace concentrations of explosives were detected in these samples.

6.2.3.3 Sediment

The majority of samples collected in Cranberry Pond contained some metal concentrations in excess of those naturally occurring in the sediment. However, the data indicated that only one sample is obviously contaminated with metals. The explosive 4-amino 2, 6- dinitro toluene was detected in one third of the samples. VOCs, pesticides, TPHC and two PAHs were also detected. Complete analytical results are presented in the RI report.

6.2.3.4 Soil

Subsurface soil samples were collected from boreholes at the Hotel Range and analyzed for TPHC, TAL metals, explosives, and TCL organics. Analytical results indicated that no metals exceeded the screening values. Low concentrations of TPHC (maximum concentration of 75.6 μg/g), below the screening level of 5,000 μg/g, were detected in some samples. VOCs and pesticides were also detected at concentrations just above the detection limit. These concentrations were well below screening values.

6.2.3.5 *Investigative Conclusions and Recommendations*

Soil and groundwater at AOC 27 are affected by military training activities, shown primarily by the presence of explosives, pesticides, and TPHC in soil, groundwater, surface water, and sediment. Previous investigation results have indicated that lead concentrations were elevated in subsurface soil and in surface water. The pesticides, mostly DDT and its derivatives DDD and 2,2-bis(para-chlorophenyl)-1, 1-dichloroethene (DDE) are below background in soils and were not present in groundwater which only showed low concentrations of delta-BHC (0.045 µg/L in the one confirmed result). Pesticide residues are likely to be a result of pest control rather than training activities at the site. Explosives in the groundwater are by far the most conclusive evidence of effects from site operations. All wells showed at least some concentrations of explosives related compounds, with Cyclonite, HMX, and 1,3-dinitrobenzene the most frequently observed compounds. 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.

The risk to human health at AOC 27 has been calculated for users, site workers, and trespassers. Given the lack of exposure to the groundwater, all estimated potential risks for carcinogens and non-carcinogens are below current USEPA Superfund policy lower limits for lifetime risks. The occurrence of carcinogenic effects is below one in 1,000,000 excess risks per lifetime, and non-carcinogenic health effects are highly unlikely.

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) imply that the level of lead in Cranberry Pond water does not pose a hazard to aquatic biota. The mean concentrations of contaminants of potential concern are unlikely to pose a risk to the selected receptors, mallards and raccoons, with the possible exception of the affect 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. These risks have high levels of uncertainty and do not apply to average concentrations but only to reasonable maximum exposure concentrations. In general, this risk assessment is more likely to overestimate risks than to underestimate them.

As the Army continues to use the site, efforts should be made to ensure that no activities further contribute to contamination of Cranberry Pond. Periodic review of the risk assessment in light of increased toxicological information of the effects of the existing levels of contamination should be used to improve the assessment of risk to the environment. Based on the results of the environmental investigations and the human-health and ecological risk assessments, no contamination is present at concentrations that pose unacceptable risks to human health or the environment. AOC 27 will continue to be used as a firing range by the Army, and no further investigation or remedial action is recommended at the Hotel Range.

6.2.4 AOC 41 (Unauthorized Dumping Site)

AOC 41 is located immediately north of New Cranberry Pond (separate from Cranberry Pond), east of Delta Range, and west of Harvard Road, approximately two miles southeast of the main entrance to South Post. AOC 41 is approximately 6 acres in size. The dumping site occupies an area approximately 75 feet square in the central portion of the site. It appears to have been associated with a historic brick making kiln that was operated in this area in the 1800s. The AOC is overgrown with trees and swampy vegetation and no records are available detailing when the site was used or what type of material was disposed of in this area. It is believed that this AOC was used until the 1950s for disposal of non-explosive military and household debris. Miscellaneous debris was scattered over a small hill located approximately 75 feet north of New Cranberry Pond. Refer to Figure 4-8, reprinted from the 2004 Annual Report and presented in Appendix E.

The geologic setting at AOC 41 includes an upper sand layer underlain by a discontinuous clayey silt layer, a lower silty sand layer, and lower sand layer. Bedrock was not encountered in any of the investigative borings completed at AOC 41.

The aquifer below AOC 41 can be classified as an unconfined overburden groundwater aquifer. The aquifer is reportedly recharged by surface water infiltration, percolation, and recharge from surface water from New Cranberry Pond. Hydraulic conditions at the AOC 41 are influenced by a road culvert located at the eastern end of the pond that artificially raises the surface water elevation in the pond, causing the surface water to recharge groundwater below AOC 41. The predominant local groundwater flow at AOC 41 is to the north-northeast, eventually discharging into the Nashua River.

6.2.4.1 Groundwater

According to the RI, groundwater flow near AOC 41 is more complex. The majority of flow enters the general groundwater flow pattern north-northeast toward the Nashua River. This general movement, away from New Cranberry Pond, is based upon RI analysis where long- term water level monitoring was performed at the pond and at wells 41M-92-01X and 41X-93-03X. Groundwater models developed in conjunction with the RIs indicate that there are several groundwater divides in the area and that most groundwater discharges to surface water before leaving the SPIA.

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 higher water level. The pond recharges the aquifer and helps direct the local groundwater flow toward the north and east.

Results of RI groundwater sampling and field analysis indicated that the existing groundwater contaminant plume appears to be confined to the upper portion (water table) of the aquifer and it is oriented in a northeast-southwest direction. The groundwater was shown to contain several VOCs, PCE, trichloroethene (TCE), and 1,1,2,2-tetrachloroethane. Results also indicated several metals were present above established background concentrations in the unfiltered samples. Significantly lower metals concentrations were observed in the filtered samples, coupled with elevated total suspended solids, measurements suggest that elevated concentrations in unfiltered samples are likely the result of suspended solids and not dissolved site-related contaminants. Based on the chemical properties of the contaminants, the slow rate of groundwater flow in the clayey silt, and the existing downgradient groundwater results (41M-94-09A and B), it appears that the distribution of the groundwater contamination has been determined, and that the likelihood of contaminant migration to any exposure point (i.e., Well D-l) is minimal.

6.2.4.2 *Soil*

In March 1995, a soil gas survey was performed in the shallow soils around monitoring wells 41M-93-03X and 41M-94-03B in an attempt to find the source area for the chlorinated solvent contamination detected in the groundwater. The soil gas survey identified two detectable concentrations of TCE around the two wells. Soil samples collected from the same TerraProbe points used in the soil gas survey indicated TCE to be present in soils adjacent to the two wells at the 30 to 37 foot level.

Soil samples collected from five test pits in the area did not indicate the presence of any target analytes. Soil samples collected from the monitoring well borings during their emplacement in October 1994 indicated the presence of TCE below the 30' below ground surface (bgs) level. The distribution of the TCE contamination coincides with the depth of the water in the boring. Therefore, it appears that the TCE contamination results from adsorption of TCE from groundwater to soil particles within the zone of the water table fluctuation. The area around 41M-93-03X and 41M-94-03B does not appear to be the source of the groundwater contamination.

6.2.4.3 *Investigative Conclusions and Recommendations*

The following conclusions are based on interpretation of data collected from each of the previous investigations (Site Inspection [SI], Supplimental Site Investigation [SSI], and RI) completed at AOC 41.

Results of RI groundwater sampling and field analysis completed during the RI, indicate that the existing groundwater contaminant plume appears to be confined to the upper portion (water table) of the aquifer and it is oriented in a northeast-southwest direction. Based on the chemical properties of the contaminants, the slow rate of groundwater flow in the clayey silt, and the existing downgradient groundwater results (41M-94-09A and B), it appears that the distribution of the groundwater contamination has been determined, and that the likelihood of contaminant migration to any exposure point (i.e., Well D-l) is minimal.

Surface water and sediment from New Cranberry Pond were sampled during previous investigations. However, data collected during the SSI and the RI; demonstrate that New Cranberry Pond surface water recharges groundwater below AOC 41. An assessment of the potential surface soil migration pathways showed that no migration pathway (i.e., overland transport of surface soil via surface water) exists between the contaminants detected in the surface soil on the waste material and New Cranberry Pond surface water and sediment. Because of these reasons, the previous surface water and sediment data was not evaluated in the RI.

The baseline human-health risk assessment was limited to an evaluation of the exposure potential to groundwater at AOC 41, and a summary of quantitative risk evaluation for groundwater from transient non-community supply Well D-1. The risk assessment concluded that there are no unacceptable risks to human health from the groundwater at Well D-1 for troops that consume the water for approximately 14 days per year, and that no further action would be required under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

Based on the results and interpretation of the physical and chemical data, and taking into account that the future land and groundwater use of this AOC will be similar to the present use, it was recommended that the Army complete a Proposed Plan and monitoring ROD for the groundwater at AOC 41 and to include the AOC 41-related contaminants in the analysis of the groundwater samples from Well D-1.

6.3 Remedial Action

A ROD was signed in July 1996 documenting No Action as the final selected remedy for the SPIA monitored-area groundwater, surface water, soil, and sediment and AOC 41 groundwater. Because No Action was selected and approved as the remedy, a FS was not performed and RAOs were not developed.

6.3.1 Selected Remedy

As part of the selected remedy of No Action for the SPIA monitored-area groundwater, surface water, soil, and sediment and AOC 41, Devens RFTA will ensure the following, excerpted from the 1996 Final Record of Decision for the SPIA and AOC 41 groundwater. Remedial components that have been undertaken are presented in Subsection 6.3.1. The current status of the remedy is discussed in Subsection 6.3.2.

- Groundwater monitoring for potential contaminant migration out of the SPIA monitored area; 1) Monitoring Wells will be used to monitor the groundwater from the EOD Range, Zulu Ranges, Hotel Range and AOC 41; 2) Monitoring Wells will be used to monitor the north, northeast, southeast, and east sides of the SPIA monitored-area.
- Monitoring wells will be sampled for explosives, TCL, and TAL metals.
- A Groundwater Monitoring Plan for the South Post will be developed that will include detailed groundwater monitoring at discharge points. The plan may include installation of additional monitoring wells to monitor for off-site groundwater flow.
- Well D-1 will be sampled and analyzed for explosives and Massachusetts and federal drinking water requirements (Massachusetts Maximum Contaminant Levels [MMCLs] / Maximum Contaminant Levels [MCLs]).
- The Army will not develop new drinking water sources within the SPIA monitored-area.
- An Integrated Natural Resources Management Plan will be developed and implemented to monitor adverse affects on the ecosystem in the SPIA monitored-area.
- Monitoring Reports will include a description of site activities and a summary of analytical results. The Army will submit these reports annually. 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, the site will be subject to five-year reviews to assess if the No Action remedy remains protective of human health and the environment.
- 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 re-examined in light of the changed use and risk factors resulting from this closure/transfer.

6.3.2 Remedy Implementation

The following remedial components have been undertaken as outlined in the ROD.

Long-term Groundwater Monitoring Plan
The Final Long Term Monitoring Plan (LTMP) for the SPIA was issued in May 1997. The plan details the individual wells to be sampled on an annual basis. The plan also provides sampling methodology and analytical requirements. Additional monitoring wells were installed at AOC 26 and within SPIA to act as sentinel wells.

Integrated Natural Resources Management Plan
An Ecological Sampling Work Plan was developed and implemented in 1998 to characterize surface water and sediment quality within the SPIA. Since 1998, the Army has completed various assessments including sensitive area characterizations, review of wetland complexes, benthic and mollusk studies and a review of impacted species. These studies have been submitted to the appropriate Fish and Wildlife Agencies.

Given that the use of the SPIA was to remain in military use, the ROD required the development of an Integrated Natural Resource Management Plan (INRMP), to further assess if there are threats posed from SPIA ongoing or residual activities. The Army is currently finalizing the INRMP, which guides implementation of the natural resources program on RFTA from 2005 through 2009. The objectives of the INRMP is to ensure land remains available for missions, land is maintained in the best natural conditions to preserve ecosystems and to minimize land-related restrictions on training. The INRMP is expected to be completed in the Fall 2005.

Groundwater Sampling
Annual groundwater monitoring has been performed in 1997, 1998, 1999, 2000, 2001, 2002, 2003, and 2004 as outlined in the Long-Term Monitoring Plan. Annual reports have been provided for the 1997 (CENAE, 1998), 1998 (CENAE, 1999) and 1999 (CENAE, 2000), 2000 (CENAE, 2001), 2001 (CENAE, 2002), 2002 (CENAE, 2003), 2003 (CENAE, 2004), and 2004 (CENAE, 2005) sampling events. The 1998 Annual Report also includes results of the ecological surface water and sediment sampling. Transient non-community water supply Well D-1 was sampled during each sampling event. The Army also sampled the transient non-community well, D-1 for perchlorate in November 2004. The perchlorate concentration detected during this sampling round was 0.24 µg/L.

Current action consists of continued implementation of the components specified in the ROD: a long-term groundwater monitoring program, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with established performance standards and reporting of performance standards.

Other Control Measures
The Army will not develop new drinking water sources within the SPIA monitored-area. Should the Army close or transfer or change the use of this property, an Environmental EBS will be performed, and the "no action" decision of this ROD will be re-examined in light of the changed use and risk factors resulting from this closure/transfer.

Five-Year Reviews
As required by CERCLA, the site will be subject to five-year reviews to assess if the No Action remedy remains protective of human health and the environment.

6.3.3 System Operations/Operation and Maintenance

Groundwater monitoring is performed in accordance with the LTMP (SWETS 1997) for the SPIA. Yearly Operation and Maintenance (O&M) costs for implementation of the remedy are not readily available for review.

6.4 Progress Since the Last Five-Year Review

This is the second five year site review for the SPIA. The first review completed in 2000 recommended that long-term groundwater monitoring should continue as outlined in the ROD and LTMP. The 2000 review indicated that the remedy at the SPIA and associated AOCs was expected to be protective to human health and the environment.

Groundwater monitoring has been performed at the SPIA since the ROD was issued and the Army is currently updating the INRMP for submittal in the Fall 2005. The INRMP guides the implementation of the natural resources program from 2005 through 2009.

6.5 Five Year Review Process

6.5.1 Document Review

The following documents were reviewed for this five-year review:

- Remedial Investigations for AOCs 25, 26, and 27 prepared by EEP, March 1994.
- Final Remedial Investigation Report, Area of Contamination (AOC) 41 prepared by ABB-ES, February 1996.
- Record of Decision prepared by USEPA, July 5, 1996.
- 2002 Annual Report for SPIA Long Term Monitoring prepared by the USACE, March 2003
- 2003 Annual Report for SPIA Long Term Monitoring prepared by USACE, March 2004.
- Draft 2004 Annual Report for SPIA Long Term Monitoring prepared by USACE, August 2005.

6.5.2 Data Review

AOC 25 Groundwater

Annual groundwater sampling results for 2003 indicated that no concentrations of metals were detected above applicable cleanup standards. Comparison of inorganic concentrations between the 1997 through 2004 LTMP rounds showed that although there was variability among concentrations of metals, the variability was not significant. Groundwater analytical results for 2004 indicated that the concentration of potassium, 2,530 μg/L (micrograms per liter), in well 25M-97-11X exceeded the background level of 2,370 μg/L.

AOC 26 Groundwater

Exceedances for groundwater in AOC 26 are summarized in the following table:

Table 6.5 AOC 26 Data Summary of Exceedances

Well Number, Parameter and Standard (μg/L)	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
26M-92-02X Thallium (2 μg/L)	<2	<2	2.2	<2	2.2	<2
26M-92-02X Arsenic (10 μg/L)	<10	<10	<10	12.4	<10	<10
26M-92-03X RDX (2 μg/L)	97	12	62	260	6.7	18
26M-92-04X RDX (2 μg/L)	240	260	200	180	210	260
26M-97-08X RDX (2 μg/L)	46	30	57	63	37	46

RDX concentrations have been fluctuating in AOC 26 wells since 1999. Well 26M-92-08X is considered a downgradient well and therefore, RDX, may be migrating off the AOC 26 site. The area downgradient of AOC 26 is considered part of SPIA and is owned by the Army. Results observed for the South Post Monitoring (SPM), perimeter wells, show that RDX is not migrating off SPIA.

AOC 27 Groundwater

Low levels of RDX, below the background level of 2.0 μg/L, have been detected in AOC 27 wells since 2002. Since 1999, the highest RDX concentration was detected in 29M-92-01X (3.0 μg/L in 1999). There have been no metal concentrations above Maximum Contaminant Levels (MCLs) in AOC 27 since low-flow sampling procedures were implemented in 1997.

AOC 41 Groundwater

Reportedly, the VOC plumes of trichloroethene and 1,1,2,2-tetrachloroethane appears to be stable based upon continued lack of contamination in downgradient monitoring wells 41M-94-09A, 41M-94-09B, 41M-94-1 1X, 41M-94-12X and 41M- 9413X. These five wells plus wells 41M-93-04X, and 41M-94-14X were sampled in 2003 and 2004. No VOCs were detected in any wells associated with AOC 41 in 2003 or 2004.

South Post Monitoring Wells

Arsenic was detected in SPM-93-06X during the last two sampling rounds at concentrations above the 10 μg/L MCL (11.7 μg/L in 2003 and 10.9 μg/L in 2004). Calcium and potassium have been detected above their respective background concentrations in SPM-93-06X since 1999. Explosive residuals have not been detected above background concentrations in the SPM wells since 1999.

Data Review Summary

Generally, annual groundwater sampling results are consistent to slightly lower. Metal concentrations from 1997 to 2004 rounds were generally lower than concentrations reported in the RIs. This decrease may largely reflect decreased sample turbidity resulting from implementation of low-flow sampling methodology.

RDX was detected above the proposed MMCL in five wells located in AOCs 26 and 27. Well 26M-92-04X has been sampled annually since 1998 to determine if contaminant levels are declining in this known contaminated area. RDX concentrations in wells 26M-92-04X and 26M-97-08X remain steady, indicating that the contamination levels are not declining. The RDX concentration in well 26M-92-03X (in 2003 and 2004) has remained consistent with historical data, after an unusually high level found in 2002. This well is downgradient of 26M-92-04X.

Groundwater samples were analyzed for perchlorate (an explosive residual) during the 2004 sampling round. The highest concentration was 3.1 μg/L detected in well 26M-92-04X. All other perchlorate results were less than 1.0 μg/L (the proposed Massachusetts Department of Environmental Protection groundwater standard for drinking water).

Samples from the water supply well, D-1 were collected in 2002, 2003, and 2004 for explosive-related compounds and for perchlorate during the 2004 sampling event. No explosive related compounds were reported above analytical detection limits during the three events. Perchlorate was detected at a concentration of 0.24 μg/L during the 2004 monitoring round.

Results from the 1997 through 2004 groundwater sampling and historical data are provided in Appendix E.

6.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at the South Post Impact Area (AOCs 25, 26, 27, and 41). Conditions during the inspection were favorable with no precipitation and temperatures in the 50 degree range.

Other than normal range use, there was no evidence of excavation at any of the sites. A brush fire occurred throughout the South Post the weekend prior to the site visit. All the AOCs were impacted by the fire. AOC 41 was significantly burned. Two monitoring wells in AOC 41 that are not sampled as part of the LTMP appeared to have been partially encompassed by the fire. Monitoring well SPM-97-23X in AOC 27 (Hotel Range) is recessed causing water to pool above the well cap. Otherwise, monitoring well protective casings were locked and secured.

6.5.4 Interviews

The following individuals were interviewed as part of the five-year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA
- Mr. Robert Simeone, Devens RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit.

Mr. Simeone indicated that the Army is currently updating the Natural Resources Management Plan for the South Post Impact Area. Once finalized, the plan will be submitted to State and Federal Departments of Fish and Wildlife. This plan will be in place for a period of 5 years (2005 through 2009). Although there may be follow up documentation in relation to this plan, there are no annual reporting requirements.

Mr. Simeone also indicated that the drinking water well (D-1) is still used by soldiers, on a limited basis, during training exercises. This is consistent with historical uses of the well and risk assessment assumptions.

6.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at the South Post Impact Area.

In January 1996, the Army issued the proposed plan to citizens and organizations to provide the public with a brief explanation of the Army's preferred remedy for the South Post Impact Area. The proposed plan and other pertinent documents for the South Post Impact Area were made available for review at local libraries and a formal 30-day public comment period was conducted from February 1 through March 1, 1996. On February 21, 1996, the Army held a public information meeting at Devens to present the proposed plan to the public, and to accept verbal or written comments from the public.

Currently the Restoration Advisory Board (RAB) meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public.

6.6 Technical Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Remedial Action Performance: Long-term groundwater monitoring is performed on an annual basis to determine if contaminants are migrating off the SPIA monitored-area and to ensure that the no-action alternative remains protective of human health and the environment.

System Operations/Operation and Maintenance (Long-Term Groundwater Monitoring): Groundwater monitoring is performed in accordance with the approved LTMP (SWETS, 1997) for the SPIA. Yearly O&M costs for implementation of the remedy at each AOC are not yet available for review.

Opportunities for Optimization: No reduction in sample locations or in frequency is recommended at this time.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. Based on the observed RDX results in 26M-92-08X at AOC 26, there is a potential for RDX to migrate off the AOC 26 boundary. In general, the purpose of the SPM well series (those that are monitored as part of the LTMP efforts) is to serve as a network of sentinel sampling points, for determination of off-site migration. RDX has not been detected in the SPM wells.

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells within the SPIA. The Army proposes to maintain possession of the SPIA for Army use. If property transfers in the future, institutional controls will be incorporated into the property deed or other instrument of property transfer. Currently the Installation Management Plan (IMP) (R&K Engineering, Inc., June 1999) will cover institutional control restrictions. The Army is currently updating the IMP, which will be finalized in Spring 2006.

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

Changes in Standards and To Be Considered: Applicable or Relevant and Appropriate Requirements Review (ARARs) and To be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed. See Section 6.6.2, ARARs.

The MCLs are health-based guidelines established by the USEPA. The MCL for arsenic (50 μg/L) in effect at the time of the ROD was selected as a standard for comparison during long term groundwater monitoring. The MCL for arsenic has been updated since the 1996 ROD. The MCL for arsenic was lowered to 10 μg/L effective February 2002.

In spring 2005, the Massachusetts Department of Environmental Protection (MADEP) published new draft groundwater standards for RDX and HMX which are military explosives. The proposed Method 1, GW-1, Groundwater Standards are 0.8 μg/L and 200 μg/L for RDX and HMX, respectively. This same proposal also includes a recommended standard of 1.0 μg/L for perchlorate. These standards, though currently in a proposed status, have been adopted for comparison to LTM data beginning with the 2004 Annual Report. RDX has been detected in AOC 26 wells above this proposed standard, perchlorate has been detected in one of those wells above this standard, and marginal exceedances of the RDX standard have been found at AOC 27 recently.

In January 2003, the USEPA Office of Solid Waste and Emergency Response (OSWER) issued an Interim Status Guidance for Perchlorate. This document cited a range of 4 parts per billion (ppb) to 18 ppb, that was intended to be used as a screening tool to see if site specific risk assessment is needed. The USEPA is currently evaluating if regulation of perchlorate is needed, and will determine action levels for perchlorate as necessary.

MADEP Surface Water Standards are taken from the USEPA National Recommended Water Quality Criteria (Office of Water, Office of Science and Technology – 4304T, 2004). This document establishes Criteria Maximum Concentrations (CMCs) and Criteria Continuous Concentrations (CCCs). CMCs are an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The CCCs are an estimate of the highest concentration of material to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. If surface water samples are collected in the future, they should be filtered, analyzed for dissolved metals and compared to this document.

Changes in Exposure Pathways: The ROD did not identify any unacceptable risks from exposure to site contaminants in groundwater (i.e., limited to 2 weeks during a year) or soils under current use conditions. Because the remedy includes limiting the use of groundwater as drinking water (specifically the transient, non-community supply well, D-1), changes to groundwater standards do not affect the protectiveness of the implemented remedy.

Future use is expected to remain unchanged. If land use does change, risks would need to be re-evaluated to determine if the potential for exposure had increased. No new contaminants, sources, or routes of exposure were identified. There is no indication that hydrologic/hydrogeologic conditions are not adequately characterized.

Changes in Exposure Assumptions: The risk assessments supporting the ROD for AOCs 25, 26, 27, and 41 used exposure assumptions based on actual site frequency of use and standard recommended assumptions for other contact rates. Since that time, USEPA has updated some of the recommended dermal contact exposure assumptions. New guidance for evaluating dermal contact exposures was finalized in July 2004 (*Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*). Because the remedy presumes continued site use on an infrequent basis and prohibiting more extensive use of groundwater as drinking water, changes to the exposure parameters do not affect the protectiveness of the implemented remedy. If site land uses changes, changes to dermal exposure parameters should be considered.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the implemented remedy.

Changes in Risk Assessment Methodologies: The methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the ROD for AOCs 25, 26, 27, and 41, based on USEPA's *Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*, July 2004. As discussed in the ROD no human health risks were found under current site conditions and uses. Because the remedy presumes that the site will continue to be used on an infrequent basis and prohibits use of groundwater as a primary source of drinking water, these risk assessment methodology changes do not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at the SPIA during this review period.

6.6.1 Summary of Technical Assessment

In the spring of 2005, MADEP published new draft groundwater standards for RDX and HMX, which are military explosives. The proposed Method 1, GW-1, Groundwater Standards are 0.8 µg/L and 200 µg/L for RDX and HMX, respectively. These standards, though currently in a proposed status, have been adopted for comparison to LTM data beginning with the 2004 Annual Report. RDX has been detected in AOC 26 wells above these proposed standards.

The methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the ROD for AOCs 25, 26, 27, and 41. Because the remedy presumes continued site use on an infrequent basis and prohibiting more extensive use of groundwater as drinking water, these risk assessment methodology changes do not affect the protectiveness of the remedy.

6.6.2 Applicable or Relevant and Appropriate Requirements Review

ARARs were not specifically identified in the ROD. However, the ROD does state that Well D-1 will be sampled and analyzed for explosives and MMCLs/MCLs. There was a change to portions of the National Primary Drinking Water Standards 40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52 and the Massachusetts Drinking Water Standards and Guidelines 310 CMR 22.0 outlined below.

- 40 CFR 141.11Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

  a) *** The analyses and determination of compliance with 50 µg/L MCL for arsenic use the requirements of 141.23.

  b) The MCL for arsenic is 50 µg/L for community water systems until January 23, 2006.

  On January 22, 2001 USEPA adopted a new standard for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L (66FR6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 µg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 µg\L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- USEPA National Recommended Water Quality Criteria (Office of Water, Office of Science and Technology – 4304T, 2004)

USEPA RfD and HA are requirements designated as TBC. These requirements were updated in the USEPA 2004 Edition of the Drinking Water Standards and Health Advisories, dated winter 2004.

6.7 Issues

Although RDX was detected in AOC 26, there is no evidence of off-site migration based on the results observed in the SPM wells. The purpose of the SPM well series (those that are monitored as part of the LTMP efforts) is to serve as a network of sentinel sampling points, for determination of off-site migration.

Although RDX was detected in AOC 26 wells, it is believed that these issues do not make the remedial actions at the SPIA non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews, and continued monitoring of the situation.

6.8 Recommendations and Follow-up Actions

The recommendations and follow up actions of this second Five-Year Review are as follows:

Recommendations/Follow Up Actions	Party Responsible	Oversight Agency	Milestone Date	Do Follow-Up Actions: Affect Protectiveness (Y/N)	
				Current	Future
Finalize the Integrated Natural Resource Plan	U.S. Army	U.S. Fish and Wildlife	Fall 2005	Y	Y

In addition, the Army should continue to evaluate the potential for off-site migration, impact to sensitive receptors, trend analysis, and remedial duration as part of the established LTMP for SPIA. Evaluation of the LTMP will occur in spring 2006.

6.9 Protectiveness Statement

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.

Human health risk is currently limited at AOCs 25, 26, 27, and 41 because groundwater at the AOCs is being used for potable use on a limited basis by a small, healthy population (by soldiers, during short-term military training exercises). Current conditions at the South Post Impact area (including eliminating the use of D-1) are consistent with the assumptions made during the risk assessment portion of the Remedial Investigation (ABB-ES, 1996).

The Army has installed groundwater monitoring wells and initiated long-term monitoring. The 2003 annual groundwater monitoring report and the groundwater sampling data from fall 2004, document that groundwater concentrations of VOCs and metals, at AOCs 25, 26, 27, and 41, are generally below drinking water standards.

Current remedial action activity consists of continued long-term groundwater monitoring, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

6.10 Next Review

This is the second Five-Year Review that has been performed for the SPIA. The next review will be performed within five years of the completion of this Five-Year Review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

6.11 References

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7.0 AOCs 32 AND 43A FIVE YEAR POLICY SITE REVIEW

7.1 Site Chronology

Table 7-1 Chronology of Site Events for AOC 32

Event	Date
Site Inspection (SI) initiated	1991
Remedial Investigation (RI) completed	1994
Feasibility Study (FS) completed	1997
Record of Decision (ROD) signature	1998
First Five-Year Statutory Review	September 2000
Monitored Natural Attenuation Assessment (MNAA)	2000
Replacement monitoring well and piezometer installation	2001
Long term groundwater monitoring	2002 to present
Second Five Year Review	2005

Table 7-2 Chronology of Site Events for AOC 43A

Event	Date
Site Inspection (SI) initiated	1991
Remedial Investigation (RI) completed	1994
Feasibility Study(FS) completed	1997
Record of Decision (ROD) signature	1998
First Five-Year Statutory Review	September 2000
Monitored Natural Attenuation Assessment (MNAA)	2000
Replacement monitoring well and piezometer installation	2001
Long term groundwater monitoring	2002 to present
Second Five Year Review	September 2005

7.2 Background

Both AOCs 32 and 43A are historically contaminated locations within the former Fort Devens property. AOC 32, the Defense Reutilization and Marketing Office (DRMO) Yard, is located on the west side of Cook Street (West Yard) in the northeast portion of the former Main Post. AOC 43A is located to the south of AOC 32, across Market Street (see Figures 1 and 2 as reprinted from the 2003 Annual Report and presented in Appendix F).

The two sites were combined administratively under one ROD, but are described separately in the following subsections for clarity. Subsections 7.2.1 and 7.2.2 provide the site description and history for AOCs 32 and 43A, respectively.

7.2.1 AOC 32 Background

AOC 32 (DRMO Yard) was used as a materials storage facility. Operational records indicate that the facility was active from at least 1964 to 1995. The nature of the materials that were processed and the activities performed in this yard varied significantly. AOC 32 consisted of three fenced areas. The DRMO Yard on the west side of Cook Street (West Yard) contained used equipment, including lead-acid batteries, telecommunications equipment, and administrative equipment. The yard on the east side of Cook Street (East Yard) was used for disassembling vehicles for reusable parts and previously contained scrap metal, tires, stored items ready for sale, and used photographic solutions. The only unpaved, fenced area was located just north of the East Yard and was used to store and recycle tires. A former underground storage tank (UST) site (UST #13) was incorporated into AOC 32. This UST was used to store waste oil and was located just northeast of the DRMO Office.

In 1991, the Army performed a Site Inspection (SI) at AOC 32 and reported contamination exceeding screening concentrations for soil and groundwater. A Remedial Investigation (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 Feasibility Study (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. Following submission of the Army's Proposed Plan (PP) and receipt of public comments on the preferred remedial alternatives, the Army issued a Record of Decision (ROD), documenting the final choice of a 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.

A separate evaluation of monitored natural attenuation as the selected remedy at AOC 32 was performed. The Monitored Natural Attenuation Assessment (MNAA) Report (SWETS, 2000b) 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 groundwater monitoring and establishment of institutional controls, would be an effective remedial action at AOC 32.

7.2.2 AOC 43A Background

At the time of base closure in 1996, the area around the location of AOC 43A was used as a petroleum, oils and lubricants storage area (POL). Located across Market Street from AOC 32, this area served as the central distribution point for all gasoline and fuel at Fort Devens during the 1940s and 1950s. AOC 43A consisted of a fenced lot within a developed industrial area.

The distribution facility formerly 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 tank (ASTs), and two 8,000-gallon ASTs. Gasoline was delivered to the facility via railroad, and was transferred to the tanks. AOC 43A consists of a fenced lot located within a developed industrial area of buildings, roads, and grass lots, with the exception of the east side of the site, which was bounded by a wooded area on a rock outcrop. A set of railroad tracks, formerly used to transport fuels to the site, formed the site's northern boundary. The UST area was fenced. 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 new USTs were located on the eastern side.

During the 1992 SI on the POL storage area, 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. 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 monitored natural attenuation. The ROD was signed in February 1998.

A separate evaluation of monitored natural attenuation as the selected remedy at AOC 43A was performed. The Monitored Natural Attenuation Assessment (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 groundwater monitoring and establishment of institutional controls, would be an effective remedial action at AOC 43A.

7.2.3 AOC 32 and 43A Redevelopment

AOC 32 and 43A underwent significant redevelopment in 2000. The two AOCs, now Lot 10 (Figure 3 reprinted from the 2003 Annual Report as presented in Appendix F), were modified by the construction of a large warehouse that was completed in 2001. As a result, major demolition, regrading, and building/paving construction has altered the site's physical setting and hydrogeologic conditions. Twenty one (21) monitoring locations were destroyed or decommissioned as part of the construction activities. Thirteen (13) new monitoring wells and nine (9) piezometers were installed to replace those destroyed during construction in November 2001 to January 2002 (HAS, 2002).

- Installed wells included: 32M-01-13XBR, 32M-01-14XOB, 32M-01-14XBR, 32M-01-15XBR, 32M-01-16XBR, 32M-01-17XBR, 32M-01-18XBR, 43M-01-016XOB, 43M-01-16XBR, 43M-01-17XOB, 43M-01-17XBR, 43M-01-20XOB, and 43M-01-20XBR. Installed piezometers included: 32M-01-04XBR, 32M-01-05XOB, 32 M-01-06XBR, 32M-01-07XOB, 32M-01-08XOB, 32M-01-09XOB, 32M-01-10XBR, 32M-01-11XBR, and 32M-01-12XBR.

- Destroyed monitoring points included: 32M-92-03X, 32M-92-04X, 32M-92-05X, 32M-92-06X, 32M-92-07X, 32M-99-08X, 32M-99-09X, 32M-99-11X, 43MA-93-04X, 43MA-93-05X, 43MA-93-06X, 43MA-93-07X, 43MA-93-08X, 43MA-93-10X, 43MA-99-11X, 43MA-99-12X, 43MA-99-13X, 43MA-99-14X, 43MA-99-15X, POL-1, POL-2, and POL-3.

7.3 Remedial Actions

Remedial response objectives were defined to aid in developing and screening alternatives. The objectives aim to mitigate existing and future potential threats to human health and the environment. The Remedial Action Objectives (RAOs) for AOCs 32 and 43A are discussed in the following subsections.

The groundwater cleanup goals were developed from several sources and were presented in the ROD. Groundwater cleanup goals for contaminants of concern (COCs) are shown in the following Table. If no cleanup goal was developed for a specific analyte as part of the ROD, the Massachusetts Contingency Plan (MCP) Method 1 GW-1 standard was used as the cleanup goal for COCs.

Table 7-3 Area 32 and 43A COC: Cleanup Level in Groundwater

Contaminant of Concern	Cleanup Goals (µg/L)
VOCs	
Vinyl Chloride	2
1,2-dichloroethene (trans)	55
1,2-dichloroethene (cis)	55
1,1,1-trichloroethane	5
Trichloroethene	5
1,1,2-trichloroethane	5
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	600
1,4-Dichlorobenzene	75
VPH	
Benzene	5
Ethylbenzene	500
m,p-xylene	--
o-xylene	--
Toluene	--
C5-C8 Aliphatics (1,2)	400
C9-C12 Aliphatics (1,3)	4,000
C9-C10 Aromatics (1)	200
EPH	
C9-C18 Aliphatics	4,000
C19-C36 Aliphatics	5,000
C11-C22 Aromatics	200
PCBs	
PCB-1016	0.5
PCB-1221	0.5
PCB-1232	0.5
PCB-1242	0.5
PCB-1248	0.5
PCB-1254	0.5
PCB-1260	0.5
INORGANICS	
Arsenic – Total	50
Lead – Total	15
Manganese – Total	3,500
Arsenic - Dissolved	50
Lead – Dissolved	15
Manganese – Dissolved	3,500

7.3.1 Surface and Subsurface Soil Remedial Objectives

The RAOs for site-related surface and subsurface soils were as follows:

- Prevent direct and indirect contact, ingestion, and inhalation of the soil contaminated with chemical of potential concern (COPCs) by human and ecological receptors at levels that could pose risks.
- Prevent erosion and migration of soil contaminated with COPCs to storm sewers and surface water bodies.
- Prevent COPC migration to the groundwater at levels that could adversely affect human health and the environment

Cleanup goals for soils were calculated from the risk assessment as candidate goals for all contaminants except polychlorinated biphenyls (PCBs). The PCB cleanup goal is an Applicable or Relevant and Appropriate Requirement (ARAR) that existed from the Toxic Substances Control Act (TSCA). Other contaminants, not addressed by these two sources, used the lower value of the USEPA Region III risk-based concentration or the RCRA corrective action level was selected. If these values were below the background concentration, the background value was used as the cleanup goal. Because cleanup goals were not established in the ROD for extractable petroleum hydrocarbons (EPH) / volatile petroleum hydrocarbons (VPH), the MCP S-2 standard was used as the cleanup goal.

7.3.2 Groundwater Remedial Objectives

The RAOs for site-related groundwater included the following:

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

The main post groundwater cleanup goals were developed from numerous sources and were presented in the ROD. These cleanup levels were used to screen groundwater data from both AOC 32 (UST #13) and DRMO/POL (AOC 32/43A). Groundwater cleanup goals for COCs are shown in Table 1-1 in Appendix F. Table 1-1 is reprinted from (SWETS, 2000c). 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 MADEP Office of Research and Standards Guidance, for chemicals for which Massachusetts Maximum Contaminant Levels (MMCLs) have not been promulgated, was selected. If measurable concentrations were below background values, the background concentrations were established as the candidate inorganic contaminant concentrations. Since cleanup goals were not established in the ROD for EPH/VPH, the MCP Method 1 GW-1 standard was used as the cleanup goal. The cleanup goal for lead is related to the groundwater associated with AOC 43A, not AOC 32.

7.3.3 Selected Remedy

7.3.3.1 Area 32 (Soils Operable Unit) Selected Remedial Components

The selected remedy for AOC 32 (Soils Operable Unit) is Alternative A6. This alternative would not treat or destroy the soil contamination, but completely remove it from the site. Therefore, this alternative would provide complete protection of human health and the environment. A detailed description of key components of alternative A6 is presented in Section 10.C.1 of the ROD; the key components are summarized below.

- Excavating contaminated soil (approximately 1,300 cubic yards [yd^3], confirmatory sampling to be performed prior to backfilling).
- Immediately transporting soils to an off-site, non-hazardous landfill for disposal.
- Backfilling the excavated area with clean material, and revegetating the area.
- Monitoring groundwater on an annual basis and reviewing the site at five-year intervals for 30 years or until contamination is reduced to acceptable concentrations.

Excavate Contaminated Soil. As presented in the ROD Section 10.C.1, contaminated soil was found in four areas: the southern portion of the tire storage area, adjacent to the northern border of the DRMO Yard; the center of the East Yard; the drainage swale along the western edge of the yard; and the drainage swale along the eastern edge of the yard. Based on sampling data collected during the RI, an estimated 1,300 yd^3 of soil needed to be excavated.

Confirmatory sampling was required to verify that cleanup goals were achieved. If sampling results exceed cleanup goals, addition excavation would be required. If results of confirmation sampling were acceptable, excavations would be considered complete and prepared for backfilling.

Transporting Soil Off-Site. As presented in the ROD Section 10.C.1, toxicity characteristic leaching procedure (TCLP) analysis for lead and cadmium would be run on excavated soil. Material would be transported to an off-site, RCRA-regulated landfill if material failed the TCLP. If material passed the TCLP, it would be transported off-site to a non-hazardous industrial landfill.

Backfilling and Revegetation. As presented in the ROD Section 10.C.1, once acceptable sample results were verified, the excavation for the area would be considered completed. Excavated areas would then be regraded or backfilled to grade with clean soils and revegetated for stabilization.

Groundwater Monitoring. As presented in the ROD Section 10.C.1, source contamination would be removed; no long-term monitoring would be required. A review of site conditions, including groundwater monitoring, would be conducted in five years to ensure no contaminants continued to migrate from unidentified sources. Appropriate action would be considered at that time.

7.3.3.2 Area 32 (Groundwater Operable Unit) Selected Remedial Components

The selected remedy for AOC 32 (Groundwater Operable Unit) is Alternative B3. This alternative relies on natural attenuation to remediate groundwater contaminants in the subsurface. The Army would follow the *Technical Protocol for Implementing Intrinsic Remediation with*

Long-Term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater (USEPA/Air Force Center for Environmental Excellence, November, 1995). During the period of restoration, access to the site for some uses, such as water supply, would be restricted, since the groundwater contaminant levels exceed ARARs. Monitored natural attenuation is differentiated from institutional action by the degree of site characterization, modeling of the groundwater flow and contaminant migration, and the long-term monitoring effort to ensure that natural attenuation is working. A detailed description of key components of alternative B3 is presented in Section 10.C.2 of the ROD; the key components are summarized below.

- Establishing institutional controls.
- Installing additional groundwater monitoring wells.
- Providing for monitored natural attenuation.
- Collecting data on monitored natural attenuation, assessing the data, and performing groundwater modeling.
- Performing long term groundwater monitoring on a semi-annual basis.
- Reviewing the site at 5-year intervals for 30 years or until contamination is reduced to acceptable concentrations.
- Providing annual data reports to USEPA and MADEP.
- Incorporate collected data into groundwater flow and transport models. Field data and model predictions were to be reviewed as part of the Five-Year Review.

Establish Institutional Controls. As presented in the ROD Section 10.C.2, 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 (November 1996 Devens Reuse Plan), which will control development upon the Army's release of the property. Therefore, no further zoning alterations would be required.

Install Additional Groundwater Monitoring Wells. As presented in the ROD Section 10.C.2, additional groundwater monitoring wells would be required to improve data collection coverage within the source area, as well as downgradient of the site. The ultimate number and location of additional wells selected for long-term groundwater monitoring would depend on the results of the fate and transport modeling. A long-term monitoring plan would be developed as part of the monitored natural attenuation remediation assessment and would undergo regulatory review. These wells would be used to monitor contaminant plume location and concentration in relation to the AOC boundary and to collect intrinsic degradation indicators. To estimate costs for this alternative, it was estimated that three additional shallow wells would be necessary.

Allow for Monitored Natural Attenuation. As presented in the ROD Section 10.C.2, naturally occurring bioremediation is expected to reduce the compounds present in the bedrock beneath the site to protoplasm, carbon dioxide, water, and chlorides by a combination of physical, chemical, and biological processes that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater in a reasonable timeframe (maximum 30-years). These in-situ processes include biodegradation, dispersion, dilution, adsorption, volatilization, and biological and chemical stabilization or destruction of contaminants.

Collect and Incorporate Additional Field Data into Groundwater Models. As presented in the ROD Section 10.C.2, prior to refining a long-term groundwater monitoring plan, additional data collection and modeling may be required. Data collection would consist of installing additional monitoring wells and performing additional rounds of groundwater sampling and analysis to refine estimates of monitored natural attenuation effectiveness in protecting downgradient receptors. A monitored natural attenuation assessment work plan would be developed and provided for regulatory review. Data collected would include groundwater elevation, monitored natural attenuation indicators, and relevant COPCs, including TPHC by MADEP method for EPH and VPH. Monitored natural attenuation indicator data would be used to provide additional evidence that monitored natural attenuation is occurring and to determine future intrinsic bioremediation potential. Relevant COPC concentration data, including VPH/EPH via MADEP methods would directly assist in estimating site-specific degradation rates and the effectiveness of monitored natural attenuation in achieving groundwater cleanup goals.

Monitor Groundwater Over the Long-term and Annually Report on Groundwater Quality. As presented in the ROD Section 10.C.2, long-term groundwater monitoring is proposed to assess the monitored natural attenuation progress and detect any potential migration of contaminants that exceed groundwater cleanup levels. Groundwater monitoring would be conducted annually for 30 years or until groundwater contamination has been reduced to acceptable levels.

The Army may request a reduction in the frequency of groundwater monitoring if warranted by site conditions. Annual monitoring would be required unless USEPA and MADEP agree to a reduced frequency. A long term groundwater monitoring plan would be developed by the Army and provided for regulatory review. Annual reports would be submitted to USEPA and MADEP and would include a description of site activities, a summary of the long-term groundwater monitoring program results, and any modeling updates.

Review Field Data, Modeling Predictions, and Compliance with ARARs at 5-Year Intervals. As presented in the ROD Section 10.C.2, under CERCLA 121(c) (42 USC 9621), any remedial action that results in contaminants remaining on-site must be reviewed at least every 5 years. During 5-year reviews, the existing data, monitoring program, and model predictions are evaluated and modified, as necessary. Whether the implemented remedy continues to be protective of human health and the environment or if the implementation of additional remedial action is appropriate are assessed.

The 5-year review would evaluate the alternative's effectiveness (compliance with ARAR at reducing potential human health risk from exposure to groundwater on-site and downgradient, considering current and potential future receptors. This evaluation would be based on how successful the alternative is at attaining groundwater cleanup levels at the long-term monitoring wells.

Review the Need for Continued Monitoring and Additional Action at 5-year Intervals. As presented in the ROD Section 10.C.2, details were provided in the previous subsection and will not be repeated here.

7.3.4 Remedy Implementation

Soil Remedial Action

Excavation and disposal activities were completed between October and December 1998, as summarized within the USACE Final Soils Remedial Action Operable Unit Completion Report: Soil, Asphalt, And Debris Removal, (Weston, 2000) and as outlined below:

- Removal and disposal of approximately 50 yd^3 of metal debris.
- Removal and disposal of approximately 1,200 yd^3 of petroleum-contaminated soil.

- Removal and disposal of approximately 800 yd^3 of non-hazardous soil with shredded tire scrap.
- Removal and disposal of approximately 400 yd^3 of soil contaminated with lead and containing shredded tire scrap.
- Removal and disposal of approximately 600 yd^3 of soil and asphalt contaminated with low levels of PCBs and pesticides.

The Removal Action for AOC 32, performed by the Army in October and November 1998, appeared to have permanently achieved the RAOs specified in the ROD as discussed in the Operating Properly and Successfully (OPS) Report (SWETS, 2000a). The final confirmation data results indicated that not only were cleanup levels met, sample concentrations were actually lower than the more conservative MCP Method 1 S-1 criteria.

An evaluation of the remedial actions was performed. The OPS Report (SWETS, 2000a) demonstrated that the selected remedial actions for AOC 43A were operating properly and successfully in accordance with applicable USEPA guidance. This OPS report was prepared prior to construction of the warehouse building in 2001 and should be revaluated based on current and proposed site conditions.

Building Construction/Well Replacement

AOC 32 and 43A underwent significant redevelopment in 2000. The two AOCs, now Lot 10, were modified by the construction of a large warehouse that was completed in 2001. As a result, major demolition, regrading, and building/paving construction has altered the site's physical setting and hydrogeologic conditions. The groundwater monitoring wells sampled as part of the MNA were destroyed. Thirteen (13) new monitoring wells and nine (9) piezometers were installed, to replace those destroyed during construction, in November 2001 to January 2002 (HAS, 2002).

The new warehouse and associated paved areas have significantly altered the ground surface and its capacity for recharge. Bedrock contour maps were developed by Shaw (USACE, 2005) for the areas beneath the site building that showed how bedrock can influence groundwater flow directions and affect contaminant transport related to the former source area that are now encompassed by the warehouse footprint. The warehouse slab foundation is likely founded directly on bedrock along its eastern side. The bedrock slopes downward to the west, east and north away from the rock mounds under the warehouse, separating groundwater flow directions in the area. The Draft 2003 Annual Summary Report (USACE, 2004) concluded that there is likely little or no groundwater in the thin overburden under the warehouse, thus preventing the transport and attenuation of some residual volatile organic compound (VOC) contamination in the overburden.

Monitored Natural Attenuation Assessment (MNAA)

A separate evaluation of monitored natural attenuation as the selected remedy at AOC 32 and 43A was performed. The Monitored Natural Attenuation Assessment (MNAA) Report (SWETS, 2000b & 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 groundwater monitoring and establishment of institutional controls, would be an effective remedial action at AOC 32 and 43A.

Four rounds of quarterly groundwater sampling were performed in January, April, July, and

October 1999. During each of the four sampling rounds, organic and inorganic compounds were detected in monitoring wells associated with AOC 43A at concentrations exceeding cleanup goals. There were two monitoring wells (43MA-93-10X and POL-3) which exhibited concentrations of organic compounds in excess of cleanup goals. The organic compounds detected, included EPH, VPH and trichloroethene. Two monitoring wells (43-MA-93-10X and POL2) exhibited concentrations of inorganics in excess of cleanup goals. Inorganics detected included arsenic, lead and manganese. Biodegradation of organic compounds was believed to be occurring at AOC 43A, based on the 1999 data, as evidenced by observed concentration decreases of organic compounds in groundwater over time, and by geochemical indicator parameters.

Four microwells (43MA-99-12X, 43MA-99-13X, 43MA-99-14X, and 43MA-99-15X) were installed in AOC 43A between March 29 and March 31, 1999 to investigate the presence or absence of chlorinated VOCs. One monitoring well (43MA-99-1IX) was installed on April 8, 1999 to provide an additional point of groundwater quality and confirm water table elevation and groundwater flow direction.

Long-term groundwater monitoring has been performed semi annually from 2002 through 2004. The USACE currently performs long-term monitoring at AOCs 32 and 43A. The long-term monitoring field activities performed at AOC 32 and 43A are summarized below:

- Thirteen monitoring wells (32M-01-13XBR, 32M-01-14XOB, 32M-01-14XBR, 32M-01-15XBR, 32M-01-16XBR, 32M-01-17XBR, 32M-01-18XBR, 43M-01-016XOB, 43M-01-16XBR, 43M-01-17XOB, 43M-01-17XBR, 43M-01-20XOB, and 43M-01-20XBR) and nine piezometers (32M-01-04XBR, 32M-01-05XOB, 32M-01-06XBR, 32M-01-07XOB, 32M-01-08XOB, 32M-01-09XOB, 32M-01-10XBR, 32M-01-11XBR, and 32M-01-12XBR) were installed between November 13, 2001 and January 2, 2002 to replace damaged groundwater monitoring points, to allow for continued groundwater elevation measurements and to collect groundwater quality samples to evaluate the effectiveness of the MNA remedial solution (HAS, 2002).

- Existing monitoring wells/piezometers remaining in the Long-Term Monitoring Plan (LTMP) include 32M-92-01X, 32Z-99-02X, 32M-92-03X, SHL-15, and SHL-25. Monitoring wells 43MA-93-05X, 63-BD-99-01, 63BD-99-02, 63BD-99-03, and 63BD-99-04, located on an adjoining site directly to the southeast, were incorporated into the LTMP for groundwater elevation information.

- The five wells in the neighboring property have not been included in groundwater elevation monitoring rounds in 2002-2005. A decision should be made about how these wells should be utilized in future sampling rounds, and the imminent 2005 revisions to the LTMP will provide that opportunity. For evaluation of volatiles at 32M-01-18XBR, it should be noted that 32M-01-04XBR, which is closer to the contaminated well, is recommended to be phased out for sampling but retained for water level monitoring: therefore sampling in the active parking lot area farther to the south would not provide useful chemical data, although water level data would be useful for a wider regional perspective.

- Two rounds of semi-annual groundwater sampling were performed at four (4) pre-existing monitoring wells and thirteen (13) replacement monitoring wells each year during 2002, 2003, and 2004. Groundwater levels and light non-aqueous phase liquid (LNAPL) thickness measurements were recorded at twenty-six (26) monitoring wells and one piezometer during January 2002, April 2002, July 2002, October 2002, March 2003, June 2003, September 2003, December 2003, May 2004, and October 2004.

Results of the quarterly sampling performed in 1999, prior to construction of the warehouse, indicated that MNA was viable. After development of the site, Shaw performed post-construction groundwater sampling between January 2002 and December 2003 (Shaw, 2004). Four pre-existing and 14 replacement wells were sampled for VOCs, VPH, EPH, PCBs, and some inorganic MNA parameters. Results obtained in 2003, for AOC 32, showed concentrations exceeding cleanup goals only in bedrock source well 32M-01-18XBR for 1,4-dichlorobenzene, 1,2- dichlorobenzene, VPH C9-C10 aromatics and manganese (total and dissolved). Results obtained in 2003, for AOC 43, did not show any exceedances. Shaw concluded that results from the three sampling rounds performed in 2003 showed overall progressive attenuation of COCs (Shaw, 2004). Results obtained in 2004 show a steady or fluctuating trend at 32M-01-18XBR (USACE, 2005b), indicating that site contaminants may not be attenuating as anticipated. Additional details on analytical results are discussed in Section 7.5.2.

Institutional Controls

The ROD stipulated that Institutional Controls (ICs) should be imposed on the properties to limit potential exposure to groundwater under both existing and future site conditions. ICs would ensure that exposure to and extraction of groundwater from the site for industrial and/or potable water supply would not be permitted. The ICs for AOCs 32 and 43A were specified in the FOST, dated May 2000 and were incorporated into the deed prior to property transfer. The deed restriction on parcel A-3 (the subject site), preventing groundwater extraction, was recorded in June 2000. A copy of the a deed is included in Appendix F. Based on information collected during this review, this IC is effective in ensuring the protectiveness of the remedy.

7.3.5 Systems Operation/Operations and Maintenance

Groundwater monitoring is being performed in accordance with the LTMP (SWETS 2001a, b) for AOC 32 and 43A. Since the LTMP was developed for the former site configuration and available well network, it should serve as a rough guide to the current program. Additional discussions are ongoing to develop an updated LTMP appropriate to current site conditions. If further development of the site occurs as proposed, then additional adjustments to the LTMP will be necessary.

7.4 Progress Since the Last Five-Year Review

This is the second Five-Year Review for AOCs 32 and 43A. The Protectiveness Statement from the first Five-Year Review indicated that the remedies at AOC 32 and 43A were expected to be protective of human health and the environment upon completion and immediate threats were addressed.

Findings and recommendations of the first Five-Year Review included the following:

- Surface and subsurface soil remedial actions were successfully completed at AOC 32 and no additional actions were necessary.
- Institutional controls, established in the ROD and described in further detail in the OPS (SWETs, 2000a), should be imposed on the properties to limit potential exposure to groundwater under both existing and future site conditions. ICs would ensure that exposure to and extraction of groundwater from the site, for industrial and/or potable

water supply, would not be permitted. The ICs for AOCs 32 and 43A would need to be incorporated either in full or by reference into deeds, easement, mortgages, or other instruments of property transfer. The ICs were specified in the FOST, dated May 2000, and were incorporated into the deed prior to property transfer.

- AOC 43A underwent significant redevelopment in 2000. As a result, major demolition, regrading, including the removal of bedrock outcrops that may have provided recharge to the source areas, and building/paving construction has altered the site's physical setting and hydrology. All of the groundwater monitoring wells sampled as part of the MNAA were destroyed during these activities. At the time, the Army intended to install source area monitoring wells and re-initiate long-term monitoring in late Fall of 2000. In addition, piezometers were to be installed and monitored to characterize the newly-altered flow field. Sentinel wells were to be installed in appropriate locations to complete the monitoring locations. Thirteen (13) new monitoring wells and nine (9) new piezometers were installed between 2001 and 2002.

7.5 Five-Year Review Process

7.5.1 Document Review

The following documents were reviewed for this Five-Year Review:

- Remedial Investigation Volume II and III prepared by Ecology and Environmental, Inc., August 1994.
- Record of Decision prepared by Horne Engineering Services, Inc., February 1998.
- Final MNA Assessment Report AOCs 32/43A, Vol. I & II prepared by Stone and Webster Environmental Technology & Services, December 2000.
- Final MNA Assessment Report AOCs 32/43A, Vol. II, Appendix E Long Term Monitoring Plan prepared by Stone and Webster Environmental Technology & Services, April 2001.
- Draft Final Data Report, Replacement GW Monitoring Wells and Piezometers, AOC 32/43A prepared by Haley & Aldrich, Inc., May 2002.
- Draft 2003 Annual Report prepared by U.S. Army Corps of Engineers, July 2004.
- Spring 2004 Semi-Annual Report prepared by the U.S. Army Corps of Engineers, February 2005.
- Draft 2004 Annual Report prepared by U.S. Army Corps of Engineers, July 2005.

7.5.2 Data Review

Since 2001, eleven (11) monitoring wells (32M-92-01X, 32M-92-03X, 32M-01-04XBR, 32M-01-13XBR, 32M-01-15XBR, 32M-01-16XBR, 32M-01-17XBR, 43M-01-16XBR, 43M-01-17XBR, 43M-01-20XOB, and 43M-01-20XBR) continue to have no exceedances throughout the post-construction long-term monitoring period. There have been no exceedances of PCBs or EPH cleanup goals for the site detected to date in these 11 wells. The one exceedance of a Massachusetts EPH standard remained below the cleanup goal for the site.

Seven monitoring wells have exhibited at least one exceedance of a COC since 2001. AOC 32 wells exhibited sporadic exceedances of arsenic, manganese, and lead in overburden/bedrock well pair 32M-01-14X, and lead in 32Z-99-02X. AOC 43A wells exhibited sporadic exceedances of some VPH and arsenic in 43M-01-17XOB, and manganese only in 43M-01-20XBR. There were no exceedances in the AOC 43A wells in the 2003 sampling period.

Bedrock source well 32M-01-18XBR continues to be the only location exhibiting exceedances (VOCs, VPH, and manganese). A fluctuation in VOC concentrations has been observed suggesting that site contaminants are not attenuating as anticipated. Nearby bedrock wells continue to exhibit no exceedances. A summary of the wells with exceedances is included in the following table:

Table 7-4 Summary of Well Contaminant Exceedances

WELL	APRIL 2002 and OCTOBER 2002	JUNE/SEPT 2003 DECEMBER 2003	MAY 2004	OCTOBER 2004
AOC 32 WELLS – EXCEEDANCES				
32M-01-18XBR	VOCs; VPH; Mn VOCs; VPH; Mn	VOCs; VPH; Mn VOCs; VPH; Mn	VOCs; VPH; Mn	VOCs; VPH; Mn
32M-01-14XBR	No exceedances	Arsenic and Lead No exceedances	No exceedances	No exceedances
32M-01-14XOB	No exceedances	Manganese only Manganese only	No exceedances	Manganese only
32Z-99-02X	Lead only	No exceedances	No exceedances	No exceedances
SHL-15	Arsenic and Manganese No exceedances	No exceedances	No exceedances	Arsenic only
AOC 43A – EXCEEDANCES				
43M-01-17XOB	VPH and Arsenic Arsenic only	No exceedances	No exceedances	Methane only; (exceeded MCP limit but not site-specific cleanup goal)
43M-01-20XBR	Manganese only Manganese only	No exceedances	No exceedances	No exceedances

The following tables are included in Appendix F: Analytical results presented in Tables D-1 and D-2 were reprinted from the 2003 Annual Report, Table 2 is reprinted from the Spring 2004 Semi-Annual Report, and Table 6-3 which was provided by the USACE.

In the Draft 2004 Annual Report (USACE 2005b) the USACE has suggested that several wells be removed from the list of sampled wells since contaminant concentrations in these wells have been below cleanup goals for two years. If implemented, these changes would reduce the number of sampled locations by seven wells to the west of the warehouse and by one well at the south-east entrance to the property. These recommendations are supported by USEPA/USACE guidance in Roadmap to Long-Term Monitoring Optimization (USEPA/USACE 2005), which in Tables 2.4.1 and 2.4.2 cite contaminant concentrations consistently below cleanup levels or detection limits and distance from a source area as valid justifications to remove a well from a monitoring network. The changes and reasons why, including an analysis of the date, will be detailed in the updated LTMP.

The Draft 2004 Annual Report (USACE 2005b) further proposes that the analyte list be reduced. Analyses no longer required would be EPH, PCBs, and dissolved metals. The recommendations are based on a history of non-detects, or of detections below cleanup goals, or for filtered metals on the essential duplication with the unfiltered samples being taken for metals analysis.

7.5.2.1 Natural Attenuation

Natural attenuation parameters (dissolved oxygen [DO] and oxidation reduction potential [ORP]/E_h) are only useful from bedrock source well 32M-01-18XBR, as it is the only well that continues to show exceedances of organic parameters. Low values of DO and ORP/E_h are well into the ranges indicating anaerobic conditions. Both have decreased markedly since 2002. This well is located beneath pavement adjacent to the warehouse and the lack of groundwater recharge is reflected in the DO values.

Score sheets were developed for this well, indicating that the evidence for bioremediation of the chlorinated VOCs to be occurring at the well is likely inadequate, and at best limited (USACE 2005b).

The Draft Annual Report (USACE 2005b) recommends that the analyte be further reduced (See section 7.5.2 above) to exclude NH_3, TOC, COD, dissolved gases, alkalinity and anions, the recommendation is based on the assessment that bioremediation of chlorinated organics is not occurring in Well 32M-01-18XBR, which is the most contaminated well, and one of the few listed in Table 7-4 as having had any exceedances of contaminant goals. Since the compounds would be monitored to develop a score for bioremediation, which is not likely, the tests would not be returning useful data, and field monitoring of DO and ORP/E_h could be used instead.

The changes, if adopted, will need to be incorporated into the revisions of the LTMP.

7.5.2.2 New Bedrock Topography

The warehouse was completed in 2001. The new warehouse and its associated pavements have significantly altered the ground surface and its capacity for recharge. Shaw Environmental, Inc. developed a more accurate contour map for bedrock under the warehouse that shows how the bedrock can influence groundwater flow directions and affect contaminant transport related to the former source areas that are now encompassed by the warehouse footprint (Figure 4 reprinted from the 2003 Annual Report and presented in Appendix F). The warehouse slab foundation is likely founded directly on the bedrock along its eastern side and overlies two topographic mounds. Test pits dug in these areas showed shallow bedrock as high as El. 270 feet. The finish floor is at El. 263.5 feet, and it is likely that excavation for the slab foundation extended several feet below this level. Therefore, rock was probably removed to at least El. 260 feet in places (USACE, 2004).

7.5.2.3 Groundwater Flow in Bedrock

The contours show the rock surface slopes east and west away from the two bedrock mounds under the warehouse, separating groundwater flow directions in the area. Flow in bedrock (Figure 5 reprinted from the 2003 Annual Report and presented in Appendix F) is likely to follow fractures and topographic gradients toward these depressions to the east and west. However, the actual presence of groundwater and flow paths in the bedrock is unknown under the building. The warehouse and its surrounding pavements significantly prevent recharge to the bedrock from infiltration through the overburden. Actual pathways for groundwater flow through fractures are not known.

The groundwater flow gradient in bedrock is interpreted from wells surrounding the building. Actual flow paths across the site are unknown because of few data points and the complexity of flow systems in fractured bedrock. The wells on the east side related to AOC 32 and the former UST are:

- Three bedrock source wells (32M-01-03XBR, 32M-01-15XBR, and 32M-01-18XBR).
- Two bedrock sentry wells (32M-01-16XBR AND 32M-01-17XBR).
- One overburden/bedrock (OB/BR) sentry well pair (32M-01-14).
- Distant sentry well SHL-25.

The wells on the west side related to the AOC 43A POL storage area include:

- OB/BR source well pairs 43M-01-17 and 43M-01-16.
- OB/BR sentry well pair 43M-01-20.
- Distant sentry well 32M-92-03X.

The validity of several bedrock wells has been called into question with the observation that water levels in bedrock wells in the depressions on the east and west side of the building were above the bedrock surface, which might indicate upwelling. The water levels recorded in the overburden and bedrock in the paired well sets were reviewed, and the following variations were noted (USACE, 2005b):

- OB/BR well pair 32M-01-14 shows, consistently, levels in the bedrock clearly above the bedrock surface and slightly above the corresponding levels in overburden.

- OB/BR well pairs 43M-01-16, 43M-01-17, and 43M-01-20 show levels in overburden and bedrock to be above the bedrock surface, but nearly identical to each other.

- The remaining bedrock wells have no overburden companion wells to compare to and show levels both above and below the bedrock surface.

The coincidence of water levels in the overburden and bedrock suggests that the bedrock in the screened interval is not isolated from the overburden or the well seals are inadequate. Since there are few reliable data points to determine flow directions in bedrock, drilling and well construction logs, water recovery rates during sampling, and other physical features were reviewed for the 2004 Annual Report (USACE 2005b) to evaluate the validity of the readings from the assumed bedrock aquifer.

The AOC 43A well-pair sampling in October 2004 was reviewed in light of the hypothesis that the deep wells were being influenced by the overburden water table. In all three cases, the hydraulic behavior and equilibration parameters were different enough (overburden versus bedrock) to refute the assumption of leaking between the two (overburden and bedrock) wells (USACE 2005b).

7.5.2.4 Groundwater Flow in Overburden

The new bedrock contour map shows overburden under the warehouse is absent to thin along the east side (less then 10 feet thick between the mounds), and thickens to about 45 feet at well 43M-

01-17XOB along the building's west margin. Hydraulic gradients in the overburden follow those contours (Figures 6 reprinted from the 2003 Annual Report and presented in Appendix F). The residual contamination in the source areas appears to be encapsulated under the warehouse structure with little to no groundwater in the thin overburden, thus preventing the transport and attenuation of some residual VOC contamination in the overburden. The warehouse and its surrounding pavements also significantly limit direct recharge to the overburden from surface infiltration.

7.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOCs 32 and 43A. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s.

AOC 32/43A is located in the northeast corner of the main post at Devens. The majority of the site is comprised of a 45,000 square foot warehouse building that is currently partially occupied. Other features located at these AOCs included paved and landscaped areas and a fence along the northern boundary of the property. The site is bound by Shepley's Hill Landfill to the north, Cook Street to the west, Antietam Street to the south and west and undeveloped areas to the east.

All of the buildings associated with or near AOCs 32 and 43A have been removed and were replaced with a large warehouse that covers both AOCs. New monitoring wells were installed after the completion of the warehouse. However, the new monitoring network did not include groundwater monitoring in the former source areas that now lie under the building. Nobis observed that monitoring well 43M-01-16XBR was missing its road box. A road cone was covering the PVC stickup of the well.

7.5.4 Interviews

The following individuals were interviewed as part of the Five-Year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens Reserve Forces Training Area (RFTA)
- Mr. Ron Ostrowski, Mass Development
- Mr. Robert Simeone, Devens RFTA

All personnel were interviewed on April 21, 2005, while performing the site visit, with select follow-up conversations or correspondence. Ms. Iorio and Mr. Tada referred Nobis to the MNA Assessment Report completed by Stone and Webster in 2000/2001 for an evaluation of remedy performance.

Ms. Iorio indicated that since construction of the warehouse building, a fluctuation in VOC concentrations has been observed in well 32M-01-18XBR suggesting that site contaminants are not attenuating as anticipated. In addition, the LTMP is in the process of being updated since it was prepared prior to redevelopment of the site in 2001. Ms. Iorio also indicated there are plans to expand the warehouse building in the Spring of 2006.

7.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 32/43A.

On June 18, 1997, the Army issued the proposed plan to citizens and organizations to provide the public with a brief explanation of the Army's preferred remedy for cleanup at both AOC 32 and AOC 43A. The feasibility study and proposed plan for AOC 32/43A were made available for review at local libraries and a formal 30-day public comment period was conducted from June 18 through July 18, 1997. On July 17, 1997, the Army held a public information meeting at Devens to present the proposed plan to the public, accept verbal or written comments from the public, and discuss the cleanup alternatives evaluated in the FS.

Currently the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals, reviewing plans and documents, identifying proposed requirements and priorities, and conducting regular meetings that are open to the public. At various times throughout the review period significant events for AOC 32/43A were discussed at the RAB meetings. As appropriate, pertinent documents were distributed to and reviewed by the RAB members. Items discussed, included, but not limited to, development of a LTMP, property transfer, construction at the site and replacement of monitoring wells.

7.6 Technical Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Remedial Action Performance: The excavation and off-site disposal of contaminated soils have been effective at immobilizing the petroleum related contaminants and has met the objectives of the remedial actions.

Groundwater data has indicated that off-site migration is not occurring; however, a fluctuation in VOC concentrations has been observed in well 32M-01-18XBR, suggesting that site contaminants are not attenuating as anticipated. The LTMP is currently being updated and will address the off-site migration, trend analysis, and an evaluation of remedial durations.

System Operations/Operation and Maintenance (Long-Term Groundwater Monitoring): Groundwater monitoring is performed in accordance with the LTMP (SWETS 2001a, b) for AOC 32/43A. The LTMP was developed prior to construction activities that occurred at the site circa 2001. Yearly O&M costs for implementation of the remedy are not readily available for review.

Opportunities for Optimization: Groundwater sampling has been conducted in broad accordance with the LTMP. However, performing low flow sampling at a lower purge rate as outlined in the EPA Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells (0.1 – 0.4 L/minute) (EPA Region I, Revision 2, June 30, 1996) and maintaining a consistent purge rate throughout sampling may provide more representative results. Shaw and the Corps of Engineers implemented this recommendation and have sampled according to the EPA Low Flow method since 2002.

Early Indicators of Potential Remedy Failure: Little or no reduction in VOC concentrations is occurring at monitoring well 32M-01-18XBR. This indicator should be reevaluated after the LTMP is revised.

Implementation of Institutional Controls and Other Measures: There are no current or future plans for development of sensitive land uses or installation of potable drinking water wells at AOCs 32 and 43A. A copy of the deed which contains the institutional controls is included in Appendix F. Based on information collected during this review, this IC is effective in ensuring the remedy's protectiveness since exposures to contaminants are not allowed to occur.

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

Changes in Standards and To Be Considered: As part of this Five-Year Review, ARARs and to be considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed. See Section 7.6.2, ARARs.

Excavation activities at AOC 32 were completed in 1998. The RAOs for soil specified in the ROD have been permanently achieved. There are no current ARARs that apply to soil contaminants at the Site. Because the cleanup goals for soil at AOC 32 were based on human health risk assessment levels determined specifically for the site or on RCRA action levels and contaminated soils were removed, changes to soil TBCs do not affect the protectiveness of the implemented remedy.

The Maximum Contaminant Levels (MCLs) are health-based guidelines established by the U.S. EPA. The MCL for arsenic (50 μg/L), in effect at the time of the ROD, was selected as a cleanup goal for groundwater. Arsenic was present on site at concentrations greater than its MCL (50 μg/L) during the remedial investigation and was identified as a primary risk driver for the ingestion of groundwater exposure pathway at AOC 32. The MCL for arsenic has been updated since the 1998 ROD. The MCL for arsenic was lowered to 10 μg/L, effective February 2002. Because the remedy prohibits the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the implemented remedy since exposures are effectively prevented.

Changes in Exposure Pathways: The ROD identified unacceptable risks from the following exposure pathways: ingestion of groundwater as the primary drinking water source at both AOCs 32 and 43A; and direct contact with and ingestion of contaminated soils by current and future site workers and future construction workers at AOC 32. Based on indications from analytical results of confirmatory soil samples collected from excavated areas, the excavation and removal of contaminated soil from AOC 32 have eliminated the direct contact exposures to contaminated soils.

Institutional controls prohibiting the use of site groundwater as drinking water at both AOCs 32 and 43A have effectively eliminated exposures via ingestion of groundwater. The construction of a large warehouse was completed in 2001. The warehouse and associated pavements now cover much of both AOCs 32 and 43A. Land use at the Site has not changed from the presumed future industrial use evaluated prior to the ROD and is not expected to change; expansion of the commercial warehouse is currently a near-term possibility. Current use is in compliance with deed restrictions on groundwater extraction recorded in November 1997 for parcel A-3, which is AOCs 32 and 43A.

The recent construction of the warehouse results in a potential exposure pathway if inhalation of vapors diffused from groundwater via soil gas into indoor air is occurring. This potential pathway was anticipated and evaluated in the RI for AOC 32 prior to the ROD for future on-site workers. No unacceptable risks were found based on modeled indoor air concentrations developed from site groundwater and soil concentrations at the time of the RI preparation (circa 1994).

As groundwater concentrations of VOCs in well 32M-01-18XBR are a potential concern for humans working within on-site buildings now or in the future, the vapor intrusion pathway should be evaluated in accordance with the _Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-F-02-052_, dated November 2002. A site-specific assessment is recommended to determine whether the pathway is complete, including evaluation of subslab soil gas and (if warranted) indoor air concentrations and/or site-specific mathematical modeling. The cleanup goals established in the ROD meet the target concentrations identified in the noted guidance. Therefore, the cleanup goals remain protective, while existing concentrations exceed the target concentrations. The schedule for finalizing the EPA Draft Guidance is not known, but the most up-to-date guidance should be used in the evaluation.

The MCP defines a potential source of vapors to indoor air when groundwater is less than 15 feet below the ground surface and within 30 feet of a structure. The observed VOC concentrations do not exceed their respective current Method 1 GW-2 vapor intrusion standards, with the exception of C9-C10 aromatics (estimated at 5,600 parts per billion [ppb] in the May 2004 sampling round, compared to a GW-2 value of 5,000 ppb). MADEP has proposed revisions to the Method 1 GW-2 standards (September 2004), but they are not yet promulgated. The most up-to-date standards will be used in the evaluation. Given the measured depths to groundwater (greater than 15 feet) in the vicinity of the warehouse, indoor air exposure associated with potential vapor intrusion is not anticipated.

Changes in Exposure Assumptions: The risk assessments supporting the RODs for AOCs 32 and 43A used exposure assumptions that were conventional at the time. Since that time, EPA has updated some of the recommended dermal contact exposure assumptions. New guidance for evaluating dermal contact exposures was finalized in July 2004 (_Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final_). Because the remedy includes prohibiting the use of groundwater as drinking water and excavation of contaminated soils, changes to the exposure parameters do not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: The carcinogenic toxicity of trichloroethylene (TCE) is currently under review. Preliminary suggestions are that TCE is more toxic than previously thought; however, revised toxicity factors have not yet been finalized. Because the remedy includes prohibiting the use of groundwater as drinking water, changes to the toxicity of groundwater contaminants do not affect the protectiveness of the implemented remedy.

Changes in Risk Assessment Methodologies: The methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOCs 32 and 43A, based on EPA's _Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final_, July 2004. The human health and ecological risks discussed in the ROD have been eliminated by the excavation and removal of soils and the institutional controls, including the deed restriction prohibiting the use of groundwater as drinking water. Therefore, while the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOCs 32 and 43A, these risk assessment methodology changes do not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at AOC 32/43A during this review period.

7.6.1 Summary of Technical Assessment

The excavation and off-site disposal of contaminated soils have been effective at immobilizing the petroleum related contaminants and has met the objectives of the remedial actions.

Groundwater data has indicated that off-site migration is not occurring, however a fluctuation in VOCs concentrations has been observed in well 32M-01-18XBR suggesting that site contaminants are not attenuating as anticipated. Low-flow sampling, as outlined in the EPA Low Stress (Low Flow) Method (add reference) was implemented in 2002, and sampling since this time has continued to follow this methodology. Therefore, the lack of consistency in results cannot be attributed to the sampling method.

Vapor intrusion is a recently emerging exposure pathway that is undergoing increased scrutiny by regulatory agencies. EPA has recently provided widely used guidance in the November 2002 *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-F-02-052.* Comparison of groundwater concentrations to existing MADEP standards for protection of indoor air indicates that indoor air risks are not likely to be problematic (i.e., the current standards are not exceeded) at AOC 32/43A. However, because those MADEP standards are in the process of being revised, vapor intrusion should be further evaluated as existing groundwater concentrations of VOCs in well 32M-01-18XBR are elevated, and may be a potential concern for humans working within on-site buildings now or in the future. A site-specific assessment is recommended using a tiered approach that begins with simple comparisons of measured groundwater contaminant concentrations to published concentrations that are protective of indoor air. If warranted, site-specific mathematical modeling, or measurement of sub-slab soil gas and indoor air concentrations also could be included at the higher potential investigative tiers. The cleanup goals established in the ROD meet the target concentrations identified in the EPA guidance and are therefore protective; however, the existing concentrations in groundwater exceed the ROD target concentrations. If updated versions of guidance or newly promulgated standards become available, they will be considered during the vapor intrusion evaluation.

While the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOCs 32 and 43A, these risk assessment methodology changes do not affect the protectiveness of the remedy, since the use of groundwater as drinking water has been prohibited.

7.6.2 Applicable or Relevant and Appropriate Requirements Review

ARARs presented in Table 24, reprinted from the ROD, are appended in Appendix F. The standards and regulations, current at the signing of the ROD and for the first Five-Year site review, have been reviewed for changes that could affect protectiveness.

ARARs presented in Table 25 of the ROD pertain to excavation and off-site disposal of soil and subsurface soil. Excavation activities were completed in 1998 and the RAOs specified in the ROD have been permanently achieved. Therefore, the ARARs in Table 25 were not reviewed for this Five-Year review.

The following ARARs listed in Appendix E have been modified since signing of the ROD and the first Five-Year review that may affect the protectiveness of the implemented remedial action:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

    a) *** The analyses and determination of compliance with 50 μg/L MCL for arsenic use the requirements of 141.23.

    b) The MCL for arsenic is 50 μg/L for community water systems until January 23, 2006.

  On January 22, 2001, EPA adopted a new standard for arsenic in drinking water at 10 μg/L, replacing the old standard of 50 μg/L (66FR6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 μg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 μg/L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- 310 CMR 30.00 "Hazardous Waste" was updated February 27, 2004. There are no revisions 310 CMR 30.660-30.679 "Groundwater Protection" that affect the protectiveness of the remedy.

- USEPA reference dose (RfD) and health advisories (HA) are requirements designated as TBC. These requirements were updated in the USEPA 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.

In addition, a search was performed for any newly promulgated standards, which could affect protectiveness at the site. No new pertinent ARARs were identified.

7.7 Issues

The Army has installed source area groundwater monitoring wells and re-initiated long-term monitoring. After construction of the building, additional wells were installed to replace destroyed wells in conjunction with regulatory approval. The 2003 annual groundwater monitoring report and the groundwater sampling data from fall and spring 2004 document that natural attenuation is effectively remediating groundwater at AOCs 32 and 43A, with the possible exception of one location (32M-01-18XBR). Groundwater sampling results from all other locations are below cleanup goals. Contamination at the bedrock source well 32M-01-18XBR is limited to some VOCs, VPH C_9-C_{10} aromatics, and manganese. However, groundwater may not be recharging AOC 32 and 43A source areas (the warehouse and its pavements are reducing groundwater recharge from surface water infiltration) resulting in less attenuation due to recharge. The capping effect of the building and pavement is creating anaerobic conditions, but not sufficient for dechlorination of the chlorobenzene compounds. If conditions become sufficiently reducing, the potential for anaerobic de-chlorination of the chlorobenzene compounds exists, if the bacterial community can support this degradation process.

The LTMP was developed for the former site configuration and well network. The LTMP is currently being updated for the current site configuration. Since there are plans to expand the warehouse, the LTMP should take into account these proposed modifications to the site.

A summary of the issues is as follows:

Issues	Affects Protectiveness (Y/N)	
	Current	**Future**
Long Term Monitoring Plan (LTMP) was developed based on previous site configuration.	Y	Y
Potential expansion to site building in Spring 2006	Y	Y
Evaluation of vapor intrusion potential in accordance with Draft Vapor Intrusion Guidance, November 2002	Y	Y

7.8 Recommendations and Follow-up Actions

Regional groundwater flows should be evaluated to include: Shepley's Hill Landfill, the Stormwater Detention system for the West Rail Area, and AOC 32/43A during the update of LTMP to reflect the post construction conditions at the warehouse. The long-term monitoring is currently performed on a semi-annual basis, and no reduction in sampling frequency is recommended at this time. Specific modifications to the sampling program will be presented in the updated LTMP.

Based on current and planned site conditions, a tiered approach to a site-specific vapor intrusion assessment is recommended. The assessment should include evaluation of subslab soil gas and indoor air concentrations (if warranted) and/or site-specific mathematical modeling in accordance with the November 2002, EPA Draft Subsurface Vapor Intrusion Guidance. The cleanup goals established in the ROD meet the target concentrations identified in the noted 2002 guidance, although the existing concentrations in groundwater exceed the target concentrations. The existing remedy is considered to be protective because the cleanup goals remain protective and the concentrations in groundwater do not exceed the current MADEP Method 1 GW-2 standards (these are protective of indoor vapor intrusion and may soon be revised). Updates or revisions to the guidance and standards also should be considered at the time of the evaluation.

Based on the noted conditions and issues, the following follow-up actions are planned for AOC 32/43A:

Recommendations/ Follow Up Actions	Party Responsible	Oversight Agency	Milestone Date	Do Follow-Up Actions: Affect Protectiveness (Y/N)	
				Current	Future
Submit updated Long Term Monitoring Plan.	Army, BRAC	U.S. EPA, Region 1	November 2005	Y	Y
Repair damaged monitoring wells	Army, BRAC	U.S. EPA, Region 1	December 2005	Y	Y
Vapor Intrusion Evaluation	Army, BRAC	U.S. EPA, Region 1	March 2006	Y	Y

7.9 Protectiveness Statement

The remedy at AOC 32 and AOC 43A currently protects human health and the environment because ICs are incorporated into the deed that prohibit the extraction of groundwater from the site for industrial and/or potable use and contaminants are not migrating off-site. However, in order for the remedy to be protective in the long-term, the recommendations and follow-up actions detailed in Section 7.8 need to be taken to ensure long-term protectiveness.

Current remedial action activity consists of implementing the remaining components specified in the ROD: the long term groundwater monitoring program, utilizing ICs, modeling, annual reporting, evaluation of the MNA performance and Five-Year site reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

7.10 Next Review

This is the second Five-Year review that has been performed at either AOC. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for non-concurrence.

7.11 References

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8.0 AOC 69W FIVE-YEAR STATUTORY SITE REVIEW

8.1 Site Chronology

Table 8-1 Chronology of Site Events

Event	Date
Fuel line crimp during underground storage tank (UST) installation leaked approximately 7,000 to 8,000-gallons of No. 2 fuel oil was released to the ground	1972
Oil recovery system installed	1972-1973
Underground fuel line failed at a pipe joint and approximately 7,000 to 8,000-gallons of No. 2 fuel oil was released to the ground	1978
Site Investigation (SI) performed	1994
Removal action of contaminated soil from 1972 leak and oil recovery system	1997-1998
Remedial Investigation (RI) completed	1998
Limited Action Record Of Decision (ROD) signed	1999
First Five-Year Review	September 2000
Long term monitoring	2000 to present
Draft Operating Properly and Successfully (OPS) Document Submitted	June 2005
Second Five-Year Review	September 2005

8.2 Background

Area of Concern (AOC) 69W is located at the northeast corner of the intersection of MacArthur Avenue and Antietam Street on the northern portion of what was formerly the Main Post at Fort Devens (Figure 1-1). AOC 69W is comprised of the former Fort Devens Elementary School (Building 215) and the associated parking lot and adjacent lawn extending approximately 300 feet northwest to Willow Brook. All contamination at AOC 69W is attributed to No. 2 heating oil, which leaked from underground piping in two separate incidences; once in 1972 and again in 1978. Approximately 7,000 to 8,000 gallons of fuel oil were released to soil from each release (Figure 2-1 is reprinted from the Long Term Monitoring Plan (LTMP) and presented in Appendix G).

The following items summarize the history for AOC 69W. Refer to Section 1.0 for general enforcement activities at Fort Devens (i.e., initiation of a Master Environmental Plan (MEP), placement on the National Priority List (NPL) on December 21, 1989, and signing of the Federal Facility Agreement (FFA) that was finalized on November 15, 1991.

- 1951. The Fort Devens Elementary School was built and was comprised 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 underground storage tank (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 which 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 three 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 was used to collect the residual oil for one month before the damaged piping was found and replaced. A minimum 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 an Area Requiring Environmental Evaluation (AREE) 69W. 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 fuel 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 that a Remedial Investigation (RI) be performed.

- 1995-1998. An RI was performed to define the distribution of contaminants, previously detected in the soil and groundwater during 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 total petroleum hydrocarbons compounds (TPHC) and semi-volatile organic compounds (SVOCs) were present in soils extending from the new (1972) boiler room to approximately 300 feet northwest. Fuel-related volatile organic compounds (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 Mass Development). The existing school building was expected to be re-opened.
- 1997-1998. Based on a review of the soil and groundwater contaminant data, the Army performed a removal action and excavated approximately 3,500 cubic yards (cy) of petroleum-contaminated soil associated with the 1972 fuel oil leak. The 10,000 gallon fuel oil UST and the 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 extractable petroleum hydrocarbon (EPH) and volatile petroleum hydrocarbon (VPH) concentrations immediately adjacent to the school still exceeded the Massachusetts Contingency Plan (MCP) Method 1 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 Record of Decision (ROD) signed. The Limited Action consists of long-term groundwater monitoring and Institutional Controls (ICs) to limit the potential exposure to contaminated soils and groundwater under both existing and future site conditions. Since groundwater in this site's recharge area is not planned for (nor is it suitable) as a drinking water source and 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 Parker Charter School and currently occupies the site. The current property owner, Mass Development, is abiding by the ICs imposed on the property, semi-annual groundwater sampling continues as recommended in the LTMP.

8.2.1 Summary of Site Geology and Hydrogeology

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 four- to five-foot layer of dark grayish-brown, sandy silt overlying the sands. Organic material was found in the area north of the school at a maximum depth of 4 feet bgs. Near surface soils beneath the school and parking lot consist of reworked native soils. Bedrock was not encountered at AOC 69W. The water table aquifer at AOC 69W occurs in the overburden at depths ranging from 4 feet to 6 feet below ground surface (bgs) on the north side of the school building to approximately 1-foot 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. 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 feet/day and a mean flow velocity of 0.7 feet/day. AOC 69W is located within the delineated Zone II for the MacPherson production well located approximately 3,000 feet to the north, and downgradient of AOC 69W.

8.2.2 Soil Contamination

A review of the field and off-site analytical data from the 1995 and 1996 RI field investigations (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 250-gallon UST in the wooded area approximately 300 feet 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, polynuclear aromatic hydrocarbons (PAHs), and EPH/VPH at approximately 6 feet to 10 feet bgs adjacent to the school and 0 to 4 feet bgs downgradient in the grassy area and in the vicinity of the 250-gallon UST. Detected 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 (RA) (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 feet bgs near the school, and 8 feet bgs near the 250-gallon UST. Confirmatory subsurface soil sample results from the RA showed that concentrations of fuel-related contaminants still exceed MCP Method 1 S-1/GW-1 standards for EPH in subsurface soils immediately adjacent to the school building, but are generally low in downgradient areas (Weston, 1998).

The other identified area of soil contamination is located adjacent to the school building outside of the original boiler room. This contamination is 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 feet to 7 feet (bgs) beneath the paved parking lot. Contaminants appeared to be localized in the area immediately adjacent to the school. Site related contaminants were absent from leaching downgradient soils (e.g., ZWR-95-27X, ZWR-95-54X, and ZWR-95-55X). Future leaching is not likely as the area is paved, thereby inhibiting leaching of soils via precipitation infiltration.

8.2.3 Groundwater Contamination

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 UST located approximately 300 feet to the northwest. The area of groundwater contamination was coincident with the underground pipe 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 concentrations. The soil around monitoring wells 69W-94-10 and 69W-94-13 exhibited the highest contaminant and inorganic concentrations and were removed during the soil RA (Weston, 1998).

Dissolved arsenic, calcium, iron, manganese, potassium, and sodium were detected in filtered groundwater samples at concentrations in excess of calculated Devens Reserve Forces Training (RFTA) background concentrations and in some cases exceeding cleanup values identified in the ROD using MCP Method 1 GW-1/GW-2 groundwater standards. The greatest number of background exceedances and the only recorded Federal Maximum Contaminant Level (MCL)/Massachusetts Groundwater Quality Standards 310 CMR 6.0 exceedances in Rounds 1 through 4 were observed in monitoring wells 69W-94-10 and 69W-94-13. 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 RA (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; however, there were no chlorinated VOCs detected during the next three subsequent rounds of groundwater sampling efforts.

8.2.4 Summary of Site Risks

The RI report (HLA, 1998) completed a Human-health risk assessment following a four-step process: (1) contaminant identification; (2) exposure assessment; (3) toxicity assessment; and (4) risk characterization. Detailed discussion of the human-health risk assessment approach and results is presented in the RI report.

As presented in the RI report (HLA, 1998), under the current land use conditions the estimated excess carcinogenic risks for exposure of a child, trespasser and site maintenance worker to soil, sediment, and groundwater were within the United States Environmental Protection Agency (USEPA) acceptable risk range of 1×10^{-4} to 1×10^{-6}. Similarly, potential non-cancer risks did not exceed the USEPA Hazard Index (HI) threshold value of 1. Excess carcinogenic risks under future land use were estimated for a pupil (exposure to surface soil, sediment, groundwater, and indoor air) and utility worker (exposure to surface soil and subsurface soil). The excess carcinogenic risk for a pupil is within the USEPA acceptable risk range while the utility worker risk was below 1×10^{-6}. Again, potential non-cancer risks did not exceed the USEPA upper threshold limit of HI = 1 (HLA, 1998).

At the time of the RI, there was no use of (or known exposure to) groundwater at AOC 69W; therefore, the RI report presented a risk assessment evaluating the potential risks associated with hypothetical residential use of the water. Estimated cancer and non-cancer risks associated with this hypothetical future exposure exceeded levels generally considered acceptable by the USEPA. These risks resulted primarily from the presence of arsenic in groundwater. The arsenic concentrations noted at the time of the RI, at monitoring wells 69W-94-10 and 69W-94-13 may represent a worst-case scenario since the Army subsequently performed a nearby soil removal action (Weston, 1998).

Potential risks for ecological receptors were evaluated during the RI report for chemicals detected in surface soil, sediment, and groundwater at AOC 69W. The RI report concluded that there are no risks to ecological receptors, except in few cases where negligible risks were estimated.

Based on the conclusions of the RI report of the ecological risk assessment, unacceptable risks are not associated with site-related fuel oil contamination at AOC 69W.

In June 1999, a Limited Action ROD was signed. The Limited Action consists of long-term groundwater monitoring and ICs to limit the potential exposure to contaminated soils and groundwater under both existing and future site conditions.

8.3 Remedial Actions

The Remedial Action Objectives (RAOs), as stipulated in the ROD, for the site are:

- Restore the aquifer to drinking water standards within a reasonable period.
- Monitor potential future migration of ground water contamination.
- Eliminate risk from potential consumption of groundwater.
- Reduce or eliminate the direct contact threat of contaminated soils.

The basis of the RAOs is to reduce or eliminate the potential health risks to individuals based on current and future use scenarios (i.e., maintenance worker, and elementary school children scenario) at the site. The risk assessment results estimated cancer and non-cancer risks associated with the possible current and future exposures to surface soil, subsurface soil, sediment, groundwater discharge to non-potable surface water and indoor air were all within acceptable levels (HLA, 1998).

The groundwater cleanup goals were developed from several sources and were presented in the ROD. Groundwater cleanup goals for contaminants of concern (COCs) are shown in the following Table. If no cleanup goal was developed for a specific analyte as part of the ROD, the MCP Method 1 GW-1 standard was used as the COC cleanup goal. The COCs and associated cleanup goals are presented in the table below:

Table 8-2 Area 69W COC Groundwater Cleanup Goals

Contaminant of Concern	Cleanup Goals (µg/L)
VPH/EPH	
VPH C9-C10 Aromatics	200
EPH C11-C22 Aromatics	200
INORGANICS	
Arsenic	50
Manganese	375

Groundwater used as source of potable water does exceed risk levels generally considered acceptable by the USEPA. The risk has been primarily attributed to arsenic in groundwater used as a potable water source. However, the analysis of samples performed using the Massachusetts Department of Environmental Protection (MADEP) VPH and EPH methods did not require the reporting of all target analytes associated with these methods; the regulating agencies requested only aliphatic and aromatic hydrocarbon ranges. For this reason, seven VPH target analytes and seventeen PAH target analytes were not compared to the MCP Method 1 GW-1 Standards. This would be an important data gap if the groundwater were actually or reasonably likely to be used as a potable water source, which is not the case. Since RAOs include restoring the aquifer to drinking water standards, it should be noted that PAHs associated with No. 2 fuel oil (naphthalene at 22 µg/l and 2-methylnapthalene at 35 µg/l) have exceeded the MCP Method 1 GW-1 Standards of 10 µg/l and 20 µg/l, respectively, in past sampling events at ZWM-99-22X. Also, it should be noted that the MADEP EPH method reporting limits used by the analytical laboratory do not meet the MCP Method 1 GW-1 Standards for benzo(a)anthracene at 1 μg/l, chrysene at 2 μg/l, benzo(b)fluoranthene at 1 μg/l, benzo(k)fluoranthene at 1 μg/l, benzo(a)pyrene at 0.2 μg/l, indeno(1,2,3-cd)pyrene at 0.5 μg/l, dibenzo(a,h)anthracene at 0.5 μg/l. Further evaluation of the PAH constituents by mass spectroscopy indicated that 1-methylnaphthalene is a primary constituent of the C11-C22 aromatic hydrocarbons.

The rationale for implementing the limited action alternative is two-fold:

1) The groundwater will not be used as a drinking water source. The town of Devens has a municipal water supply. Therefore, the groundwater poses no excessive risk to human health or the environment.

2) The Army will monitor arsenic and EPH/VPH levels in groundwater and place ICs on the property to ensure protectiveness with regard to current and future land use.

For the purpose of assessing the VPH/EPH monitoring results, the Army has compared the results to the MCP Method 1 groundwater standards for a GW-1/GW-2 aquifer. A GW-1 aquifer is defined as either a current or potential drinking water source area. A GW-2 aquifer is defined as any groundwater monitoring point that is located within 30 feet of an existing occupied structure and the average annual groundwater level is within 15 feet of the ground surface.

8.3.1 Selected Remedy

The ROD for AOC 69W was signed in June 1999 identifying Limited Action as the selected remedy. A Feasibility Study (FS) was not performed prior to the ROD as previous source removal activities had been performed.

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 LTMP details the installation of additional water table groundwater monitoring wells to replace source area wells and downgradient sentry wells to monitor for off-site migration. Eight wells will be monitored semi-annually for EPH, VPH, iron, manganese, arsenic, and bis (2-ethylhexyl) phthalate.
- Five-year reviews would be performed to review the data collected and assess the effectiveness of the remedy.

The LTMP states that if there is indication that contaminants are migrating downgradient from the former source area, the Army, in conjunction with MADEP and USEPA representatives, will evaluate the need for additional action. Under the LTMP, downgradient migration is defined by the presence of a COC concentration in any of the designated sentry wells (ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, and ZWM-99-24X) above their respective action levels.

8.3.2 Remedy Implementation

The Final LTMP for AOC 69W was issued in March 2000. The plan detailed the individual wells to be sampled on a semi-annual basis. The plan also provides sampling methodology and analytical requirements. Monitoring well ZWM-99-23X exhibited contamination beginning at the inception of monitoring in 2000, and was then supplemented in 2001 with two additional sentry wells located cross gradient and downgradient of monitoring well ZWM-99-23X.

The 2002 Draft Interim Remedial Action Report indicated that, based upon evaluation of previous analytical data, bis (2-ethylhexyl) phthalate was dropped from the long-term monitoring program because it was found to be a common laboratory contaminant. Iron was also eliminated as a COC, but was retained in the monitoring program as an indicator of remedial progress.

Current action consists of continued implementation of the components specified in the ROD: ICs; a long-term groundwater monitoring program; annual reporting; and five-year site reviews. These components enable continued assessment for compliance with established performance standards and reporting of performance standards.

Long-term monitoring is performed by the United States Army Corp. of Engineers – New England District (USACE-NAE), Concord, Massachusetts. The first round of long-term groundwater monitoring was performed in the spring of 2000 with subsequent rounds in 2001, 2002, 2003, and 2004. Mass Development currently supplies potable water to the school. Excavated Soil Management Area (ESMA) is monitored during sampling events for broken ground or excavations. Work is being performed in accordance with the approved LTMP (HLA, 2000).

8.3.3 System Operation/Operation and Maintenance

Groundwater monitoring is performed in accordance with the LTMP (HLA, 2000) for AOC 69W. Yearly Operation & Maintenance (O&M) costs for implementation of the remedy are not readily available for review.

<u>8.4 Progress Since the Last Five-Year Review</u>

This is the second Five-Year Review for AOC 69W. In the first Five-Year Review, it was recommended to remove iron as a COC and as a sampled analyte in the LTMP. Iron is no longer considered a COC at AOC 69W. However, iron has not been removed as a sampled analyte because it is being used as an indicator of remediation efficacy.

The second recommendation was to terminate groundwater monitoring if four consecutive groundwater sample concentrations for a COC fall below action criteria. The source wells have not displayed a decrease below the action criteria for four consecutive rounds. Therefore, there is no reduction in sample locations and/or frequency recommended at this time.

The remedy was considered protective of human health and the environment in the first Five-Year Review and remains protective at this time.

8.5 Five-Year Review Process

8.5.1 Document Review

The following documents were reviewed for this Five-Year Review:

- Final Remedial Investigation AOC 69W prepared by HLA, August 1998.
- Record of Decision prepared by HLA, June 30, 1999.
- 2000 Annual Report prepared by USACE, April 2001.
- 2001 Annual Report prepared by USACE, April 2002.
- Interim Remedial Action Report prepared by USACE, June 2002.
- 2002 Annual Report prepared by USACE, April 2003.
- 2003 Annual Report prepared by USACE, March 2004.
- 2004 Semi-Annual Report prepared by USACE, January 2005.

8.5.2 Data Review

In reviewing the analytical results of the first three rounds of long-term monitoring data, it was determined by USACE that sentry well ZWM-99-23X could no longer be considered a sentry well as contaminants had been detected in the well. As a response, two additional sentry wells were installed in 2001, ZWM-01-25X and ZWM-01-26X, located down and cross gradient of ZWM-99-23X.

The 2003 Annual Report (USACE, 2004) presented data from the May 2000 through October 2003 monitoring rounds. A report summarizing the data from April and October 2004 monitoring rounds was not available for this Five-Year Site Review Report. However, preliminary results from the April and October 2004 round were available for review. Analytical results of wells with exceedances of target parameters, since 2000, are depicted in the tables below. Complete summary tables from the applicable documents are presented in Appendix G.

Table 8-3 Summary of Groundwater Analytical Data

C9-C10 Aromatics – 200 μg/L Cleanup Goal

Sampling Location	2000* May/Nov.	2001* May/Nov.	2002* May/Nov.	2003 May/Oct.	2004 April/Oct.
69W-94-13	120/270	160/320	150/200	62/140	*2,500/230
ZWM-99-22X	(5.3)/150	550/83	88/150	840/450	*650/600
ZWM-99-23X	46/62	40/34	(25)/(25)	53/59	*(100)/(100)
ZWM-95-15X	(25)/(25)	(25)/(25)	(25)/(25)	(25)/(25)	*(100)/(100)

* From May 2000 – May 2003, 1,000 micrograms C9-C10 Aromatics per liter water (μg/L) was applied as the point of comparison as provided in Table 2-3 of the Final LTMP. The appropriate MADEP Groundwater Standard for C9-C10 Aromatics is more conservative at 200 μg/L. Historical VPH data previously not exceeding 1,000 μg/L for C9-C10 Aromatics may have exceeded the 200 μg/L GW-1 standard without being flagged appropriately. After the May 2003 groundwater sampling round, the point of comparison for C9-C10 Aromatics was lowered to 200 μg/L to reflect the correct groundwater standard.

It should be noted that C9-C10 aromatic hydrocarbon range concentrations did not exceed the less stringent criterion of 1,000 μg/L used for all wells monitored May 2000 through May 2003. With the exception of the April 2004 round, the detected concentrations are within the range of historical observations. Exceedances of the more stringent 200 µg/L standard were noted in 69W-94-13 and ZWM-99-22X during the April and October 2004 round; similar exceedance may have occurred during the earlier sampling rounds.

C11-C22 Aromatics – 200 µg/L Cleanup Goal

Sampling Location	2000 May/Nov.	2001 May/Nov.	2002 May/Nov.	2003 May/Oct.	2004 April/Oct.
69W-94-13	690/1400	720/790	1,900/290	ND/(160)	ND/110
ZWM-99-22X	2,500/1,400	2,100/370	620/210	380/330	270/400
ZWM-99-23X	(170)/520	200/(140)	(140)/ND	ND/ND	ND/ND
ZWM-95-15X	ND	ND	ND	ND	ND

Analytical results from May 2000 to October 2004, exhibit an overall decrease in the C11-C22 aromatic hydrocarbon range concentrations.

Arsenic – 50 µg/L Cleanup Goal

Sampling Location	2000 May/Nov.	2001 May/Nov.	2002* May/Nov.	2003 May/Oct.	2004 April/Oct.
69W-94-13	54/110	85/150	52/130	(35)/69	(27)/88
ZWM-99-22X	150/130	230/140	86/140	150/160	140/140
ZWM-99-23X	(23)/70	67/55	15/ND	(27)/ND	(44)/61

The April 2004 sampling round resulted in only one monitoring well (ZWM-99-22X) with concentrations exceeding the arsenic cleanup standard of 50 µg/L. However, results from the October 2004 sampling round detected concentrations that exceed the cleanup standard of 50 µg/L in well 69W-94-13, ZWM-99-22X and ZWM-99-23X.

Manganese – 375 µg/L Cleanup Goal

Sampling Location	2000 May/Nov.	2001 May/Nov.	2002 May/Nov.	2003 May/Oct.	2004 April/Oct.
69W-94-13	2,300/1,700	1,500/1,600	2,100/2,400	2,800/4,100	2,500/1,300
ZWM-99-22X	2,000/1,800	2,300/2,400	2,000/1,500	2,700/2,300	3,100/1,900
ZWM-99-23X	4,200/3,600	5,800/1,500	550/1,700	5,300/4,300	2,500/2,300
ZWM-95-15X	(28)/1,300	(25)/(100)	1,500/2,200	1,600/970	4,600/980

Notes:
ND = Not detected at or above the reporting limit indicated.
(#) = Reported value is below Cleanup Goal.
µg/L = micrograms per liter.

Analytical results for manganese have exhibited fluctuating concentrations which exceed the cleanup standard of 375 µg/L.

Based on review of the available data (for sentry wells ZWM-01-25X, ZWM-01-26X, and ZWM-95-18X) COCs exceeding cleanup goals are not migrating off-site. Therefore, a draft Operating Properly and Successfully (OPS) demonstration document was submitted to USEPA in June 2005. The OPS conclusion was based on the following lines of evidence:

- The remedy for AOC 69W 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
- Intuitional controls have been enacted to provide further protection to human health

As part of the final OPS, the Army will be conducting statistical trend analyses, including a Mann-Kendall test to support the above conclusions.

The 2004 Annual Report recommended that the sampling frequency be reduced to once per year and that three monitoring wells (ZWM-95-17X, ZWM-01-26X and ZWM-95-18X) be removed from the sampling program. The rational for the removal of each well was as follows:

ZWM-95-17X

- Upgradient well used as background
- Historically manganese detected at very low concentrations (less than 3.6 μg/L)
- Arsenic only detected twice (2.0 μg/L)
- No other COCs detected
- VPH/EPH not detected during five year of semi-annual sampling

ZWM-95-26X

- Cross-gradient well to northeast of source area
- Historically, groundwater flow has been in northwesterly direction
- Manganese has been only COC detected. Concentrations have been less than 85 μg/L (below goal of 375 μg/L)

ZWM-95-18X

- Most northerly well and is downgradient of ZWM-95-15X
- Contaminants migrating in this direction would be intercepted by ZWM-95-15X
- Manganese has been only COC detected. Concentrations have been less than 15 μg/L (below goal of 375 μg/L)

Analytical results from the 2000 through 2004 groundwater sampling rounds have been reprinted from their respective Annual Reports as provided in Appendix G.

8.5.3 Site Inspection

On April 21, 2005, a representative from Nobis Engineering performed site inspections at AOC 69W. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s.

The Parker Charter School, formerly known as Fort Devens Elementary School (Building 215), currently occupies the site. The site consists of one building, paved parking areas and landscaped areas that extend northwest to Willow Brook. There were no observed excavations or other violations of proposed ICs anywhere at the site. All wells were intact and secured.

8.5.4 Interviews

The following individuals were interviewed as part of the Five-Year Review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP

- Mr. Takashi Tada, Contractor, Devens RFTA
- Mr. Robert Simeone, Devens RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit. ICs are presented in the ROD and are included in the Lease in Furtherance of Conveyance (LIFOC) currently in place for AOC 69W; however, none are currently recorded with the deed. Personnel were not aware of any violations of the ICs.

Ellen Iorio stated that the USACE is anticipating that the 2004 Semi-Annual Report for AOC 69W, will state that the remedy is operating properly and successfully as demonstrated by the available data collected to date. Based on this conclusion the Army submitted a draft OPS demonstration document for certification from the USEPA.

Mr. Simeone indicated that AOC 69W will likely be transferred to Mass Development by January 2006. ICs will be incorporated either in full or by reference into all deeds, easements, mortgages, leases or any other instruments of transfer prior to the transfer of the property. Administrative ICs would be developed and detailed in the finding of suitability to transfer (FOST) and included with the Deed prior to transfer of the land parcels associated with AOC 69W.

8.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 69W.

In 1999, the Army issued the Proposed Plan (PP) for AOC 69W. In accordance with the PP, the Army, published public notices and held a public information meeting on May 5, 1999. The PP was also made available for review at local libraries and a formal 30-day public comment period was conducted from April 8 through May 10, 1999.

Currently, the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public.

8.6 Technical Assessment

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

Remedial Action Performance: Five-years of groundwater monitoring have been performed following the LTMP (HLA, 2000). The LTMP details the site monitoring that will be performed in order to meet the remedial goals for the site. These goals include the restoration of the aquifer to drinking water standards within a reasonable period, to monitor potential future migration of ground water contamination, to eliminate risk from potential consumption of groundwater, to reduce or eliminate the direct contact threat of contaminated soils.

Based on review of the available data (for sentry wells ZWM-01-25X, ZWM-01-26X, and ZWM-95-18X) COCs exceeding cleanup goals are not migrating off-site. Therefore, a draft Operating Properly and Successfully (OPS) demonstration document was submitted to USEPA in June

2005. As part of the OPS statistical trends analyses using the Mann-Kendall Test will be conducted to support the conclusions of the OPS.

System Operations/Operation and Maintenance: Groundwater monitoring is being performed in accordance with the approved LTMP for AOC 69W (HLA, 2000). Yearly O&M costs for implementation of the remedy at AOC 69W are not yet available for review.

Opportunities for Optimization: Based on historical results, the 2004 Annual Report recommended that the sampling frequency be reduced to once per year and that three monitoring wells (ZWM-95-17X, ZWM-01-26X and ZWM-95-18X). The rational for this recommendation is detailed in Section 8.5.2 of this Review.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. Recommendation for further assessment/remedial action will also be provided in the Annual Report should analyses indicate that attainment of cleanup criteria is not occurring. The Army should continue to evaluate the potential for off-site migration, impact to sensitive receptors, trend analysis and remedial duration as part of the established LTMP for AOC 69W.

Implementation of ICs and Other Measures: There are no current or future plans for installation of potable water wells at AOC 69W. ICs (i.e., land use restrictions) as outlined in the ROD (prohibiting installation of drinking water wells at the site and restricting execution within the soils management area), are covered by the LIFOC until the time of property transfer. The LIFOC agreement identifies the general restrictions and required actions that are in place to protect the remedy for AOC 69W. Administrative ICs would be developed and detailed in the FOST and included with the Deed prior to transfer of the land parcels associated with AOC 69W.

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

Changes in Standards and To Be Considered: As part of this Five-Year Review, Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) guidance for the site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed. See Section 8.7.1, ARARs.

The MCLs are legally enforceable standards intended to protect public water supplies, and are established by the USEPA. The MCL for arsenic (50 μg/L) in effect at the time of the ROD was selected as a cleanup goal for groundwater. Arsenic at concentrations greater than its MCL (50 μg/L) was a primary risk driver for the ingestion of groundwater at AOC 69W. The MCL for arsenic has been updated since the 1999 ROD. The MCL for arsenic was decreased to 10 μg/L, effective February 2002.

MA DEP Method 1 standards are used as comparison values as an alternative to complex site-specific risk assessments. The lower of MADEP GW-1 and GW-2 standards were used as clean up goals for petroleum hydrocarbon fractions. GW-1 standards are protective of groundwater used as drinking water; GW-2 standards are protective of groundwater with the potential to volatilize into indoor air spaces. Correction of the GW-1 standard for the VPH C9-C10 aromatic fraction in June 2003 resulted in a decrease in the point of comparison from 1,000 μg/L to 200 μg/L.

Since the cleanup goals are based on drinking water standards, changes to the MCLs and MADEP GW-1 standards influence the protectiveness of the cleanup goals. However, because the remedy includes prohibiting the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the remedy.

The Army should review the previously completed indoor air assessments performed as part of the RI (HLA, 1998). The review should confirm that prior assessments are consistent with the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-F-02-052*, dated 2002 and to verify that the assumptions of the previous assessments are consistent with the current site use.

Changes in Exposure Pathways: The ROD identified unacceptable risks from the following exposure pathway: potential ingestion of groundwater as the primary drinking water source at AOC 69W.

Groundwater at the site is not currently used as drinking water. The contaminants appear to be increasing in some of the monitoring wells. The groundwater discharges to Willow Brook , near the site. Willow Brook contributes to McPherson Well. As part of the established LTMP, the Army should conduct a review of McPherson Wells, Zone II be ensure that plume monitoring is sufficient. Results of the review will be reported in the Annual Reports as applicable.

The exposure to groundwater through drinking water and household water use is of concern to future receptors on a hypothetical basis only. ICs prohibiting the use of site groundwater as drinking water at AOC 69W will eliminate the potential drinking water and household water exposure pathway. Land use at the site has not changed and is not expected to change, and current land use complies with planned deed restrictions for AOC 69W. No new contaminants, sources, or other routes of exposure were identified. There is no indication that hydrogeologic conditions are not adequately characterized.

No evaluation of inhalation while showering or dermal contact with groundwater used for household use was provided in the RI supporting the ROD. Lack of consideration of these pathways may yield an underestimate of risks from future (hypothetical) household water use.

Response to Comments, included in Appendix C of the ROD, indicated that in October 1997 indoor air sampling was performed at AOC 69W. Three analytes (ethylbenzene, 2-methylheptane, and xylene) were detected at concentrations that fall below applicable standards. Additional air sampling was performed by the USEPA, with samples showing no unacceptable levels of risk (HLA, 1999). Review of referenced documents listed in the ROD indicated that air sampling was performed by ABB Environmental Services, Inc. in 1996 and the additional sampling was performed in 1997/1998 by the USEPA.

Changes in Exposure Assumptions: The risk assessment, supporting the ROD for AOC 69W, used exposure assumptions for the ingestion of groundwater pathway that are consistent with standard practice at the time. Since that time, USEPA has updated recommended dermal contact exposure assumptions. The 1998 draft guidance for evaluating dermal contact exposures used in the RI was finalized in July 2004 (*Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*). The final guidance includes slight changes in some dermal exposure assumptions. Because the remedy includes prohibiting the use of groundwater as drinking water and excavation of contaminated soils, changes to the exposure parameters do not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: Since the groundwater cleanup goals are based on drinking water standards and not on risk-based calculated concentrations, changes to the toxicity values do not influence the protectiveness of the groundwater cleanup goals. In addition, because the remedy includes prohibiting the use of groundwater as drinking water, changes to the toxicity of groundwater contaminants do not affect the protectiveness of the remedy. Because the cleanup goals for soil at AOC 69W were based on site-specific human health risk assessment, changes in the toxicity values for soil contaminants could affect the soil cleanup goals; however, since contaminated soil has been removed, changes to soil contaminant toxicity do not affect the protectiveness of the implemented remedy.

Changes in Risk Assessment Methodologies: The methods for evaluating groundwater ingestion exposures have not changed since the time the risk assessment was conducted supporting the ROD for AOC 69W. The potential human health risks discussed in the ROD will be eliminated by ICs, including the proposed deed restriction prohibiting the use of groundwater as drinking water. There are no changes to risk assessment methodology that appear to affect the protectiveness of the remedy.

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

No additional information other than that noted above has come to light to call into question the protectiveness of the remedy. No natural disaster impacts occurred at AOC 69W during this review period.

8.6.1 Summary of Technical Assessment

No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results consistently fluctuate with each sampling round. The GW-1 standard for the VPH C9-C10 aromatic fraction was decreased from 1,000 μg/L to 200 μg/L in June 2003.

While the methods for evaluating dermal contact exposures have changed since the time the risk assessments supporting the ROD for AOC 69W were conducted, these risk assessment methodology changes do not affect the protectiveness of the remedy since the use of groundwater as drinking water has been prohibited.

8.6.2 Applicable or Relevant and Appropriate Requirements Review

The ARARs are presented in Table 8-1 in Appendix E as reprinted from the ROD. The standards and regulations, current at the signing of the ROD and for the first Five-Year Review, have been reviewed for changes that could affect protectiveness.

The following ARARs, listed in Appendix E, have been modified since signing of the ROD and the first Five-Year Review that may affect the protectiveness of the implemented remedial action:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

    a) The analyses and determination of compliance with 50 μg/L MCL for arsenic use the requirements of 141.23.

b) The MCL for arsenic is 50 μg/L for community water systems until January 23, 2006.

- On January 22, 2001, USEPA adopted a new standard for arsenic in drinking water at 10 μg/L, replacing the old standard of 50 μg/L (66 FR 6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 μg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F, Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). There currently is no MCLG for arsenic.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL 10 μg\L listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- 310 CMR 30.300 "Hazardous Waste" was updated February 27, 2004. These revisions do not affect the protectiveness of the remedy.

In addition, a search was performed for any newly promulgated standards, which could affect protectiveness at the site. Although not an ARAR, the MCP is utilized by the Army in order to compare VPH/EPH data to "drinking water standards" for ROD compliance. The MCP has been revised several times since 2000. In addition, MADEP has issued policies regarding VPH/EPH sample collection and analyses. The most-recent revision of this policy was issued in June 2003. Neither the MCP revisions nor the VPH/EPH policy revisions have influenced the protectiveness of the remedy. There also were recent revisions made to the MADEP VPH and EPH Methods. Analytical laboratories should be performing these methods by the revisions dated, May 2004.

It should be noted that in October 2004, MADEP proposed revisions to the MCP Method 1 GW-1 standards, which would adopt the Federal MCLs, and a methodology for determination of substances for which an MCL has not been promulgated. The proposed changes would not affect the petroleum hydrocarbon range GW-1 standards for those substances monitored (the proposed GW-2 concentrations would be elevated over the current standards). However, the arsenic standard would follow the Federal MCL revision, and be lowered from 50 ppb to 10 ppb. These proposed revisions do not affect the protectiveness of the remedy.

8.7 Issues

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial action at AOC 69W non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports, a review of ARARs and the findings from the site inspection and interviews with personnel familiar with the site.

8.8 Recommendations and Follow-up Action

Long-term monitoring should continue as specified in the AOC 69W LTMP (HLA, 2000). However, groundwater monitoring can be terminated if four consecutive groundwater samples are below action criteria.

As transfer of AOC 69W is pending the ICs in the LIFOC are to be incorporated either in full or by reference into all deeds, easements, mortgages, leases or any other instruments of transfer prior to the transfer of the property.

Based on the noted conditions and issues, the following follow-up actions are planned for AOC 69W:

Recommendations/ Follow Up Actions	**Party Responsible**	**Oversight Agency**	**Milestone Date**	**Do Follow-Up Actions: Affect Protectiveness (Y/N)**	
				Current	**Future**
Evaluate previous indoor air assessments	Army, BRAC	U.S. EPA, Region 1	Spring 2006	Y	Y
Reduce sampling frequency and remove three wells from sampling program	Army, BRAC	U.S. EPA, Region 1	Spring 20056	N	N

The Army should continue to evaluate the potential for off-site migration, impact to sensitive receptors, trend analysis and remedial duration as part of the established LTMP for AOC 69W.

8.9 Protectiveness Statement

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. The Army believes that the remedy is operating properly and successfully and submitted a draft OPS demonstration document for certification from the USEPA.

A Health and Safety Plan (HASP) and Investigation Derived Waste (IDW) handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOC 69W because groundwater at the AOC is not being used for potable use nor proposed for potable use and COCs exceeding cleanup goals are not migrating off-site.

Current remedial action activity consists of long-term groundwater monitoring, semi-annual reporting, and five-year site reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

8.10 Next Review

AOC 69W is a statutory site that requires ongoing Five-Year Reviews. This is the second Five-

Year Review that has been performed at AOC 69W. The next review will be performed within five years of the completion of this Five-Year Review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

8.11 References

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9.0 AOCs 9, 11, 40, 41 AND SAs 6, 12, 13 (SOLID WASTE) FIVE-YEAR STATUTORY SITE REVIEW

9.1 Site Chronology

Table 9-1 Chronology of Site Events

Event	Date
Landfill Consolidation Feasibility Study (FS) Report	September 1995
Proposed Plan (PP) issued describing the Army's preferred remedy.	December 1997
Landfill Remediation Feasibility Study Report	January 1997
Off site disposal evaluated	Spring/Summer 1998
Expanded on site landfill site search	Spring/Summer 1998
Landfill Remediation Feasibility Study Addendum Report	November 1998
Second Proposed Plan (PP) issued describing the Army's Alternative 4c as the preferred option.	December 1998
Record of Decision (ROD) Signed	July 1999
First Five-Year Statutory Review	September 2000
Commenced Landfill Construction	September 25, 2000
Mobilized at Area of Concerns (AOCs) 11, 12, 13, and 40	October 2000
Mobilized at AOC 9	January 2001
Work Completed at AOCs 11 and 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 Site Area (SA) 12	January 2003
Landfill Site Restoration	Spring 2003
O&M Activities at Landfill and Remedial Sites	July/August 2003
Remedial Action Complete	October 2003
Second Five-Year Statutory Review	September 2005

9.2 Background

This subsection describes the debris disposal sites, including a summary of contaminant characterization. A summary of post-investigation, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related site history is also presented. Descriptions of the landfill sites, including contamination assessments and risk evaluations, where applicable, can be found in the following data packages, Site Investigation (SI) reports, and Remedial Investigation (RI) reports:

Table 9-2 Summary of Reports

Site	Investigation Report Reference
SA 6	Landfill Study Data Package (ABB-ES, 1994b)
SA 12, SA 13	Supplemental Site Investigation Data Packages (ABB-ES, 1994a) SI Report (ABB-ES, 1995b)
AOC 9	SI Report (ABB-ES, 1996a)
AOC 11	SI Report (Arthur D. Little, 1994) RI Report (Arthur D. Little, 1995)
AOC 40	RI Report (E&E, 1993) Supplemental RI Report (ABB-ES, 1993)
AOC 41	SI Report (ABB-ES, 1995b) SI Report (ABB-ES, 1996c)

Study Areas (SAs) 6 and 12, and Area of Concern (AOC) 41 are located on the South Post (Figure 1-1). AOC 9 is located on the former North Post of Fort Devens. AOCs 11 and 40, and SA 13 are located on the former Main Post of Fort Devens.

SIs were performed at SAs 12 and 13 and AOCs 9, 40, and 41 to verify the presence or absence of environmental contamination and to determine whether further investigation or remediation was warranted. Supplemental SI activities were performed at SAs 12 and 13, and AOC 41 to address data gaps identified in the SI reports. RIs were completed at AOCs 11, 40, and 41 to further assess contaminant distribution and baseline human-health and ecological risk assessments.

Predesign investigations were performed at SA 6, 12, and 13, and AOC 9 (ABB-ES, 1994b) to define depth, extent, type of waste, composition of waste, and site conditions to help identify appropriate remedial alternatives.

Descriptions of the landfill sites, including contamination assessments and risk evaluations, where applicable, are available in the data packages, SI reports, and RI reports. Detailed summary tables of analytical results for each of the SAs and AOCs discussed below are included in Appendices F.1 and F.2 of the Record of Decision (ROD). The information provided below is a summary (taken from the ROD) of the available historical information.

9.2.1 Description and History of SA 6

SA 6 is located on the eastern side of Shirley Road on the South Post (Figure 1-1). The South Post is to be retained by the Army for continued military training. SA 6 was used between 1850 and 1920, prior to Army ownership, for disposal of household debris. Debris was deposited in a low area, less than one-quarter acre in size, south of the access road. SA 6 is moderately forested with hardwood trees. The disposal area has not been covered, and debris is visible on the ground surface.

Previous investigations at SA 6 determined that the disposal area contains household debris, primarily metal and glass. The volume of debris in the landfill is approximately 500 cubic yards (cy). Archaeologists have determined that SA 6 may be valuable in researching the socioeconomic status and trash disposal behavior of 19th Century northern Lancaster residents.

9.2.2 Description and History of AOC 9

AOC 9 is located on the former North Post, north of Walker Road and west of the wastewater treatment plant (Figure 1-1). 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 material at AOC 9 was generally demolition debris, including wood, concrete, asphalt, metal, brick, glass, and tree stumps. Debris volume was estimated to be approximately 112,000 cy.

A geophysical survey was performed during the SI to supplement information derived from evaluation of aerial photographs and to help 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 consisted of five areas: a larger northern pod containing the majority of landfill materials; and four smaller southern pods adjacent to the wetlands containing mostly near-surface debris (Figure C-3 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H).

Surface Water Contamination. During the SI at AOC 9, surface water samples were collected from the Nashua River and the swampy 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 inorganic concentrations in the river likely represented typical Nashua River water quality in the general area. The SI report concluded that contaminant effects on surface water from AOC 9 debris were likely not significant.

Sediment Contamination. Relatively low concentrations of total petroleum hydrocarbons compounds (TPHC) and some inorganics were present in sediment samples collected from the swampy area south of the debris landfill. Relatively low concentrations of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) 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 present-day 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.

Surface Soil Contamination. Organic contaminants were not detected in surface soil samples collected at AOC 9. The inorganics copper, lead, and nickel were detected at concentrations of above background concentrations for Devens, but below residential standards set by United States Environmental Protection Agency (USEPA). Arsenic was detected at a concentration above USEPA residential standards, but below Devens background concentrations.

Subsurface Soil Contamination. Organic compounds detected in AOC 9 subsurface soil consist mostly of polynuclear aromatic hydrocarbons (PAHs) and TPHC. Because of their consistent co-location in samples collected from AOC 9, PAHs and TPHC are believed to be present as a result of charred lumber and ashes mixed with the demolition debris. Except for arsenic and beryllium, maximum concentrations of inorganics detected in subsurface soil were below screening standards established by USEPA for protection of a commercial/industrial worker. The maximum concentration of beryllium (1.0 μg/g) was higher than the commercial/industrial standard (0.67 μg/g).

Groundwater Contamination. Two rounds of groundwater samples were collected from monitoring wells at the site during the SI. Two organic compounds, chloroform and TPHC, were detected in AOC 9 groundwater. Chloroform was detected in one of ten samples collected during Round 1. The chloroform concentration was below the Massachusetts drinking water standard. TPHC was detected in three of ten samples, once in Round 1 and twice in Round 2. No drinking water standards or guidelines existed for TPHC at the time this work was performed.

Inorganics were detected, above background concentrations in nearly all groundwater samples collected from AOC 9 monitoring wells. Several organics were detected in upgradient, downgradient, and crossgradient wells. Eight of the eighteen inorganics detected in unfiltered Round 1 samples exceeded their respective drinking water standard or guideline. 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 are 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.

9.2.3 Description and History of AOC 11

AOC 11 is located east of Lovell Road on the Main Post, adjacent to the Nashua River (Figure 1-1). 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 area that runs along the western side of the Nashua River (Figure C-8 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H). East of the landfill, a 40-foot wide soil berm separates the landfill from the Nashua River. Low concentrations of PAHs, chromium, mercury, cadmium, arsenic, and antimony were identified as possible contaminants in soil and sediments.

The RI report for AOC 11 concluded the primary mode of contaminant transport from the debris landfill is by surface water runoff into the wetland areas adjacent to the landfill, where a significant portion of contaminants sorb to sediments. Surface water in the wetlands contained metals and PAHs. However, the Nashua River contains metals and PAHs in surface water both adjacent to and upstream of AOC 11. Contamination in wetland surface water could be attributed to Nashua River contamination, and may not have been be related to AOC 11 debris.

Sediment Contamination. Sediments in the Nashua River and in wetland areas adjacent to the debris landfill contained pesticides, polychlorinated biphenyls (PCBs), PAHs, and metals. Pesticides concentrations were below Devens Reserve Forces Training Area (RFTA) background concentrations. It is not clear whether PCBs, detected at relatively low concentrations in sediment, were from the debris area or from the Nashua River during periodic flooding. PAHs could be attributable to the Nashua River, and may not be related to AOC 11 debris. Some metals were detected in sediment samples at concentrations exceeding Devens RFTA background concentrations in place when the ROD was finalized.

Surface Soil Contamination. Pesticide concentrations measured in surface soil samples were, with the exception of one sample, below Devens RFTA background concentrations. Higher concentrations of PAHs were measured in surface soil samples collected within the debris area, compared to those collected outside the area. Metals were detected at concentrations exceeding Devens RFTA background values at sample locations throughout the site.

Groundwater Contamination. Two rounds of groundwater samples were collected for analysis during the RI. Relatively low concentrations of the pesticides DDD and DDT were detected in a sample collected from one monitoring well during the first round. Several metals were detected in groundwater during both sampling rounds. The highest metal concentrations were found in the northernmost groundwater monitoring well (11M-94-OSX). Higher concentrations and more metals were detected in the shallower wells screened near the water table, while lower metal concentrations were detected in the deep well screened just above bedrock. Sampling results indicated that assorted metals at concentrations above and below respective drinking water standards and guidelines are being transported from the debris landfill to the Nashua River via groundwater flow.

9.2.4 Description and History of SA 12

SA 12 is located on a steep, wooded slope adjacent to the Nashua River floodplain and partially encroaching on wetlands on the South Post. The landfill is located across Dixie Road from B and P Ranges (Figure C-22 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H). SA 12 was used by the Army beginning in 1960, was still in use in 1982, and appeared in 1988 to have been inactive for several years. The debris came from construction and range operations.

Debris at SA 12 consisted mostly of lumber, sheet metal, concrete, and leaves mixed with soil. Debris volume was estimated to be approximately 8,700 cy.

Surface Water Contamination. Inorganics were detected in surface water samples collected between the SA 12 debris area and the Nashua River. These detections could be attributable to Nashua River contamination, and may not have been related to SA 12 debris.

Sediment Contamination. Sediments between the SA 12 debris area and the Nashua River contained PAHs, TPHC, pesticides, and inorganics. Concentrations of similar contaminants in Nashua River sediment were higher than those in sediment at the foot of the debris area. This suggests that the river itself contributed to sediment contamination at the foot of the debris area.

Surface Soil Contamination. The highest concentrations of PAHs, TPHC, pesticides, and inorganics measured in surface soil at SA 12 were associated with samples collected from the soil directly above the debris landfill. Evaluation of samples collected at SA 12 indicated that the majority of potential human-health and ecological risk from surface soil results from stained soil directly above the debris area.

Groundwater Contamination. Organic compounds were not detected in groundwater samples collected at SA 12. Inorganic compounds were detected in unfiltered groundwater samples collected from shallow sumps downgradient from the debris landfill. It is believed that concentrations of inorganics detected in groundwater at SA 12 were largely the result of suspended solids in the samples.

9.2.5 Description and History of SA 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 is 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 (Figure C-13 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H). SA 13 is surrounded by large trees, but no trees are 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 is located at the base of this slope.

In 1989, disposed stumps, branches, steel fencing, plumbing fixtures and pipes were removed from the site.

Surface Water Contamination. Organic and inorganic compounds 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 compounds in surface water, particularly mercury, presented potential risks to sensitive aquatic ecological receptors.

Sediment Contamination. Sediments at SA 13 contained PAHs, TPHC, pesticides, and inorganics. Pesticides in sediment presented potential risk to sensitive aquatic ecological receptors.

Surface Soil Contamination. Soil samples collected from stained areas directly over the debris area contained PAHs, TPHC, pesticides, and inorganics. Surface soil samples collected directly from the debris area contained higher concentrations of contaminants than those collected downgradient from the landfill.

Groundwater Contamination. Contaminants detected in groundwater at SA 13 were primarily inorganics. It is believed that concentrations of inorganics detected in groundwater at SA 13 were attributed to suspended solids present in the unfiltered samples.

9.2.6 Description and History of AOC 40

AOC 40 is located along the edge of Patton Road, in the southeastern portion of the Main Post. This area was used for the disposal of construction debris (masonry, asphalt, wire and metal), ash, stumps, and logs.

AOC 40 covers an area of approximately four acres and was estimated to contain 110,000 cy of debris, requiring removal. Portions of the landfill area were situated in a wetland, and were subsequently submerged under Cold Spring Brook Pond (Figure C-16 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H). 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 feet. The area is also within a recharge zone for the Patton water supply well.

Surface Water Contamination. Inorganic compounds 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 according to ecological benchmarks developed to be protective of aquatic organisms.

Sediment Contamination. Sediments in Cold Spring Brook Pond contained PAHs, pesticides, and inorganics. Risk to ecological receptors at two locations in the pond were attributed to arsenic and the pesticide DDD.

Surface Soil Contamination. Samples collected from the debris 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 characterized during two rounds of sampling during the RI, and during two rounds of sampling during the supplemental RI. Contaminants detected in groundwater were primarily inorganics. At that point in time, under existing conditions, the Army had concluded that AOC 40 is not a source of inorganic groundwater contamination.

9.2.7 Description and History of AOC 41

AOC 41 is 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 (Figure C-24 reprinted from the Remedial Action Closure Report prepared by Shaw Environmental, 2003 is included in Appendix H). The landfill, less than one-quarter acre in size, was used up to the 1950s for disposal of non-explosive military and household debris.

Debris at AOC 41 included beverage cans, bottles, and motor vehicle parts. Debris volume was estimated to be approximately 1,500 cy. The site was heavily overgrown with trees and brush.

Surface Water Contamination. Organic and inorganic contaminants were detected in surface water samples collected from New Cranberry Pond, near AOC 41. The concentrations were not considered significant.

Sediment Contamination. Pesticides and inorganics were detected in sediment samples collected from New Cranberry Pond near AOC 41. It is unlikely that the contaminants posed a risk to ecological receptors.

Surface Soil Contamination. TPHC, PAHs, pesticides, and inorganics were detected in surface soil samples collected at the landfill. Some contaminant concentrations exceeded screening standards established by USEPA for protection of potential residents living at the site. There are no residents occupying the site. Surface soil contaminants were found to pose no risk to ecological receptors.

Groundwater Contamination. During the RI performed at AOC 41, it was determined that the source of groundwater contamination was not the landfill debris. In the 1996 South Post Impact Area (SPIA) ROD, the Army selected No Action with long-term groundwater monitoring as the remedy for groundwater.

9.2.8 Post-Site Investigation History

A history of post-site investigation activities related to Fort Devens landfill remediation is presented in this subsection.

The Landfill Consolidation Feasibility Study (FS) Report (ABB-ES, 1995 a) contained an evaluation of options to consolidate debris from the seven landfills into a single waste disposal site. After reviewing the FS report, the U.S. 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, 1996 b,) was issued in February 1996. The memorandum evaluated a cap-in-place and a consolidation option for each of the seven landfills.

To further respond to 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, capping in-place, and debris removal and consolidation.

In the December 1997 Proposed Plan, 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 in the area near the existing 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 in an alternate location. Because of the site's proximity to the Nashua River floodplain, the community also indicated a preference for full excavation and removal of debris from AOC 11.

In response to public comment, the Army issued a second Proposed Plan in November 1998. The proposed alternative included full debris removal at AOCs 9, 11, and 40, and SA 13, with disposal either at 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 the seven debris disposal areas. In accordance with the ROD, the option of either on-site consolidation or off-site disposal of the debris would be based on a "best value" evaluation of proposals to be solicited upon completion of the design for both options. Methods and practices for construction and operation and closure of the Consolidation Landfill were documented in the Final Design Technical Specifications and Drawings for Consolidation Landfill (USACE, October 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, March 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 no further action at SA-6; limited removal at SA-12 and AOC-41; full excavation of AOCs 9, 11 and 40, and SA-13, with on-site consolidation or off-site disposal.

9.3 Remedial Actions

Remedial response objectives were defined during the FS to aid in developing and screening alternatives. The objectives aim to mitigate existing and future potential threats to human health and the environment. The response objectives are:

- Prevent human exposure to groundwater contaminants released from Fort 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 Ambient Water Quality Criteria (AWQC) or acceptable ecological risk-based thresholds.
- Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds.

- Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use.
- Support the civilian redevelopment effort at Devens.

9.3.1 Selected Remedy

Key components of the selected remedy presented in the ROD include:

SA 6 - No further action

SA 12, AOC 41

- Mobilization/demobilization.
- Site preparation.
- Surface debris removal.
- Known hot-spot removal.
- Backfilling/regrading/revegetation.
- Site monitoring.

AOC 9, AOC 11, SA 13, AOC 40

- Mobilization/demobilization.
- Site preparation.
- AOC 40 sediment removal with disposal either in the Consolidation Landfill or in an off-site landfill.
- AOC 40 drum removal with disposal either in the Consolidation Landfill or in an off-site landfill. (It should be noted that this remedy was included in the ROD, but no drums were encountered during removal and consolidation construction operations.)
- Debris excavation, backfill, and regrading.
- Wetlands restoration at AOC 9, AOC 11, and AOC 40.
- Consolidation of excavated debris the site Consolidation Landfill, or to an off-site landfill.
- If required, cover system monitoring and maintenance at the Consolidation Landfill.
- Institutional Controls (ICs) and Five-Year site Reviews at those sites where unrestricted future use is not achievable or economical.

9.3.2 Remedy Implementation

The decision to proceed with on-site consolidation was issued June 30, 2000, and a temporary (120 day) access agreement to begin construction was signed on September 15, 2000. The United States Army Corps of Engineers (USACE) contracted Stone & Webster, Inc. to construct the selected remedy. The Consolidation Landfill was constructed at the Former Golf Course Driving Range. Debris from each of the six landfill areas was excavated, characterized, transported and disposed at either the secure on-site landfill or an off-site licensed facility if characterization results exceeded on-site disposal requirements. Soils disposed of at the Consolidation Landfill included those contaminated with petroleum, pesticides, PCBs, PAHs, and asbestos, for a total waste volume of approximately 365,000 cubic yards. Debris excavations were then backfilled and/or re-graded to restore the site to pre-construction conditions. After completing the removal actions, the Consolidation Landfill was graded and permanently capped.

9.3.2.1 Remedial Action AOC 9

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 began in January 2001 and were completed in June 2002. Excavated debris was analyzed for waste disposal characteristics designated in the Sampling and Analysis Plan (SAP) (S&W, 2000). Characterized debris material was transported to the Consolidation Landfill for disposal. A total of 161,477 tons of debris materials from AOC 9 were disposed in the Consolidation Landfill.

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. Concrete debris was processed through a crushing plant for possible reuse as backfill in other areas if analytical results indicated the material met the preliminary remediation goals (PRGs).

A total of 156,000 cy of debris were removed from AOC 9, which is 44,000 cy yards more than the original estimated volume of 112,000 cy. The 44,000 cy of additional debris was attributed to greater excavation depths over extended debris limits. The actual debris limits extended to the south of the proposed landfill limits, which accounted for an additional 0.7 acres resulting in a total disposal area of 9.6 acres. Debris materials primarily consisted of concrete, scrap steel, tires, soil and miscellaneous demolition debris.

Following verification that confirmatory sampling results met the PRGs and the excavation limits had been reached, restoration activities commenced. 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 wetland and upland habitat restorations will be evaluated during the first three or more growing seasons (2003-2006). Restoration activities were completed in accordance with the Habitat Restoration Work Plan (S&W, 2002).

9.3.2.2 Remedial Action AOC 11

Debris was excavated from the 2.7-acre disposal area and transported to the staging area, which was used for material holding during sampling and waste characterization activities. Excavation activities started on November 14, 2000 and were completed on September 28, 2001. Excavated debris was analyzed for waste disposal characteristics designated in the SAP (S&W, 2000). Characterized debris material was transported to the Consolidation Landfill for disposal. A total of 38,096 tons of debris materials from AOC 11 were disposed in the Consolidation Landfill.

During the excavation process, larger debris (i.e. wood, scrap steel, concrete debris and tires) was segregated from the waste soil in an effort to recycle and reduce the volume of material to be disposed in the Consolidation Landfill. Material that resulted from these efforts was disposed of offsite at a licensed disposal 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 Consolidation Landfill.

A total of 32,000 cy of debris was removed from AOC 11, which is 3,000 cy less than the original estimated volume of 35,000 cy. The actual debris limits extended to the west of the proposed landfill limits, which accounted for an additional 0.6 acres resulting in a disposal area of 3.3 acres. Debris materials primarily consisted of concrete, scrap steel, soil and miscellaneous demolition debris.

Following verification that confirmatory results met the PRGs, restoration activities commenced. The first phase of restoration was to restore the berm adjacent to the Nashua River. A portion of the berm was disturbed during the excavation process. The top surface of the berm was stabilized with an upland seed mixture and the lower slope was overseeded with wetland seed mix. The northern slope was stabilized with a native warm season grass mixture. The restorations will be evaluated during the first three or more growing seasons. Restoration activities were completed in accordance with the Habitat Restoration Work Plan (S&W, 2002).

9.3.2.3 Remedial Action AOC 40

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. Excavation activities began in November 2000 and were completed in September 2002. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the Consolidation Landfill for disposal. A total of 166,799 tons of debris materials from AOC 40 were disposed in the Consolidation Landfill.

A total of 148,450 cy of debris were removed from AOC 40, which is 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. The increased depths accounted for an additional 0.2 acres resulting in a total disposal area of 4.1 acres. Debris materials primarily consisted of concrete, scrap steel, stumps, soil and miscellaneous demolition debris. Excavation limits to remediate the extent of debris encroached the existing roadway (Patton Road) adjacent to the disposal site. A road realignment was designed and constructed that detoured traffic during the remedial activities at the site.

Following verification that confirmatory results met the PRGs and the excavation limits had been reached, 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 ten feet 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). It should be noted that although drum removal was included in the selected remedy, no drums were encountered during these remedial actions.

9.3.2.4 Remedial Action AOC 41

Debris was removed from the 0.25-acre disposal area and transported to the SA 12 material staging area, which was used for material holding during characterization activities. Characterized debris material was transported to the Consolidation Landfill for disposal. A total of 200 cy of debris was removed from AOC 41, 1,300 cy less than the original estimated volume of 1,500 cy.

Following verification that confirmatory results met the PRGs and the excavation limits had been reached, restoration activities commenced. Restoration included regrading the area to adjacent elevations and stabilization with the placement of loam and a native grass seed mixture. Site restoration activities began on September 11, 2002 and were completed on September 23, 2002.

9.3.2.5 Remedial Action SA 12

Debris was excavated from the 0.54-acre disposal area and transported to a staging area, which was used for material holding during sampling and waste characterization activities. Excavation activities began on May 1, 2002 and were completed on July 25, 2002. Excavated debris was analyzed for waste disposal characteristics. Characterized debris material was transported to the Consolidation Landfill for disposal. A total of 16,706 tons of debris materials from SA 12 were disposed in the Consolidation Landfill.

A total of 14,300 cy of debris were removed from SA 12, which is 5,600 cy more than the original estimated volume of 8,700 cy. The 5,600 cy of excess debris was attributed to deeper excavation over extended debris limits. The actual debris limits extended beyond the original scoped disposal area limits, which accounted for an additional 0.48 acres resulting in a total disposal area of 1.02 acres. The actual excavation depths ranged, on average, from 4 to 6 feet deeper than proposed excavation grades throughout the excavation area. Debris materials primarily consisted of concrete, scrap steel, soil and miscellaneous demolition debris.

Following verification that confirmatory results met the PRGs and the excavation limits had been reached, restoration activities commenced. Reconstruction and restoration activities were required due to the extended debris limits and hence deeper excavations to remove the debris. The slope was reconstructed to maintain long-term stability. Restoration activities began on July 29, 2002 and were completed on September 13, 2002. Extensive slope reconstruction occurred at the site during the restoration activities. The base of the slope was stabilized with riprap to approximately five feet above the waterline. The remainder of the slope was stabilized with six inches of loam and seeded with a native grass seed mixture. Restoration activities were completed in accordance with the Habitat Restoration Work Plan (S&W, 2002).

9.3.2.6 Remedial Action SA 13

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 Consolidation Landfill for disposal. A total of 13,715 tons of debris materials from SA 13 were disposed in the Consolidation Landfill.

During the excavation process, larger debris (i.e. wood, scrap steel and concrete debris) was segregated from the waste soil in an effort to recycle and reduce the volume of material to be disposed in the Consolidation Landfill. Material that resulted from these efforts was disposed of offsite at a licensed disposal 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 Consolidation Landfill.

A total of 13,900 cy of debris were removed from SA 13, which is 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 limits. The actual debris limits extended to the north of the original disposal area limits, which accounted for an additional 0.3 acres resulting in a disposal area of 1.1 acres. The excavation depths ranged from 4 feet to 8 feet deeper than proposed excavation grades throughout the center of the excavation area.

In addition to the added debris quantities and excavation area, the constituents of the excavated disposal material varied from the anticipated stumps and trees originally thought to make up the "stump dump." Debris materials primarily consisted of concrete, scrap steel, soil and miscellaneous demolition debris (glass, wood, etc.) along with some stumps and brush.

Following verification that confirmatory results met the PRGs and the excavation limits had been reached, restoration activities commenced in October 2001. Minimal restoration operations took place at SA 13. 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 the 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).

9.3.2.7 Current Status

This is the second Five-Year Review for AOC 9, 11, 40, 41 and SAs 6, 12, and 13. All components of the ROD have been implemented. No contingency action is required at this time at the SAs, AOCs or the Consolidation Landfill.

Current action consists of continued implementation of the components specified in the ROD: a groundwater monitoring and maintenance program for the consolidation landfill, annual reporting, and Five-Year Reviews. These components enable continued assessment for compliance with established performance standards and reporting of performance standards.

Post-closure groundwater and maintenance activities are performed by the USACE-NAE, Concord, Massachusetts. The first groundwater monitoring and landfill inspection was performed in November 2003. Work is being performed in accordance with the approved Landfill Operation and Maintenance Plan (O&M) (Shaw Environmental, Inc., 2003).

The Habitat Restoration Work Plan (S&W, 2002) addressed the restoration, maintenance, and monitoring of wetland and upland habitats that were restored after excavation of the six disposal sites. The wetland and upland habitat restorations will be evaluated during the first three or more growing seasons. Long-term monitoring began in Spring 2004.

The first post-closure inspection of the Consolidation Landfill was conducted in November 2003. The features that were inspected included signs of erosion and settlement, vegetative cover, vegetation types, and other general conditions. The physical features of the cap were in good condition and there were no significant deficiencies. During a subsequent inspection/site visit, some washout/slippage was observed in certain areas.

9.3.3 System Operations/Operation and Maintenance

O&M is performed in accordance with the approved Landfill O&M (S&W, 2003). Leachate monitoring takes place on a quarterly basis; groundwater monitoring wells are sampled semi-annually; and the passive gas vents are monitored semi-annually for potential explosive hazards.

In addition, settlement and cover system monitoring is conducted on a visual basis during the scheduled semi-annual inspections. The leachate collection system is also inspected and maintained to ensure the collection system is in good working order. Order of magnitude costs for yearly O&M for implementation of the remedy are $150,000. The O&M of the Pump Station is now being maintained by Mill City Environmental of Lowell, Mass.

9.4 Progress Since the Last Five-Year Review

This is the second Five-Year Review for AOCs 9, 11, 40, 41; SAs 6, 12, and 13; and the first Five-Year Review for the Consolidation Landfill. Since there were no site operations ongoing at the debris disposal areas and planned remediation had not been implemented at the time of the first Five-Year Review, there were no recommendations for improvement.

The first Five-Year Review recommended that the Army 1) submit a permit application for new landfill construction to the Massachusetts Department of Environmental Protection (MADEP), if on-site disposal was selected as the most desirable option and 2) proposed setbacks to the setback requirements should be evaluated for potential reduction of the area currently considered suitable for landfill construction.

The first Five-Year Review concluded that, when completed, the planned remedy was expected to meet remedial action objectives, and be protective of human health and the environment.

9.5 Five-Year Review Process

9.5.1 Document Review

The following documents were reviewed for this Five-Year Review:

- Final Design Technical Specifications for Consolidation Landfill prepared by EA Engineering, Science, and Technology (EA), October 1999.
- Landfill Technical Guidance Manual prepared by Massachusetts Department of Environmental Protection, May 1997.
- Contractor Quality Control Plan prepared by Stone & Webster, Inc., January 2000.
- Sampling and Analysis Plan (SAP) prepared by Stone & Webster, Inc., February 2000.
- Environmental Protection Plan prepared by Stone & Webster, Inc., February 2000.
- Site Safety and Health Plan prepared by Stone & Webster, Inc., September 2000.
- Excavation and Handling Plan prepared by Stone & Webster, Inc., December 2000.
- Materials Management Plan prepared by Stone & Webster, Inc., February 2001.
- Dewatering Work Plan prepared by Stone & Webster, Inc., August 2001.
- Wetland and Upland Habitat Restoration Plan prepared by Stone & Webster, Inc., January 2002.
- Remedial Action Closure Report prepared by Shaw Environmental, September 2003.
- Operation and Maintenance Plan prepared by Shaw Environmental, Inc., 2003.
- Annual Report, Post-Closure, Long Term Monitoring and Maintenance, May 2004.

9.5.2 Data Review

9.5.2.1 AOC 9

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation, documenting the attainment of PRGs. Field sampling activities and analysis were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. Samples were collected from the excavated material for waste characterization prior to transport and disposal. A total of 255 composite samples were collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. These analytical results were compared against the Toxicity Characteristic Leaching Procedure (TCLP) based action limits identified in the Construction Specifications (USACE, 1999). Of the excavation samples collected and analyzed, 139 exceeded the TCLP based action limit of 100 milligrams/kilogram (mg/kg) for the analyte lead. TCLP analysis was performed on these samples to determine if leaching at regulatory levels would occur. Thirteen (13) samples analyzed for TCLP lead exceeded the TCLP limit of 5.0 mg/L. The remaining TCLP results indicated that the concentration of lead detected was below the regulatory level needed for the waste to be characterized as hazardous and was acceptable for transport and disposal at the Consolidation Landfill. The material that exceeded the TCLP limits was segregated and stockpiled in the lined material staging area and transported off site to an approved disposal facility.

Confirmatory Samples. Confirmatory samples were collected after the debris material had been excavated from within the disposal area at the site. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 37 confirmatory samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. Out of the 37 samples collected, three samples did not meet the PRGs. The areas represented by these failing samples received additional remedial efforts and another round of collected confirmatory samples until the PRGs were reached or exceeded. All results presented in the Closure Report by Shaw 2003, indicated that the removal goals had been met.

Other Samples. Concrete samples were collected from the processed concrete debris to determine if the product would meet the requirements for reuse as backfill material. The material that met all requirements of the PRGs was segregated and used as road base material during the construction of access roads, as needed. The remainder of the concrete that did not meet the requirements for reuse as backfill or road base material was disposed of at the Consolidation Landfill.

9.5.2.2 AOC 11

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation, documenting the attainment of PRGs. Field sampling activities and analysis were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. Samples were collected from the excavated material for waste characterization prior to transport and disposal. A total of 61 composite samples were collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. The analytical results were compared against the TCLP based action limits identified in the Construction Specifications (USACE, 1999). All of the samples collected and analyzed exceeded the TCLP based action limit of 100 mg/kg for the analyte lead. TCLP analysis was performed on these samples to determine if leaching at regulatory levels would occur. Only two samples analyzed for TCLP lead exceeded the TCLP limit of 5.0 mg/L. The remaining TCLP results indicated that the detected concentration of lead was below the regulatory level needed for the waste to be characterized as a hazardous. The exceedances of two samples were considered minimal at 5.1 mg/l and 5.2 mg/l respectively. S&W and the USACE agreed to segregate the material from the debris stockpile and collect 4 additional samples to be analyzed for TCLP lead. All results indicated that the material excavated from the site was acceptable for transport and disposal at the Consolidation Landfill.

Confirmatory Samples. Confirmatory samples were collected after the debris material had been excavated from within the disposal area at the site. Samples were collected in a phased manner as areas were completed. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 8 confirmatory samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. Out of the 8 samples collected, two samples did not meet the PRGs. The areas represented by the samples received additional remediation efforts and another round of confirmatory samples were collected until the PRGs were reached or exceeded. All results indicated that the removal goals had been met.

Other Samples. One concrete sample was collected from the initial concrete debris that was removed during the remedial activities to determine if the product would meet the requirements for reuse as backfill material. The analytical results indicated that the end product did not meet the requirements of the PRGs, therefore the material was disposed at the DCL.

9.5.2.3 AOC 40

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation and documenting the attainment of PRGs. Field sampling activities and analysis were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. A total of 286 composite samples were collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. These analytical results were compared against the TCLP based action limits. Of the excavation samples collected and analyzed, 2 samples exceeded the TCLP based action limit of 100 mg/kg for the analyte lead. TCLP analysis was performed on the samples to determine if leaching at regulatory levels would occur. The TCLP results indicated that the concentration of lead detected was below the regulatory level needed for the waste to be characterized as hazardous. All results indicated that the material excavated from the site was acceptable for transport and disposal at the Consolidation Landfill.

Confirmatory Samples. Samples were collected in a phased manner as appropriate areas were completed. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 34 confirmatory samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. Out of the 34 samples collected, 8 samples did not meet the PRGs. The areas represented by these failing samples received additional remedial efforts and another round of confirmatory samples were collected until the PRGs were reached or exceeded. All results indicated that the removal goals had been met.

Other Samples. Water samples were collected and analyzed to obtain a dewatering permit so that construction dewatering could be discharged to Cold Spring Brook, a body of water adjacent to the remediation site, in order to facilitate soil excavation at the AOC 40. Water collected and discharged into Cold Spring Brook during the excavation and dewatering activities at AOC 40 was sampled in accordance with a general permit for construction dewatering issued by the MADEP. Discharge water into Cold Spring Brook was monitored on a weekly basis for turbidity and pH using field-testing equipment. All results indicated that discharge parameters were not exceeded.

9.5.2.4 AOC 41

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation and documenting the attainment of PRGs. Field sampling activities and analyses were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. Samples were collected from the excavated material for waste characterization prior to transport and disposal. One composite sample was collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. These analytical results were compared against the TCLP based action limits identified in the Construction Specifications (USACE, 1999). The one sample collected and analyzed exceeded the TCLP based action limits for excavation samples for the analyte lead. TCLP analysis was performed on the sample to determine if leaching at regulatory levels would occur. The TCLP results indicated that the concentration of lead detected was less than 5 mg/l (the regulatory level needed for the waste to be characterized as hazardous waste). The result indicated that the material excavated from the site was acceptable for transport and disposal at the Consolidation Landfill.

Confirmatory Samples. Confirmatory samples were collected after the debris material had been removed from within the disposal area at the site. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 2 confirmatory composite samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. The results indicated that the removal goals had been met.

9.5.2.5 SA 12

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation, documenting the attainment of PRGs. Field sampling activities and analyses were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. Samples were collected from the excavated material for waste characterization prior to transport and disposal. A total of 29 composite samples were collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. The analytical results were compared against the TCLP based action limits identified in the Construction Specifications (USACE, 1999). Eleven (11) samples were analyzed for the TCLP based action limits for excavation samples for the analyte lead. TCLP analysis was performed on these samples to determine if leaching at regulatory levels would occur. The TCLP results indicated that the concentration of lead detected was below the regulatory level necessary for the waste to be characterized as a hazardous material. All results indicated that the material excavated from the site was acceptable for transport and disposal at the Consolidation Landfill.

Confirmatory Samples. Confirmatory samples were collected after the debris material had been excavated from within the disposal area at the site. Samples were collected in a phased manner as appropriate areas were completed. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 3 confirmatory composite samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. All results indicated that the removal goals had been met.

9.5.2.6 SA 13

Samples were collected and analyzed for excavated debris material stockpiles, confirming the limits of excavation, documenting the attainment of PRGs. Field sampling activities and analysis were conducted in accordance with the USACE's Construction Specifications (USACE, 1999) and the guidelines specified in the SAP (S&W, 2000).

Stockpile Samples. Material was excavated and stockpiled in the material staging area and samples were collected for waste characterization prior to transport and disposal. Twenty-four composite samples were collected and analyzed from the material that was excavated and stockpiled during the remedial activities at the site. The analytical results were compared against the TCLP based action limits identified in the Construction Specifications (USACE, 1999). Twenty-two (22) of the samples analyzed exceeded the TCLP based action limits for excavation samples for the analyte lead. TCLP analysis was performed on these samples to determine if leaching at regulatory levels would occur. The TCLP results indicated that the concentration of lead detected was below the regulatory level needed for the waste to be characterized as a hazardous. All results indicated that the material excavated from the site was acceptable for transport and disposal at the Consolidation Landfill.

Confirmatory Samples. Confirmatory samples were collected after the debris material had been excavated from within the disposal area at the site. Samples were collected in a phased manner as appropriate areas were completed. Confirmatory grab samples were taken at a depth of 6 inches from the exposed face of the excavation. A total of 3 confirmatory samples were collected and analyzed to document the chemical concentrations within the excavated area and verify the attainment of PRGs. All results indicated that the removal goals had been met.

9.5.2.7 Construction of Consolidation Landfill

Construction of the Devens Consolidation Landfill was performed between September 2000 and November 2002. Construction oversight was performed by Stone and Webster Construction, Inc. The landfill was constructed in accordance with MADEP Landfill Technical Guidance Manual (May 1997) and the Final Design Technical Specifications prepared by EA Engineering, Science and Technology (October 1999).

Over the course of construction, approximately 591,804 tons of materials were placed at the landfill. Materials disposed of at the landfill included a variety of debris, which was excavated from the above-identified AOCs and SAs. The approved landfill easement occupies 16.88 acres with approximately 8.0 acres utilized for debris disposal. 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 geocomposite and 40-mil flexible polyethylene (VFPE) liner, a sand drainage layer, and vegetation support layers.

9.5.2.8 Long Term Monitoring

O&M is performed in accordance with the approved Landfill Operation and Maintenance Plan (S&W, 2003). As part of the O&M Plan, the wetland and upland habitat restorations at AOCs 9, 11, 40 and SAs 12 and 13 were evaluated during the first three growing seasons. Semi-annual wetland restoration inspections are to be conducted in accordance with the ROD. Leachate monitoring takes place on a quarterly basis in accordance with a permit issued to Mass Development; groundwater monitoring wells are sampled semi-annually; and the passive gas vents are monitored semi-annually. In addition, settlement and cover system monitoring is conducted on a visual basis during the scheduled semi-annual inspections. The leachate collection system is also inspected and maintained to ensure the collection system is in good working order.

Leachate monitoring results were reported in January 2002, April 2002, July 2002, April 2003, June 2003, October 2003, January 2004, and March 2004. All results were below local effluent limitations as specified by the industrial wastewater discharge permit.

Three monitoring wells were sampled in June and November 2003. The lead concentration in one well was the only Contaminant of Concern (COC) that exceeded a Massachusetts Contingency Plan (MCP) Method 1 Standards. The concentration of lead increased from 13 μg/L in June to 17 μg/L in November. The RCGW-1 reportable concentration is 15 μg/L (USACE, May 2004). Lead was not detected in the sampling round performed in October 2004.

9.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOCs 9, 11, 40, 41, and SAs 6, 12, and 13. Conditions during the inspection were favorable, with no precipitation and temperatures in the 50° to 60° F range. The Devens Consolidation Landfill consists of an 8-acre, grass-covered, capped landfill that is constructed with a leachate collection system, gabion drains, perimeter drainage swales, and sedimentation pond. Other than a small pump house that handles the collected leachate and the concrete pad for the weight scale, no other structures are located at the site.

Significant soil erosion was observed in the north-northeast gabion slope drain starting at the intersection with the bench drain, and deposition of the eroded materials was observed in the perimeter swale of the consolidation landfill. Ellen Iorio (USACE) stated that the intersection of the slope and bench drain did not appear to be built in full compliance with the specifications and is probably a construction deficiency. A scope of work (SOW) was issued and awarded for the repair of the gabion slope drain and appurtenant work. Ms. Iorio anticipates that the work will be completed in the Fall 2005.

There was no evidence of excavation or disturbance at any of the landfill sites. Inspected monitoring well casings were intact and secured.

9.5.4 Interviews

The following individuals were interviewed as part of the Five-Year Review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA
- Mr. Robert Simeone, Devens, RFTA

All personnel were interviewed on April 21, 2005 while performing the site visit. Other than the noted eroded gabion slope drain, none of the personnel were aware of any reported problems with any of the sites. Evaluation of future land use has indicated that commercial and open space are acceptable. ICs are presented in the ROD for AOCs 9, 11, 40, 41, and SAs 6, 12, and 13, however, none are currently recorded with the deed. At the present time, the Installation Master Plan (IMP) covers institutional control restrictions. Property transfer for AOCs 9 and 40, and SAs 13 is scheduled to be completed by January 2006, at which time the ICs will be incorporated into the deed.

9.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at the Devens Consolidation Landfill.

In December 1997, the Army issued the first of two Proposed Plans (PP) to interested citizens and organizations. In response to public comment, the Army issued the revised Proposed Plan in November 1998. In both cases, numerous public notices were published, several public meetings were held, and a public review and comment period for the PP and FS was implemented.

Currently, the RAB meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public.

At various times throughout the review period significant events for the Devens Consolidation Landfill were discussed at the RAB meetings. As appropriate, pertinent documents were distributed for review by the RAB members. In addition, the Army performed public site tours for the landfill sites in June 2001, June 2002 and May 2005.

9.6 Technical Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Remedial Action Performance: Based on indications from analytical results of confirmatory samples collected from the areas that were excavated, and disposal of excavated materials into the Consolidation Landfill or off-site as applicable, site cleanup goals and remedial action objectives established in the ROD have been satisfied.

System Operations/Operation and Maintenance (Consolidation Landfill): O & M is performed in accordance with the approved Landfill Operation and Maintenance Plan (Shaw Environmental, Inc., 2003).

Opportunities for Optimization: Remedial action and construction activities have been completed at this site, and therefore, there are no proposed opportunities for optimization.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review.

Implementation of ICs and Other Measures: ICs are presented in the ROD for AOCs 9, 11, 40, 41, and SAs 6, 12, and 13. If property transfer occurs in the future, ICs will be incorporated into the property deed or other instrument of property transfer. Until that time, the Installation Master Plan (R&K Engineering, Inc., June, 1999) will cover institutional control restrictions. The Master Plan identifies known environmental conditions, restrictions, and required actions that are in place for the properties. The Army is currently updating the Master Plan, which will be finalized in Spring 2006. Transfer of AOCs 9, 40 and SA 13 is expected to occur by January 2006. ICs for these sites are included in the Finding of Suitability to Transfer (FOST) and will be incorporated into the deeds once finalized.

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

Changes in Standards and To Be Considered: As part of this Five-Year Review, Applicable or Relevant and Appropriate Requirements (ARARs) and To be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. A few changes have been promulgated since the ROD was signed in 1999. See Section 9.6.2, ARARs.

Excavation activities at AOCs 9, 11, 40, and 41 and SAs 12 and 13 were completed in 2003. Cleanup goals for the disposal areas were established by using USEPA Region 9 PRGs for residential soil and/or MCP S-1 soil standards, whichever was more stringent. PRGs were attained and verified through confirmatory sampling. The Remedial Action Objectives (RAOs) for soil specified in the ROD have been achieved. Contaminated soils were removed and placed in the Consolidation Landfill; therefore, changes to soil TBCs do not affect the protectiveness of the implemented remedy.

Changes in Exposure Pathways: The ROD identified unacceptable risks from the following exposure pathways: direct contact with and ingestion of contaminated soils by future residents at AOC 9, 11, 40, and 41 and SA 12 and 13. Based on analytical results of confirmatory soil samples collected from excavated areas, and implementation of ICs prohibiting residential site use, the direct contact with and ingestion of contaminated soil exposure pathways have been eliminated. Land use at the site has not changed and is not expected to change. The sites have been restored to wetland and upland habitats.

Changes in Exposure Assumptions: Human health risk assessments were performed for AOCs 11 and 40. Preliminary risk evaluations (screening risk evaluations) were performed for AOCs 9 and 41 and SAs 12 and 13. The risk assessments supporting the RODs for AOC 11 and AOC 40 used exposure assumptions consistent with standard practice at the time. Since that time, USEPA has updated some of the recommended dermal contact exposure assumptions. New guidance for evaluating dermal contact exposures was finalized in July 2004 (*Risk Assessment Guidance for*

Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final). Because the remedy includes excavation of contaminated soils, changes to the exposure parameters do not affect the protectiveness of the implemented remedy.

Changes in Toxicity and Other Contaminant Characteristics: Because the remedy includes excavation of contaminated soils, changes to the toxicity of groundwater contaminants do not affect the protectiveness of the implemented remedy.

Changes in Risk Assessment Methodologies: The methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOC 11 and AOC 40, based on USEPA's *Risk Assessment Guidance for Superfund, Volume I – Human Health Evaluation Manual – Part E, Supplemental Guidance for Dermal Risk Assessment – Final*, July 2004. The human health and ecological risks discussed in the ROD have been eliminated by the excavation and removal of soils and the ICs. Therefore, while the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOC 11 and AOC 40, these risk assessment methodology changes do not affect the protectiveness of the remedy.

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

Additional information, other than noted above, that would call into question the protectiveness of the remedy was not noted. No natural disaster impacts occurred at the Devens Consolidation Landfill during this review period.

9.6.1 Summary of Technical Assessment

O & M is performed in accordance with the approved Landfill Operation and Maintenance Plan (Shaw Environmental, Inc., 2003). Excavation activities at AOCs 9, 11, 40, and 41 and SAs 12 and 13 were completed in 2003. The RAOs for soil specified in the ROD have been permanently achieved.

Because the remedy included excavation of contaminated soils, changes to the exposure parameters do not affect the protectiveness of the implemented remedy. The human health and ecological risks discussed in the ROD have been eliminated by the excavation and removal of soils and the ICs. Therefore, while the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOC 11 and AOC 40, these risk assessment methodology changes do not affect the protectiveness of the remedy.

9.6.2 Applicable or Relevant and Appropriate Requirements Review

Standards identified as ARARs appeared in the ROD (see Tables B.1, B.2, and B.3 reprinted from the ROD in Appendix H). These were reviewed for changes that could affect protectiveness.

Some standards relative to landfill remediation and construction determined to be applicable, relevant and appropriate, or to be considered, have been updated since the signing of the ROD in 1999. Changes in these standards do not affect the protectiveness of the remedy. In addition, no new standards promulgated since the ROD signing were identified.

The following are changes in the standards concerning groundwater and surface water:

- 40 CFR 141.11 Subpart B MCLs was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

  a) *** The analyses and determination of compliance with 50 µg/L MCL for arsenic use the requirements of Section 141.23.

  b) The MCL for arsenic is 50 µg/L for community water systems until January 23, 2006.

  On January 22, 2001, USEPA adopted a new standard for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L (66FR6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 µg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.
- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.
- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 µg/L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

Ambient water quality criteria (40 CFR 131) were updated since the signing of the ROD and the last Five-Year Review. However, the updates applied to different states, not including Massachusetts, and do not affect the protectiveness of the remedy.

9.7 Issues

At present, there are no deficiencies that would prevent planned response actions from being protective of human health and the environment, nor are any expected in the future.

Significant soil erosion was observed in the north-northeast gabion slope drain starting at the intersection with the bench drain and deposition of the eroded materials was observed in the perimeter swale of the consolidation landfill.

9.8 Recommendations and Follow-up Actions

It is the recommendation of this review that operation and maintenance at the Devens Consolidation Landfill be continued as outlined in the Landfill Operation and Maintenance Plan (2003) and the wetland and upland habitat restorations at AOCs 9, 11, 40 and SAs 12 and 13 be evaluated during the first three growing seasons (2004 – 2006). It is recommended that quarterly leachate sampling be continued per the Mass Development permit, semi-annual Consolidation

Landfill Long Term Maintenance (LTM) inspections are continued, and that the recommendations highlighted in 2004-2005 Annual LTM Reports are implemented.

It is also recommended that the Consolidation Landfill site undergo continued visual inspection to look for settling areas on the cap surface and along the edge (swales).

Recommendations/ Follow Up Actions	**Party Responsible**	**Oversight Agency**	**Milestone Date**	**Do Follow-Up Actions: Affect Protectiveness (Y/N)**	
				Current	**Future**
Incorporate ICs into the revised IMP	U.S. Army, BRAC	U.S. Army, BRAC	Spring 2006	Y	Y
The north-northeast gabion slope drain of the landfill should be repaired to correct the erosion and probable construction deficiencies.	U.S. Army, BRAC	U.S. Army, BRAC	Fall 2005	Y	Y

9.9 Protectiveness Statement

The remedies at AOCs 9, 11, 40, and 41 and SAs 6, 12 and 13 are protective of human health and the environment, and exposure pathways that could result in unacceptable risk are being controlled.

A health and safety plan (HASP) and investigation derived waste (IDW) handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOCs 9, 11, 40, and 41 and SAs 6, 12 and 13 because contaminated soils have been excavated and placed in the Consolidation Landfill where it has been capped.

All components of the ROD have been implemented. No contingency action is required at this time. Current remedial action activity consists of continued implementation of the components specified in the ROD: the long-term groundwater monitoring and maintenance program at the Consolidation Landfill, annual reporting, and Five-Year Reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

9.10 Next Review

This is the second Five-Year Review that has been performed for AOCs associated with the Devens Consolidation Landfill. The next review will be performed within five years of the completion of this Five-Year Review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonoccurrence.

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10.0 AOC 50 FIVE YEAR POLICY SITE REVIEW

10.1 Site Chronology

Table 10-1: Chronology of Site Events

Event	Date
National Priority List (NPL) Listing	December 1989
Remedial Actions, Pre-Record of Decision (ROD)	1996 (SVE); 2001 (Pilot ERD)
Remedial Investigation (RI) Initiated	1996
Remedial Investigation Complete	January 2000
Feasibility Study (FS) Complete	December 2002
Proposed Plan (PP)	January 2003
RODSignature	March 2004
Actual Remedial Action Start (Post ROD)	May 2004
Five-Year Review	September 2005

10.2 Background

AOC 50 is located on the northeastern boundary of the former Moore Array Airfield (MAAF), within the former North Post portion of Devens RFTA, Ayer, Massachusetts. The AOC 50 Source Area (Figure 2, reprinted from Record of Decision (ROD) and included in Appendix I) comprises less than 2 acres and includes Buildings 3803 (the former parachute shop), 3840 (the former parachute shakeout tower), 3824 (a gazebo), and 3801 (the former 10th Special Forces airplane parachute simulation building). Sources of groundwater contamination within AOC 50 include two World War II fueling systems, a drywell, and the tetrachloroethylene (PCE) drum storage area. These sources are collectively referred to as the Source Area. Other potential sources of contamination may include a former cesspool and floor drain associated with Building 3840. 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 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 to the Nashua River.

AOC 50 is currently defined by three distinct areas; the Source Area, Southwest Plume, and North Plume. These areas are shown on Figure 6 of the December 2004 Operations & Maintenance and Groundwater Sampling Report. The Army currently leases the area designated as the Source Area to Mass Development. The buildings on this property are included in the lease but are generally inactive. The Army intends to convey this property to Mass Development once a determination is made that the remedy is Operating Properly and Successfully (OPS) and a Finding of Suitability to Transfer (FOST) is issued by the Army. Appropriate Land Use Controls (LUCs) and CERCLA Right of Access will be incorporated into the conveyance.

The Army, Mass Development, and the Fish and Wildlife Service own portions of the area overlying the Southwest Plume. The Army retained approximately 9.1 acres of the former airfield for vehicle storage and maintenance and 4.3 acres including the AOC 50 source area, but transferred approximately 14 acres of the property to Mass Development in 1996 for reuse. The Fish and Wildlife Refuge, located adjacent to the Nashua River, is generally forested and heavily vegetated with steep terrain and limited access. The Refuge abuts the Nashua River and there are currently no known plans to develop this area. The area owned by Mass Development has several buildings and a former airfield. Currently, the airfield is closed to aircraft traffic and is used by the Massachusetts State Police for training and vehicle storage. Under the Devens Reuse Plan (November 14, 1994), the area is zoned for Special Use II and Innovation and Technology Business, which includes a broad range of industrial, light industrial, office, and research and development uses. There are currently no plans for development of the MAAF, although the area can be developed if interested parties are identified. Zoning of the MAAF property could change when the Towns of Ayer, Harvard and Shirley vote on the ultimate disposition of the Devens property in 2006.

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 also located on the property and would be used for fire suppression should it be necessary. The North Plume also affects the abutting GFI Ayer, LLC property.

Groundwater beneath AOC 50 (Source Area, Southwest Plume, and North Plume) is not used as a drinking water or industrial water source and the entire area is on publicly supplied water and sewer. Future residential use of land at AOC 50 is not likely based on zoning restrictions and the Army will not use the land for residential use. The Devens Reuse Plan does not include residential development of land in the vicinity of AOC 50, and the privately owned land (North Plume) is not zoned for residential use. Since the aquifer underlying portions of the AOC 50 site are classified as high and medium yielding aquifers, there is the potential to use this resource in the future.

10.2.1 Fueling Systems

During World War II, two fueling systems were used in the area subsequently designated 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 al., 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 (Figure 2). Releases of fuel associated with incidental spills at the former aircraft fuel pits, truck-fill stands, and railroad fuel-delivery points were considered possible sources of contamination. Because the systems were approximately 50 years old, underground storage tanks (USTs) were also considered possible continuing sources of releases. The potential for migration of contaminated groundwater to the Nashua River was a concern. At the time of the initial Site Inspection (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 18 feet below ground surface (bgs) due to the presence of water in the excavation. All excavations were backfilled to grade. Field screening results and post-excavation sample analyses are presented in the RI prepared by HLA (HLA, 2000a).

10.2.2 Drywell

In 1969, Building 3840 was constructed and attached, via an enclosed walkway, to Building 3803. In addition, two large sinks and a janitors' 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 feet northeast of Building 3840 (Figure 2). This drywell received wash water, rainwater, and PCE waste associated with parachute cleaning activities. The drywell near Building 3840 and associated piping were removed for the Army by Roy F. Weston Corporation between November and December 1996 (Weston, 1997). The resulting excavation was approximately 9.5-feet deep and covered an area approximately 21 feet by 30 feet, equating to approximately 225 cubic yards (cy) of soil (in-place). Details regarding the removal activities are documented in the Remedial Action Report (Weston, 1997). In addition to the removal of the drywell, a 750-gallon fuel storage UST associated with the Building 3840 heating system, was also removed. In connection with the tank removal, approximately 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 storage UST were taken off site for proper treatment and disposal.

10.2.3 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, 2000a). 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 manifests, which did not include the removal of waste chlorinated solvents from AOC 50 (Molt, 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. Based on the results of various field investigations, PCE was detected in vadose zone soils beneath the former drum storage area and was likely contributing to PCE impacts in groundwater. An interim removal action for PCE-contaminated soil at the former drum storage area was planned and implemented as a source-control measure while additional investigation activities were conducted across the site.

10.2.4 In-Situ Soil Vapor Extraction (SVE)

An in-situ SVE system was installed adjacent to the former drum storage area in December 1993 and January 1994. Five soil vapor extraction wells (SVE-1 through SVE-5) were installed, one in the center of the presumed PCE source and four on the periphery (Figure 2). Details regarding the installation, operation, and performance of the SVE system between February 1994 and July 1996 are documented in a November 1996 report titled *Summary Report, SVE Monitoring, AOC 50* (ABB, 1996a). The SVE system was operated again for brief periods in December 1998, May and June 1999, and October and November 1999. The brief periods of SVE system operation, after the 1996 shut down were conducted to evaluate the concentration of PCE in the soil vapor, under equilibrium conditions. In general, recovered vapor concentrations were either below the detection limits of a photoionization detector (PID), or after a brief peak, observed when the system was restarted, and quickly attenuated within minutes. Data collected between 1994 and 1996 indicate that approximately 240 pounds of PCE were recovered and treated. No appreciable mass of PCE was recovered during operation in 1998 and 1999. The SVE system was re-activated in September 2004; however, the system was recently shut down due to poor recovery/treatment of the PCE.

10.2.5 Cesspool

A cesspool associated with the bathroom in Building 3803 was identified on the site drawing and it appears to be the only septic system structure for either building. The drywell and cesspool were investigated as potential contaminant sources for the various volatile contaminants, including PCE detected in soil and groundwater during previous investigations. The cesspool was removed concurrent with the drywell and UST associated with Building 3840. During the cesspool removal activities, a total of 25 cy of soil, sludge, and concrete were excavated and taken off site for treatment and disposal.

10.2.6 Basis for Response Action

The baseline human health risk assessment revealed that workers and residents potentially exposed to contaminants of concern (COCs) in groundwater via potable water ingestion and vapor inhalation may present unacceptable human health risks (i.e., cancer risks greater than $1x10^{-4}$ and noncancer hazard indices greater than 1). 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, may present an imminent and substantial endangerment to public health, welfare, or the environment. Groundwater will continue to be the focus of remedial actions.

10.2.7 Enhanced Reductive Dechlorination (ERD)

Between December 2001 and June 2002, an ERD pilot test was performed in the Southwest Plume Area and operation of the pilot ERD has been continuous since 2001. The ERD system utilizes a molasses-water solution as the treatment reagent. The active area of the pilot ERD system is located approximately 800 feet upgradient of the Nashua River. Prior to 2001, a pilot test was performed in the same area, by MACTEC, using hydrogen release compound (HRC). Based on the results of the pilot test, full-scale implementation was started in May 2004. The ERD system operation consists of making reagent injections into 40 injection wells located in the Source Area and Southwest Plume Area to maintain the In-situ Reactive Zone (IRZ) and promote microbial activity.

A Feasibility Study (FS), performed to develop and assess potential remedial alternatives for cleanup at AOC 50, was issued in December 2002. Following submission of the Army's Proposed Plan (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 SVE, ERD, in-well stripping (IWS) bioremediation, control of solubilized inorganics, long term monitoring and institutional controls. The ROD was signed in March 2004.

<u>10.3 Remedial Actions</u>

The groundwater cleanup goals were developed from several sources and were presented in the ROD. Groundwater cleanup goals for COCs are shown in the following Table. If no cleanup goal was developed for a specific analyte as part of the ROD, the MCP Method 1 GW-1 standard was used as the cleanup goal for COCs.

Table 10-2 Area 50 COC: Cleanup Level in Groundwater

Contaminant of Concern	Cleanup Goals (µg/L)
VOCs	
Arsenic	10
Benzene	5
1,2-dichloroethane	5
Lead	15
Methylene Chloride	5
Tetrachloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2
1,1-Dichloroethylene	7
1,2-Dichloropropane	5
cis-1,2-Dichloroethylene	70
Iron	3,129
Manganese	1,460
Nitrate	10,000

MCL of 10 µg/L for arsenic is not effective until January 26, 2006; however, USEPA has indicated in the ROD, dated 2004, that this is the maximum interim cleanup level likely to be accepted for arsenic.

There are three main areas of contamination identified for AOC 50; the Source Area, the Southwest Plume and the North Plume. The remedial objectives for each of these areas are as follows:

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 and inhalation of vapors released from contaminated groundwater to indoor air.
- Restrict groundwater pumping and stormwater discharge/recharge to avoid drawing the contaminated groundwater from the source area.
- Limit construction in specified area over the contaminated groundwater that would interfere with the operation of the remedy.
- Reserve access to the site for monitoring and remediation.

Southwest Plume

- Protect potential residential and commercial/industrial receptors from ingesting contaminated groundwater.
- Restrict groundwater pumping and stormwater discharge/recharge to avoid drawing the contaminated groundwater from the source area.

- Limit construction in specified area over the contaminated groundwater that would interfere with the operation of the remedy.

- Reserve access to the site for monitoring and remediation.

North Plume

- Protect potential residential receptors from ingesting contaminated groundwater.

- Restrict groundwater pumping to avoid drawing the contaminated groundwater from the source area.

- Limit construction in specified area over the contaminated groundwater that would interfere with the operation of the remedy.

- Provide access to the site for monitoring and remediation.

10.3.1 Remedy Selection

The selected remedial technologies for AOC 50 are SVE, ERD, IWS/Aerobic Bioremediation, Monitoring and Institutional Controls. In addition, geochemical additives and In-Situ Chemical Oxidation (ISCO) were included as contingencies to address inorganics and VOCs, respectively, in the event that monitoring data indicate that implementation of these contingencies was warranted. The remedy was a comprehensive approach that addresses all current and potential future 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 ARARs, offers long term and short-term effectiveness, and is readily implementable at a reasonable cost. The principal components of the remedial systems for AOC 50 consist of the following:

- SVE in the Source Area.
- ERD throughout the site with solubilized inorganic controls.
- IWS along the downgradient portion of the Southwest Plume.
- ISCO in the North Plume (contingency).
- Iron injection downgradient of the ERD transect (contingency).
- Long term monitoring.
- Institutional Controls.
- Five-Year Site Reviews.

A description of the components of the selected remedy (Remedial Alternative 6) and other related activities is provided below.

Pre-Design Investigation Activities. Since 2003, the Army has performed additional field investigations at AOC 50 to further assess the nature and extent of PCE impacts at AOC 50. A pilot test of the ERD technology was completed between December 2001 and July 2002, the results of which were documented in a report incorporated into the Final FS. Additional investigation activities were conducted to support the Final Remedial Design (RD), (ARCADIS, 2004). This included collection and analysis of groundwater and soil samples, installation and testing of IWS, and the installation of additional permanent SVE and monitoring wells, as necessary. Work plans would be submitted for review prior to initiating additional investigation activities.

Application of SVE in the Source Area. Based on the results of pre-design investigation to be performed, the existing SVE system, formerly operated in the Source Area at AOC 50, would be refurbished for use in the preferred alternative. The system would apply a vacuum to wells completed within the unsaturated soils, capturing VOC mass in the vapor phase as soil gases are withdrawn. The soil gases extracted from the subsurface would be treated, as needed with activated carbon prior to being discharged to the atmosphere. Operation of the SVE system in the Source Area will provide indirect remediation of groundwater impacts, if recoverable chlorinated volatile organic compounds (CVOC) mass is present. Specifically, the capture of adsorbed phase mass potentially present in the vadose zone soils will be removed as a continuing source for groundwater contamination. Additional SVE wells would be installed if necessary, in the Source Area, to supplement the existing SVE well network.

ERD Implementation. This technology is implemented *in-situ* by stimulating microbial activity and significantly increasing rates of CVOC degradation. The microbial activity is stimulated through the injection of an organic carbon substrate. The areas in which this substrate is delivered become anaerobic and reducing due to the uptake of available electron acceptors to support respiration of the microbes, providing the environment required for the ERD process to take place. The preferred remedy would involve the installation of multiple injection wells in a series of transects oriented perpendicular to the direction of groundwater flow. A dilute solution of potable water and the organic carbon substrate (molasses or other) will be periodically injected into the formation through these wells to drive the groundwater environment to anaerobic and reducing conditions. The exact locations, spacing, and completion details of the injection wells/transects would be specified in the RD. In order to optimize the design and further reduce the remedy duration, the design will reflect the most up to date groundwater quality data and flow modeling.

Solubilized Inorganics Controls. As outlined in the Final FS (ARCADIS, 2002a) and confirmed during the ERD pilot test, inorganics including iron, manganese and arsenic are solubilized within the reducing zones created by ERD technology. Inorganics solubilized within the reducing in-situ reactive zones (IRZs) are not expected to migrate beyond the boundary of reducing conditions, and are not expected to persist once the prevailing aerobic groundwater environment is restored. Outside of the zone of reducing conditions (i.e., under the naturally aerobic conditions present in the groundwater at AOC 50), the inorganic constituents will be oxidized and subsequently immobilized through precipitation and/or adsorption. However, it is recognized that a subsequent phase of remediation will be implemented should groundwater monitoring indicate that the inorganics have not attained remediation goals. After the ERD remedy is completed within sections of the plume and injection transects are phased out (which is expected to be approximately 10 to 15 years, based on the groundwater modeling prepared in the FS), the inorganic data collected during the long term monitoring will be evaluated to assess that adequate restoration of natural aerobic conditions and re-precipitation of inorganics have been achieved. If warranted, the re-precipitation of inorganics will be expedited through manipulation of aquifer chemistry or application of more effective treatment technologies along the length of the plume utilizing existing ERD injection wells as transects are phased out following the treatment of VOCs.

IWS/Circulation Well Transect. Alternative 6 would involve the installation of groundwater circulation/IWS wells in the downgradient portion of the Southwest Plume and upgradient of the

Nashua River. The inlet (lower) screen interval of the circulation well(s) would be positioned to intercept the zone of highest chlorinated CVOC concentrations, with the recharge (upper) screen interval positioned at the upper limit of the impacted zone (to prevent cross-contamination of unimpacted zones). The lower screen would also intercept the zone of highest potential solubilized inorganics should this condition present itself. The IWS would create aerobic conditions conducive to the precipitation of solubilized inorganics. As with the new monitoring wells, the exact location, spacing, and completion details of the circulation wells would be specified in the RD.

Sentinel Groundwater Monitoring Wells. Monitoring wells would be placed in strategic locations between the Nashua River and the most downgradient ERD injection transect to serve as sentinel wells. The sentinel well network would consist of a series of wells installed approximately 400 feet from the most downgradient ERD injection transect. These wells would be located laterally and vertically across the plume to monitor the possible presence of solubilized inorganics beyond the expected extent of the reducing conditions created by the ERD application and trigger the inorganics contingency for the treatment of solubilized inorganics as discussed below. The number of wells required to adequately monitor the residual plume and solubilized inorganics would be determined in the RD.

Monitoring. Long term monitoring would be performed to evaluate performance of the remedy and to confirm that COC concentrations are reduced to remediation goals. During the initial phases of implementation, monitoring would be conducted more frequently. As the progress of the remedy was established, monitoring frequency would be reduced. Samples will primarily be analyzed for VOCs, with additional analyses including dissolved metals (arsenic, iron, and manganese), nitrate, redox couples (sulfate/sulfide, and carbon dioxide/methane), and dissolved gases (e.g. oxygen, ethane, and ethene). Field parameters (e.g., ORP, pH, conductivity, turbidity, and temperature) would also be collected. Details of the monitoring will be outlined in a long term monitoring plan (LTMP).

Institutional Controls. Institutional controls (ICs) would be implemented in each area of the plumes (i.e. North, Source Area, and Southwest) through formal negotiations with the different entities that own the properties overlying these areas. ICs are necessary to restrict land and groundwater use at the site to prevent unacceptable risk for the duration of the remedy. Risks include risks to human health (identified earlier as ingestion, inhalation) as well as the conceptual risk to the remedy (plume exacerbation). ICs would also regulate ground extraction for industrial purposes that may affect the plume configuration, groundwater injection and storm drain retention/detention ponds that could influence groundwater flows and affect the remedy. Within 90-days of the ROD signature, the Army would prepare and submit to the USEPA for review and approval, Remedial Action Work Plan (RAWP), which would contain implementation and maintenance actions including periodic inspections.

10.3.2 Remedy Implementation

10.3.2.1 Enhanced Reductive Dechlorination (ERD)

During system operation between April and June 2004, approximately 170 to 180 gallons of reagent were made during each of the five separate injection wells on three occasions. Reagent injections were made by mixing molasses and water in a holding tank and transferring the contents of the tanks through the wellhead assembly at the injection well.

During system operation between September 2004 and July 2005, reagent injections were made in 40 injections wells on a monthly basis. During each injection event prior to June 2005, approximately 80 gallons of reagent were injected in each well in the Source Area and approximately 170-180 gallons were injected into each well in the Southwest Plume Area. During injection events in June and July 2005, approximately 100-110 gallons of reagent were injected in each well in the Source Area; approximately 450-500 gallons were injected into each well in Areas 2, 3, and 4 in the Southwest Plume Area; and approximately 200 gallons were injected into each well in Area 5. These enhancements were made, along with addition of ferrous sulfate, to accelerate the establishment of reducing zones and limit the migration of arsenic. During these events, injections were made using a trailer mounted manifold system with 5,000 gallon tank trucks with pre-mixed reagent.

During the ERD system operation, no significant operational problems were encountered and only minor maintenance was performed in the system.

10.3.2.2 In-Well stripping (IWS)

The IWS system was also started in May 2004, which consists of two recirculation wells located on the downgradient portion of AOC 50. The IWS system is located on the U.S. Fish & Wildlife property at the southern most portion of the plume. The IWS system consisted of 2 recirculation wells (IWS-1 and IWS-2) that are positioned to intercept the zone of highest CVOC impact in groundwater and treat volatile compounds in-situ. The IWS system also creates aerobic conditions in the event that reducing conditions extend beyond the area of the ERD treatment.

The final mechanical testing and start up of the IWS system was completed in May 2004. During system operation between May through December 2004, the groundwater recirculation rate ranged from 10 gallons per minute (gpm) to 16 gpm, and air flow ranged from 85 to 100 cubic feet per minute (cfm). Monitoring of influent and effluent PCE concentrations indicated that removal efficiencies of the IWS system ranged from 88 to 90 percent. As of December 2004, it was estimated that approximately 6.1 pounds of PCE have been removed from the groundwater by the IWS system.

During this period of operation, all equipment operated properly and only minor maintenance activities were conducted.

Institutional Controls. ICs will be implemented in each area of the plume (i.e. North, Source Area, and Southwest) through formal negotiations with the different entities that own the properties overlying these areas. The LUCs are detailed in the RAWP. The RAWP is currently being finalized by the regulatory agencies. The purpose of the LUCs is to restrict or prevent potential human exposure to groundwater contaminants at the site until the property can be used for unrestricted use. In addition, the plan protects the integrity and effectiveness of the selected remedy and provide access to maintain the remedy. As detailed in the RAWP, the LUCs, in the form of ICs, will be implemented in each area of the plume (North Plume, Source Area Plume and Southwest Plume) through formal negotiations following regulatory approval.

10.3.3 System Operations/Operations and Maintenance (O&M)

The full-scale start-up of the ERD and IWS treatment systems began in May-September 2004. Routine operations and maintenance of those systems were conducted throughout 2004. No significant maintenance activities were conducted in 2004. Annual estimates provided in the

ROD indicated that annual O&M costs would be approximately $240,000; however, this estimate included full-scale implementation of all treatment systems.

10.4 Progress Since Last Five Year Review

This is the first Five -Year Policy Site Review for AOCs 50. Therefore, there are no follow-up actions to be assessed from a previous Five -Year Review.

10.5 Five Year Review Process

10.5.1 Document Review

The following documents were reviewed for this five-year review:

- Remedial Investigation, prepared by Harding Lawson Associates, January 2000.
- Feasibility Study, prepared by Arcadis, December 2002.
- Record of Decision, prepared by Arcadis, March 31, 2004.
- Operation and Maintenance and Groundwater Monitoring Report, prepared by Arcadis, July 2004.
- Operation and Maintenance and Groundwater Monitoring Report, prepared by Arcadis, September 2004.
- Operation and Maintenance and Groundwater Monitoring Report, prepared by Arcadis, December 2004.
- Operation and Maintenance and Groundwater Monitoring Report, prepared by Arcadis, August 2005.
- Remedial Action Work Plan (RAWP), prepared by Arcadis, June 2005.

10.5.2 Data Review

Analytical data from the July, September, December 2004 and June 2005 Operation and Maintenance and Groundwater Monitoring Reports were reviewed for this Five-year review (ARCADIS July 2004, December 2004, February 2005, and August 2005). Elevated concentrations of CVOCs were detected in groundwater at AOC 50, although a decreasing trend has been observed in some areas of the site due to the on going remedial efforts. Figures 2 and 6, and analytical trend charts from the July and December 2004 Maintenance and Groundwater Monitoring Reports (ARCADIS, 2005) and Table 6 from June 2005 Report are presented in Appendix I.

During the remedial investigation phase of AOC 50, (completed in 2000), the maximum concentrations of tetrachloroethylene (PCE) observed were: 10,000 μg/L in the Source Area Plume, 900 μg/L in the Southwest Plume and 100 μg/L in the North Plume Area. Review of the data collected in June 2005 indicated that the maximum concentrations for PCE were 2,800 μg/L in the Source Area, 1,500 μg/L in the Southwest Plume and 7.6 μg/L in the North Plume Area.

10.5.3 Site Inspection

On April 21, 2005, a Nobis representative performed site inspections at AOC 50. Conditions during the inspection were favorable with no precipitation and temperatures in the 50s. AOC 50 is located on the northeastern boundary of the former MAAF, within the former North Post portion of Devens RFTA, Ayer, Massachusetts. The AOC 50 Source Area comprises less than 2 acres and includes Buildings 3803 (the former parachute shop), 3840 (the former parachute shakeout tower), 3824 (a gazebo), and 3801 (the former 10th Special Forces airplane parachute simulation building). The buildings in the source area are not occupied.

Building 3813 (former hanger building) is used for vehicle maintenance and is occupied during the day by workers. It should be noted that Building 3813 is located, outside of the source area and is on top of the Kane Terrace present at AOC 50. The remaining portions of AOC 50 consist of paved areas, landscaped area and a portion of the former airfield. Currently the airfield is closed to aircraft traffic and is used for vehicle storage and training by the Massachusetts State Police.

A water pump in the IWS shed was being replaced by ARCADIS during the site inspection. This is regular O&M of the system and does not indicate any sort of problem or deficiency.

10.5.4 Interviews

The following individuals were interviewed as part of the five-year review:

- Ms. Ellen Iorio, USACE, New England District
- Mr. Dave Salvador, MADEP
- Mr. Takashi Tada, Contractor, Devens RFTA
- Mr. Peter Kaselis, Devens RFTA

Personnel were interviewed on April 21, 2005 while performing the site visit and during subsequent meetings and phone calls. None of the personnel interviewed were aware of any significant problems with the ERD, or the IWS systems. Mr. Kaselis indicated that the depth to the groundwater contamination beneath the Kane Terrace is more than 70 feet below the ground surface.

According to Mr. Salvador, the SVE system is not operational running due to the high water table inhibiting cost effective PCE extraction. Discussions pertaining to the long term plan for the SVE system are ongoing.

A RAWP (ARCADIS, 2005), including a land use control plan (LUCP) and long-term groundwater plan (LTMP) is currently being reviewed and finalized by the Army and the regulatory agencies. In addition, an optimization plan for the ERD treatment system is currently being evaluated.

10.5.5 Community Participation

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC 50.

Currently, the Restoration Advisory Board (RAB) meets every other month and provides advice to the installation and regulatory agencies on the Devens RFTA cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public.

On January 20, 2003, the Army issued the PP, to provide the public with an explanation of the Army's proposal for remedial actions at AOC 50. The PP also described the opportunities for community participation and provided details on the upcoming public comment period and public meeting.

On January 22, 2003, the Army published a public notice information meeting, the date for a public information meeting and the start and end dates of a 30-day public comment period in the Harvard Post and papers of the Nashoba Publishing Company (Groton Landmark, Harvard Hillside, Pepperell Free Press, The Public Spirit, Shirley Oracle, and Townsend Times). The Army also made the PP available to the public at the public information repositories at the Ayer Public Library, the Hazen Memorial Library in Shirley, the Harvard Public Library, and the Lancaster Public Library, or by request from the Devens BRAC Environmental Office.

From January 23 through February 20, 2003, the Army held a 30-day public comment period to accept public comments on the PP. On January 30, 2003, the Army held an informal public information meeting at Devens RFTA to present the Army Proposed Plan to the public and to provide the opportunity for open discussion concerning the PP.

On February 7, 2003, the Army published a public notice announcing the PP the date for a public hearing in the Harvard Post and papers of the Nashoba Publishing Company (Groton Landmark, Harvard Hillside, Pepperell Free Press, The Public Spirit, Shirley Oracle, and Townsend Times). On February 19, 2003, the Army held a Public Hearing to present the PP and accept formal verbal or written comments from the public. A written request to extend the comment period for the PP from February 20, 2003 to March 7, 2003 was accepted by the BRAC office on February 20, 2003.

In August 2004, a public site tour was held for AOC 50 and in December 2004 an AOC 50, status update was presented to the RAB. A copy of the December presentation is included in Appendix I.

All supporting documentation for the decision regarding AOC 50 is contained in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by the Army in choosing the plan of action for AOC 50. The Administrative Record is available for public review at the Devens BRAC Environmental Office and at the Town Repositories. An index to the Administrative Record is available at the BRAC Environmental Office.

10.6 Technical Assessment

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

Remedial Action Performance: Initial results of the ERD and IWS treatment systems have been favorable. These systems have been in place since May 2004. Dechlorination has been demonstrated by the pilot ERD transect. More time is needed to determine long term effectiveness. Efforts are currently underway to accelerate the establishment of the IRZs through the implementation of the Army's optimization plan. The optimization plan was outlined in a memorandum prepared by ARCADIS G&M, Inc. in March 2005.

System Operations/Operation and Maintenance (Long Term Groundwater Monitoring): Groundwater monitoring is being performed in conjunction with the remedial implementation of the ERD and IWS treatment systems. Annual estimates provided in the ROD indicated that annual O&M costs would be approximately $240,000; however, this estimate included full-scale implementation of all treatment systems.

Opportunities for Optimization: The Army's optimization plan for ERD injections has been implemented as of June 2005. (ARCADIS, 2005). The optimization plan focused on enhancing the degradation of CVOCs within the IRZ and increasing the control of arsenic solubility. The SVE system is operated seasonally when soil conditions permit and was reactivated in July 2005. PCE mass recovery will be documented by O&M reports and decisions will be made whether to continue operations.

Early Indicators of Potential Remedy Failure: No indicators of potential remedy failure were noted during this review.

Implementation of Institutional Controls and Other Measures: 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, 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.

As detailed in the RAWP, the LUCs, in the form of ICs, will be implemented in each are of the plume (North Plume, Source Area Plume and Southwest Plume) through formal negotiations following regulatory approval. It is anticipated that the RAWP will be approved by the end of 2005 and that negotiations of the LUCs will subsequently be performed. In the event of future property transfer, ICs will be stated in full or by reference within deeds, easements, mortgages, leases, or other instruments of property transfer. These controls will be drafted, implemented and enforced in cooperation with federal, state, and local governments. These covenants will be maintained as long as soil and groundwater contaminants remain at concentrations above cleanup levels.

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

Changes in Standards and To Be Considered: As part of this five-year review, ARARs and To Be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. See Section 10.6.2, ARARs.

The Maximum Contaminant Levels (MCLs) are health-based standards established by the Environmental Protection Agency. Since most of the cleanup goals are based on these drinking water standards, changes to the MCLs impact the protectiveness of these cleanup goals. However, because the remedy includes prohibiting the use of groundwater as drinking water, changes to groundwater standards do not affect the protectiveness of the remedy.

Changes in Exposure Pathways: The ROD identified unacceptable risks from the following exposure pathways: potential ingestion of groundwater as the primary drinking water source;

inhalation of VOCs from groundwater through vapor intrusion; use of groundwater as process water by future commercial/industrial workers; potential ingestion of groundwater as the primary drinking water source; and inhalation of volatiles from household groundwater used by future residents at AOC 50. No evaluation of dermal contact with groundwater used for household use was provided in the RI supporting the ROD. Lack of consideration of this pathway may yield to an underestimate of risks from future residential household water use.

There are no current complete exposure pathways. The depth to the groundwater contamination in the vicinity of the occupied building (Building 3813) is more than 70 below the ground surface and does not pose a risk to vapor intrusion. Groundwater at the site is not currently used as drinking water or process water. Thus, the exposure to groundwater through drinking water, process water, and household water use is of concern to future receptors only.

A site specific risk assessment was conducted to evaluate risks associated with exposure to vapors migrating to indoor air. Excess risk was identified for residential use in the Source Area only. An IC restricting new building construction and residential/ educational uses in the Source Area will eliminate this pathway.

ICs prohibiting the use of groundwater as drinking water at AOC 50 will eliminate the potential drinking water and household water exposure pathway. Current use is in compliance with existing zoning that prohibits residential use and planned land-use restrictions for AOC 50. Land use at the site has not changed. No new contaminants, sources, or other routes of exposure were identified. There is no indication that hydrogeologic conditions are not adequately characterized.

Changes in Exposure Assumptions: The risk assessment supporting the ROD for AOC 50 used exposure assumptions for the ingestion of groundwater pathway consistent with standard practice at the time. Those assumptions remain consistent with current risk assessment guidance.

Changes in Toxicity and Other Contaminant Characteristics: Iron was identified as a COC in the ROD because non-cancer health hazards from exposures to iron in groundwater exceeded a hazard index (HI) of 1. United States Environmental Protection Agency (USEPA) Region I has since indicated that they do not support evaluations of risk from exposures to iron because the reference dose (RfD) developed for iron is based on concentrations needed to protect against a nutritional deficiency (USEPA Region I Risk Updates, November 1996). Based on this guidance, non-cancer health risks would not be calculated for iron. Consequently, iron would not be considered a COC and total site hazard indices would be lower.

The toxicities of PCE and TCE are currently under review. Preliminary suggestions are that PCE and TCE are more toxic than previously thought; however, revised toxicity factors have not yet been finalized.

USEPA has withdrawn the cancer slope factor for 1,1-DCE used in the risk assessment. The RfD for 1,1-DCE has been revised to a less stringent value than that used in the risk assessment. Therefore, both cancer and non-cancer risks from exposure to 1,1-DCE may be overestimated.

USEPA Region I currently supports an oral RfD for manganese of 0.07 mg/kg/day for ingestion of soil, sediments or food. EPA Region 1 supports an oral RfD of 0.024 mg/kg/day for manganese in drinking water. EPA issued a Lifetime Health Advisory of 0.3 mg/L for manganese in January, 2004. This value should be used for infants younger than 6 months even for an acute exposure of 10 days. The advisory is a TBC.

USEPA's IRIS database revised the oral cancer slope factor for vinyl chloride in 2000 to a less stringent oral cancer slope factor than that used for vinyl chloride in the risk assessment. Therefore risks from exposure to vinyl chloride may be overestimated.

USEPA's IRIS database currently lists a range of oral cancer slope factor values for benzene ($1.5x10^{-2}$ to $5.5x10^{-2}$). Since the risk assessment used a cancer slope factor within the current range ($2.9x10^{-2}$), risks from exposure to benzene would be higher if the cancer slope factor from the high end of the range was used and lower if the cancer slope factor from the low end of the range was used. Therefore, cancer risks from exposure to benzene may be over- or under-estimated. The USEPA's IRIS database currently lists a higher oral RfD for benzene ($4x10^{-3}$) than the oral RfD used for arsenic in the risk assessments ($3x10^{-3}$). Therefore, non-cancer health risks from exposure to benzene may be overestimated.

Since the cleanup goals are based on drinking water standards and not on risk-based calculated concentrations, changes to the toxicity values do not impact the protectiveness of the cleanup goals. In addition, because the remedy includes prohibiting the use of groundwater as drinking water, changes to the toxicity of groundwater contaminants do not affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: The methods for evaluating groundwater exposures have not changed since the time of the risk assessment supporting the ROD for AOC 50. The potential human health risks discussed in the ROD will be eliminated by ICs, including the proposed deed restriction prohibiting the use of groundwater as drinking water. Therefore, there are no risk assessment methodology changes that affect the protectiveness of the remedy.

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

No information that would call into question the protectiveness of the remedy was noted. No natural disaster impacts occurred at AOC 50 during this review period.

10.6.1 Summary of Technical Assessment

Modifications to optimize the ERD treatment system have been implemented.

While the methods for evaluating dermal contact exposures have changed since the time of the risk assessments supporting the RODs for AOC 50, these risk assessment methodology changes do not affect the protectiveness of the remedy, since the use of groundwater as drinking water has been prohibited.

10.6.2 Applicable or Relevant and Appropriate Requirements Review

ARARs, presented in Table 6, reprinted from the ROD, are appended in Appendix I. The standards and regulations, current at the signing of the ROD have been reviewed for changes that could affect protectiveness.

The following ARARs, listed in Appendix I, have been modified since signing of the ROD that may affect the protectiveness of the implemented remedial action:

- 40 CFR 141.11 Subpart B Maximum Contaminant Levels was updated July 1, 2001. Section 141.11 (a) and (b) was amended at 66 FR 7061 on January 22, 2001 to state the following:

  a) *** The analyses and determination of compliance with 50 μg/L MCL for arsenic use the requirements of 141.23.

  b) The MCL for arsenic is 50 μg/L for community water systems until January 23, 2006.

  On January 22, 2001 USEPA adopted a new standard for arsenic in drinking water at 10 μg/L, replacing the old standard of 50 μg/L (66FR6976). The rule became effective on February 22, 2002. The date by which systems must comply with the new 10 μg/L standard is January 23, 2006.

- 40 CFR 141.15 and 141.16 Subpart B Maximum Contaminant Levels were updated July 1, 2003. An effective date note (65 FR 76745) removed the sections from the Code of Federal Regulations effective December 8, 2003. Sections 141.15 and 141.16 do not appear in 40 CFR 141 updated on July 1, 2004. These two sections addressed MCLs for radium-226, radium-228, gross alpha particle radioactivity, and beta and photon radioactivity, which do not affect the protectiveness of the remedy.

- 40 CFR 141.51 Subpart F Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals was updated July 1, 2001. The table was amended in Section 141.51 by adding arsenic with a MCLG of zero effective January 23, 2006 (66 FR 7063). Until then, there is no MCLG.

- 310 CMR 22.0 Drinking Water was updated on May 24, 2004. The arsenic MCL, 10 μg/L, listed in Section 22.06 is effective for the purpose of compliance with the Code of Federal Regulations (outlined above) on January 23, 2006.

- USEPA RfD and Health Advisories (HA) are requirements designated as TBC. These requirements were updated in the USEPA 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.

Several other regulations were updated since the ROD, but do not affect the protectiveness of the remedy. These updated regulations include:

- 40 CFR 262.34 Hazardous Waste Generators, "Accumulation Time" was updated April 22, 2004. There were no revisions that affect the protectiveness of the remedy for AOC 50.

- 310 CMR 10.00 "Wetlands Protection" was updated February 11, 2005. There were no revisions that affect the protectiveness of the remedy for AOC 50.

In addition, a search was performed for any newly promulgated standards, which could affect protectiveness at the site. No new ARARs were identified that would affect the protectiveness of the remedy.

10.7 Issues

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOC 50 non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

Although elevated concentrations of CVOCs continue to be detected in groundwater at AOC 50, a decreasing trend has been observed in some areas of the site due, to the on going remedial efforts. A RAWP, including a LUCP is in the process of being finalized.

10.8 Recommendations and Follow-up Actions

Continue current remedial actions as specified in the ROD. These components enable continued assessment for compliance with remedial goals established in the ROD and reporting of the remedial progress. Follow performance standards and continue to assess for contaminant migration and remedial duration. Evaluation of the SVE system is ongoing. The IC's should be implemented through deed restrictions in accordance with the RAWP prior to the OPS Demonstration.

10.9 Protectiveness Statement

The remedy at AOC 50 is expected to be protective upon completion, and in the interim, exposure pathways that could lead to unacceptable risks are being controlled.

A health and safety plan (HASP) and investigation derived waste (IDW) handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOC 50 because groundwater at the AOC is not being used for potable use nor proposed for potable use.

The remedial actions at AOC 50 are expected to allow unrestricted use and unlimited exposure upon final achievement of Remedial Goals (RGs) in groundwater. The Army has installed groundwater monitoring wells and initiated long term monitoring. The groundwater sampling data from fall 2004 and spring 2005 document that both the ERD system and the IWS system are effective in degrading PCE and creating proper conditions for treatment. PCE and TCE contaminant concentrations in groundwater are decreasing.

Current remedial action activity consists of operation of the remedy, long term groundwater monitoring, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with performance standards and reporting of remedial progress.

10.10 Next Review

AOC 50 is a policy site that requires ongoing Five-Year Reviews. The next review will be performed in 2010.

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2005 FIVE-YEAR REVIEW REPORT

VOLUME II

FORMER FORT DEVENS
DEVENS, MASSACHUSETTS

GSA CONTRACT NO. GS-10F-0399N

Prepared for:

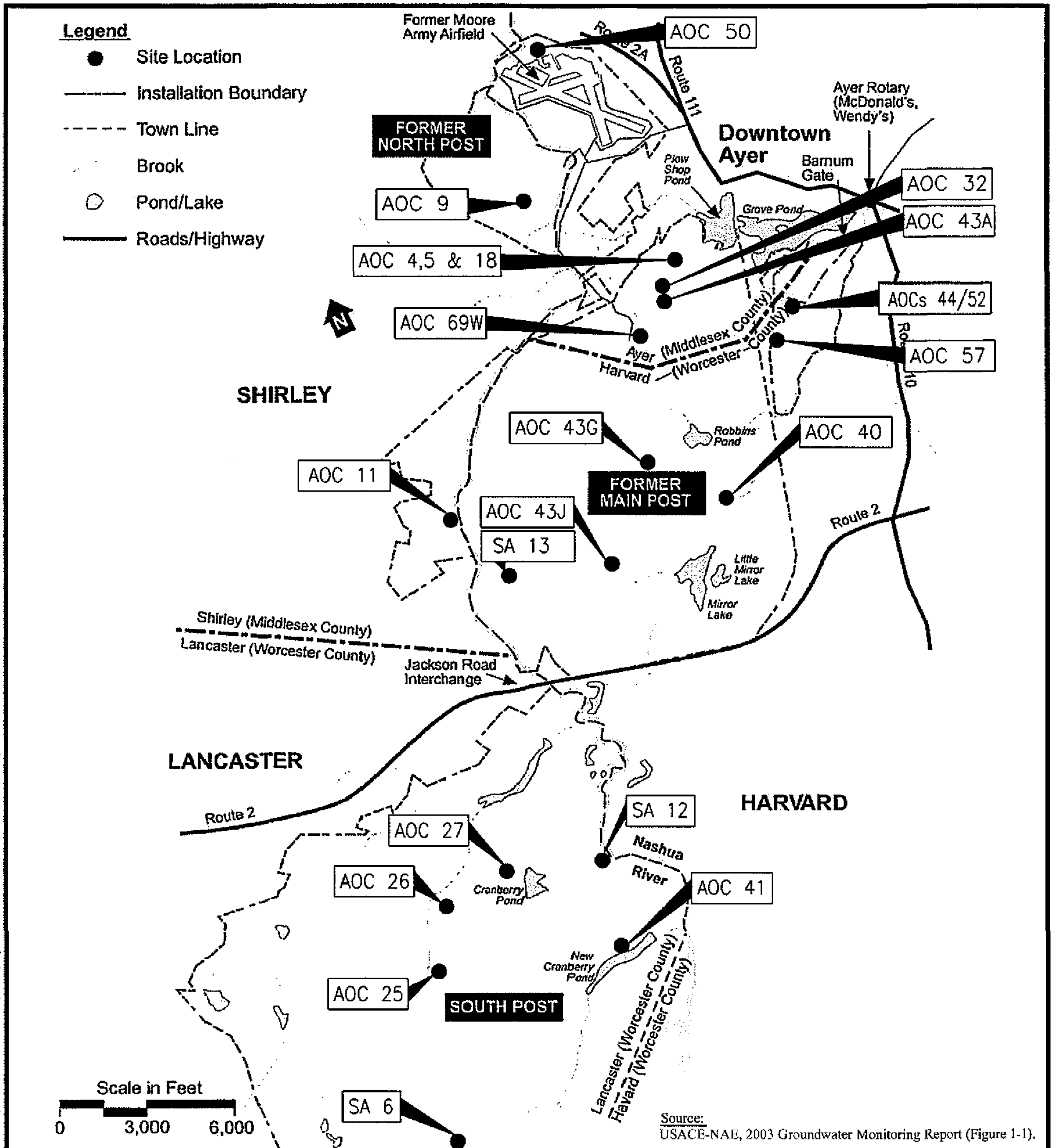
Former Fort Devens
Devens, Massachusetts
Middlesex County, MA
September 2005

Prepared by:

U.S. Army
BRAC Environmental Office
30 Quebec Street, Box 100
Devens, MA 01432

FIGURE 1-1

SITE PLAN
LOCATION OF STUDY AREAS AND
AREAS OF CONTAMINATION



Source:
USACE-NAE, 2003 Groundwater Monitoring Report (Figure 1-1).

Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301
Tel (603) 224-4182
Fax (603) 224-2507
www.nobisengineering.com

FIGURE 1-1

SITE PLAN

LOCATION OF STUDY AREAS AND
AREAS OF CONTAMINATION
DEVENS, MASSACHUSETTS

PROJECT 76004	SEPTEMBER 2005

O:\Active\76004 Devens 5-Year Review\2005 5-Year Report\Figures\76004_SitePlan_1-1.dwg

APPENDIX A

BARNUM ROAD MAINTENANCE YARDS AOCS 44 AND 52

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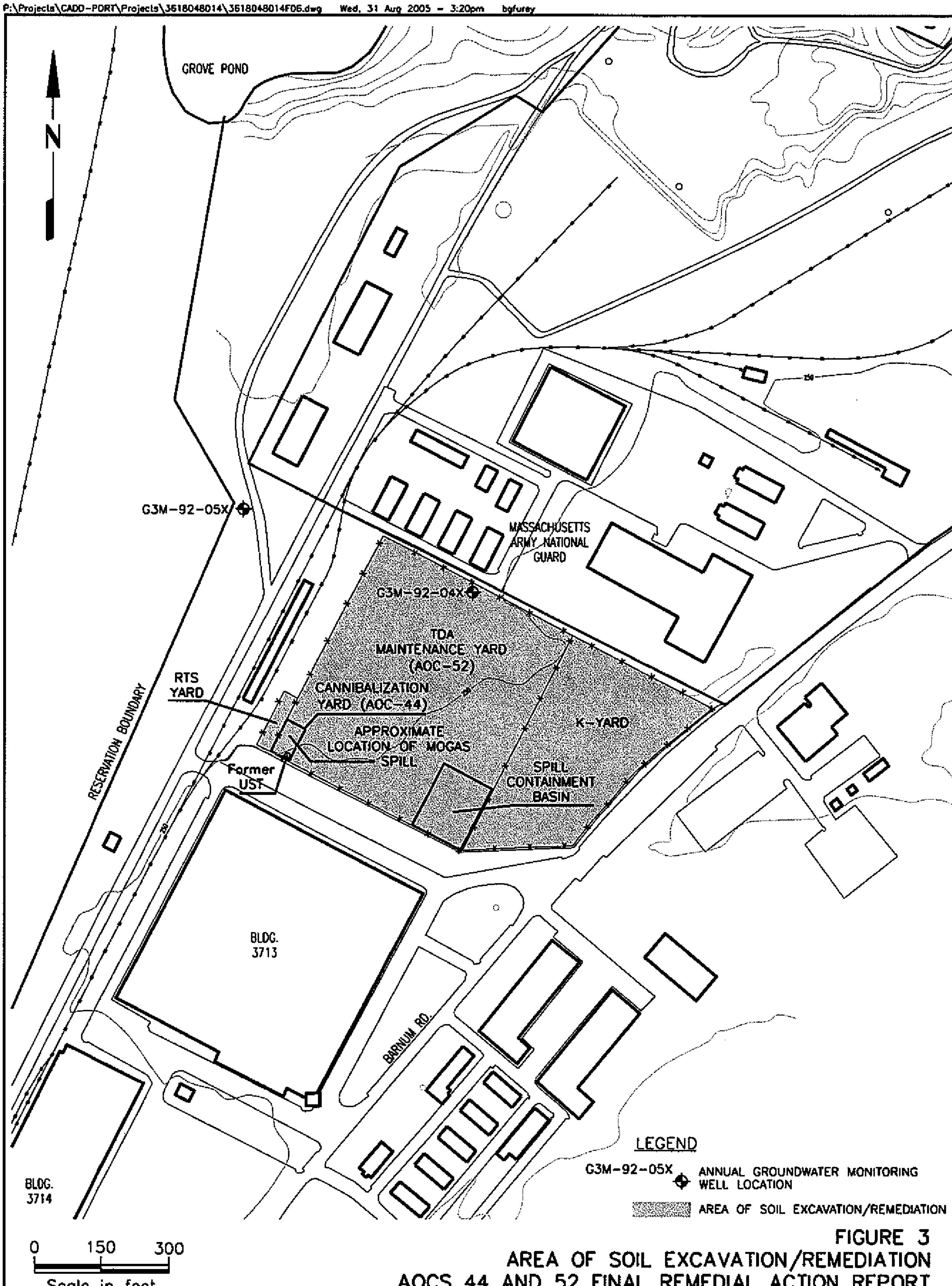

PREPARED/DATE:	BGF 8/30/05
CHECKED/DATE:	SWR 8/30/05

FIGURE 3
AREA OF SOIL EXCAVATION/REMEDIATION
AOCS 44 AND 52 FINAL REMEDIAL ACTION REPORT
BARNUM ROAD MAINTENANCE YARDS
DEVENS, MA

MACTEC

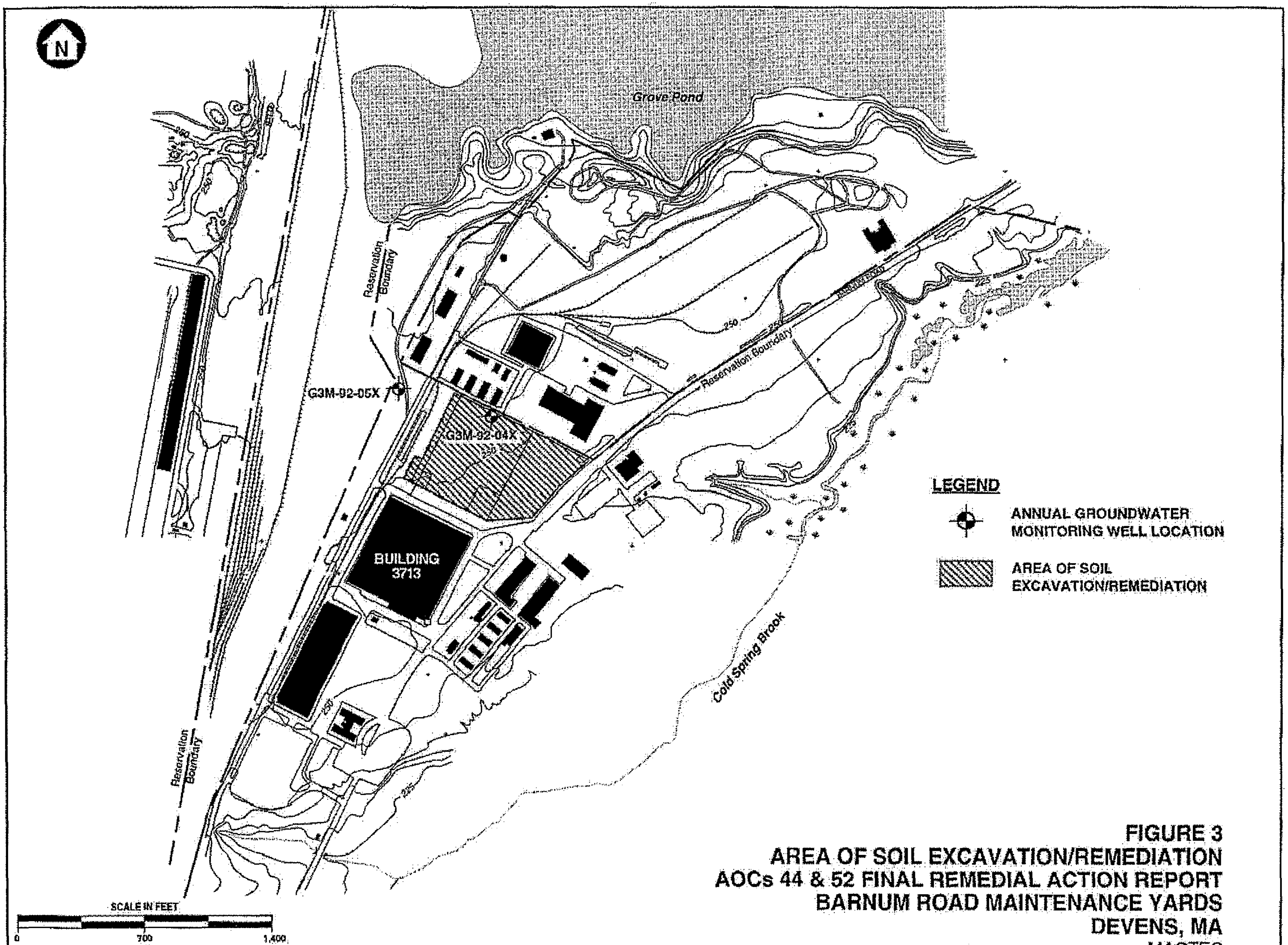

FIGURE 3
AREA OF SOIL EXCAVATION/REMEDIATION
AOCs 44 & 52 FINAL REMEDIAL ACTION REPORT
BARNUM ROAD MAINTENANCE YARDS
DEVENS, MA

MACTEC

2004018.mac 12 4 8

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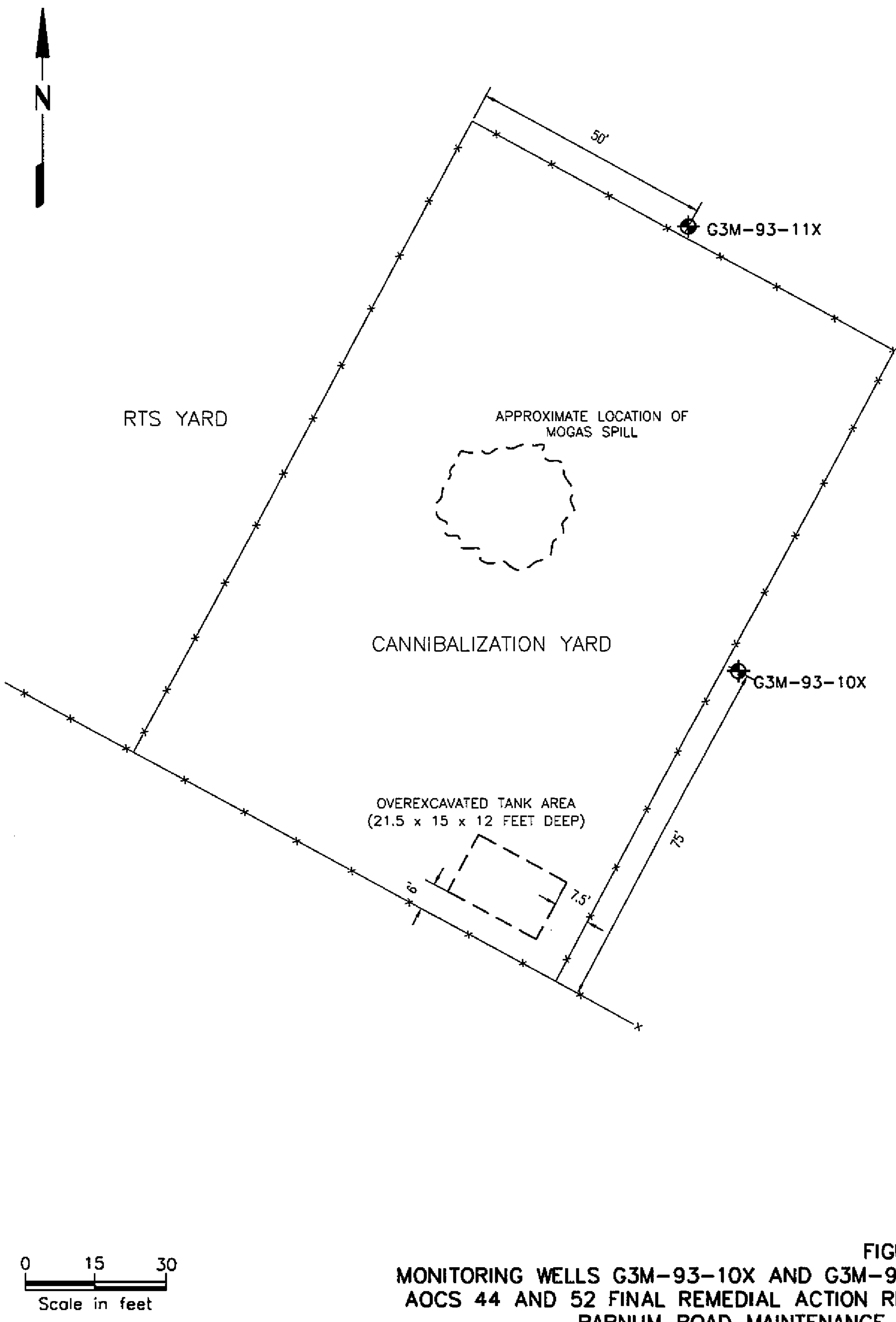


PREPARED/DATE:	BGF 8/30/05
CHECKED/DATE:	SWR 8/30/05

FIGURE 4
MONITORING WELLS G3M-93-10X AND G3M-93-11X
AOCS 44 AND 52 FINAL REMEDIAL ACTION REPORT
BARNUM ROAD MAINTENANCE YARDS
DEVENS, MA

MACTEC

Table C-1
Ground Water Analytical Results 1998
Relative to Massachusetts Contingency Plan Standards

Sample ID	G3M-92-04X	G3M-92-05X	G3M-92-05XD	*MCP GW-1 Standards*
Date Sampled	5/21/98	5/21/98	5/21/98	
Units	ppb	ppb	ppb	*ppb*
EPH Aliphatics/Aromatics				
C9-C18 Aliphatics	<61	<62	<61	*4,000*
C19-C36 Aliphatics	<61	<62	150	*5,000*
C10-C22 Aromatics	<160	<160	<160	*200*
PAH				
Acenaphthene	<0.2	<0.2	<0.2	*20*
Acenaphthylene	<0.2	<0.2	<0.2	*300*
Anthracene	<0.2	<0.2	<0.2	*2,000*
Benzo (a) anthracene	<0.2	<0.2	<0.2	*1*
Benzo (b) fluoranthene	<0.2	<0.2	<0.2	*1*
Benzo (k) fluoranthene	<0.2	<0.2	<0.2	*1*
Benzo (a) pyrene	<0.2	<0.2	<0.2	*0.2*
Benzo (g,h,i) perylene	<0.2	<0.2	<0.2	*0.5*
Chrysene	<0.2	<0.2	<0.2	*2*
Dibenzo (a,h) anthracene	<0.2	<0.2	<0.2	*0.5*
Fluoranthene	<0.2	<0.2	<0.2	*300*
Flourene	<0.2	<0.2	<0.2	*300*
Indeno (1,2,3-cd) pyrene	<0.2	<0.2	<0.2	*0.5*
2-Methylnaphthalene	<0.2	<0.2	<0.2	*10*
Naphthalene	<0.2	<0.2	<0.2	*20*
Phenanthrene	<0.2	<0.2	<0.2	*300*
Pyrene	<0.2	<0.2	<0.2	*200*
VPH Aliphatics/Aromatics				
C5-C8 Aliphatics	<40	<40	<40	*400*
C9-C12 Aliphatics	<10	<10	<10	*4,000*
C9-C10 Aromatics	<10	<10	<10	*200*
VPH Analytes				
Benzene	<5	<5	<5	*5*
Toluene	<15	<15	<15	*500*
Ethylbenzene	<5	<5	<5	*700*
p/m-Xylenes	<20	<20	<20	*500*
o-Xylene	<10	<10	<10	*500*
Naphthalene	<10	<10	<10	*20*
Methyl-tert-Butyl Ether	<15	<15	<15	*70*
Metals				
Lead	<5	<5	<5	*15*

Table C-2
Ground Water Analytical Results 1999
Relative to Massachusetts Contingency Plan Standards

Sample ID	G3M-92-04X	G3M-92-05X	G3M-92-05XD	*MCP GW-1 Standards*
Date Sampled	6/8/99	6/8/99	6/8/99	
Units	ppb	ppb	ppb	*ppb*
EPH Aliphatics/Aromatics				
C9-C18 Aliphatics	<100	<110	<100	*4,000*
C19-C36 Aliphatics	<100	<110	<100	*5,000*
C10-C22 Aromatics	<100	<110	<100	*200*
PAH				
Acenaphthene	<0.1	<0.11	<0.1	*20*
Acenaphthylene	<0.1	<0.11	<0.1	*300*
Anthracene	<0.1	<0.11	<0.1	*2,000*
Benzo (a) anthracene	<0.1	<0.11	<0.1	*1*
Benzo (b) fluoranthene	<0.1	<0.11	<0.1	*1*
Benzo (k) fluoranthene	<0.1	<0.11	<0.1	*1*
Benzo (a) pyrene	<0.1	<0.11	<0.1	*0.2*
Benzo (g,h,i) perylene	<0.1	<0.11	<0.1	*0.5*
Chrysene	<0.1	<0.11	<0.1	*2*
Dibenzo (a,h) anthracene	<0.1	<0.11	<0.1	*0.5*
Fluoranthene	<0.1	<0.11	<0.1	*300*
Flourene	<0.1	<0.11	<0.1	*300*
Indeno (1,2,3-cd) pyrene	<0.1	<0.11	<0.1	*0.5*
2-Methylnaphthalene	<0.1	<0.11	<0.1	*10*
Naphthalene	<0.1	<0.11	<0.1	*20*
Phenanthrene	<0.1	<0.11	<0.1	*300*
Pyrene	<0.1	<0.11	<0.1	*200*
VPH Aliphatics/Aromatics				
C5-C8 Aliphatics	<100	<100	<100	*400*
C9-C12 Aliphatics	<25	<25	<25	*4,000*
C9-C10 Aromatics	<25	<25	<25	*200*
VPH Analytes				
Benzene	<0.2	<0.2	<0.2	*5*
Toluene	<0.2	<0.2	<0.2	*500*
Ethylbenzene	<0.2	<0.2	<0.2	*700*
p/m-Xylenes	<0.2	<0.2	<0.2	*500*
o-Xylene	<0.2	<0.2	<0.2	*500*
Naphthalene	<0.2	<0.2	<0.2	*20*
Methyl-tert-Butyl Ether	<0.2	<0.2	<0.2	*70*
Metals				
Lead	<5	<5	<5	*15*

Table C-3
Ground Water Analytical Results 2003
Relative to Massachusetts Contingency Plan Standards

Sample ID Date Sampled Units	G3M-92-04X 12/23/03 µg/L	G3M-92-05X 12/23/03 µg/L	G3M-92-05X Duplicate 12/23/03 µg/L	*MCP GW-1 Standards* *µg/L*
EPH Aliphatics/Aromatics				
C9-C18 Aliphatics	0.062 U	0.061 U	0.062 U	*4,000*
C19-C36 Aliphatics	0.083 U	0.082 U	0.082 U	*5,000*
C11-C22 Aromatics	0.18 U	0.17 U	0.17 U	*200*
PAH				
Acenaphthene	0.020 U	0.020 U	0.020 U	*20*
Acenaphthylene	0.020 U	0.020 U	0.020 U	*300*
Anthracene	0.016 J	0.020 U	0.020 U	*2,000*
Benzo (a) anthracene	0.020 U	0.020 U	0.020 U	*1*
Benzo (b) fluoranthene	0.018 J	0.020 U	0.020 U	*1*
Benzo (k) fluoranthene	0.015 J	0.020 U	0.020 U	*1*
Benzo (a) pyrene	0.020 U	0.020 U	0.020 U	*0.2*
Benzo (g,h,i) perylene	0.014 J	0.020 U	0.020 U	*0.5*
Chrysene	0.016 J	0.020 U	0.020 U	*2*
Dibenzo (a,h) anthracene	0.020 U	0.020 U	0.020 U	*0.5*
Fluoranthene	0.024	0.020 U	0.020 U	*300*
Flourene	0.020 U	0.020 U	0.020 U	*300*
Indeno (1,2,3-cd) pyrene	0.013 J	0.020 U	0.020 U	*0.5*
2-Methylnaphthalene	0.020 U	0.020 U	0.020 U	*10*
Naphthalene	0.020 U	0.020 U	0.020 U	*20*
Phenanthrene	0.020 U	0.020 U	0.020 U	*300*
Pyrene	0.021	0.020 U	0.020 U	*200*
VPH Aliphatics/Aromatics				
C5-C8 Aliphatics	40 U	40 U	40 U	*400*
C9-C12 Aliphatics	10 U	10 U	10 U	*4,000*
C9-C10 Aromatics	10 U	10 U	10 U	*200*
VPH Analytes				
Benzene	5.0 U	5.0 U	5.0 U	*5*
Toluene	15 U	15 U	15 U	*500*
Ethylbenzene	5.0 U	5.0 U	5.0 U	*700*
p/m-Xylenes	20 U	20 U	20 U	*500*
o-Xylene	10 U	10 U	10 U	*500*
Naphthalene	10 U	10 U	10 U	*20*
Methyl-tert-Butyl Ether	15 U	15 U	15 U	*70*
Metals				
Lead	1.6 U	1.6 U	1.6 U	*15*

Notes:
U: not detected above method detection limit
J: estimated value

TABLE 19
SYNOPSIS OF 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 AND ARAR TYPE	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal Regulatory Authority	Wetland Location-Specific	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 Action-Specific	Massachusetts Air Pollution Control Regulations; [310 CMR 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 $50 \mu g/m^3$ and a maximum 24-hour concentration of $150 \mu g/m^3$. 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 Action-Specific	Massachusetts Hazardous Waste Management Rules (MHWMR) 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 CMR 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.

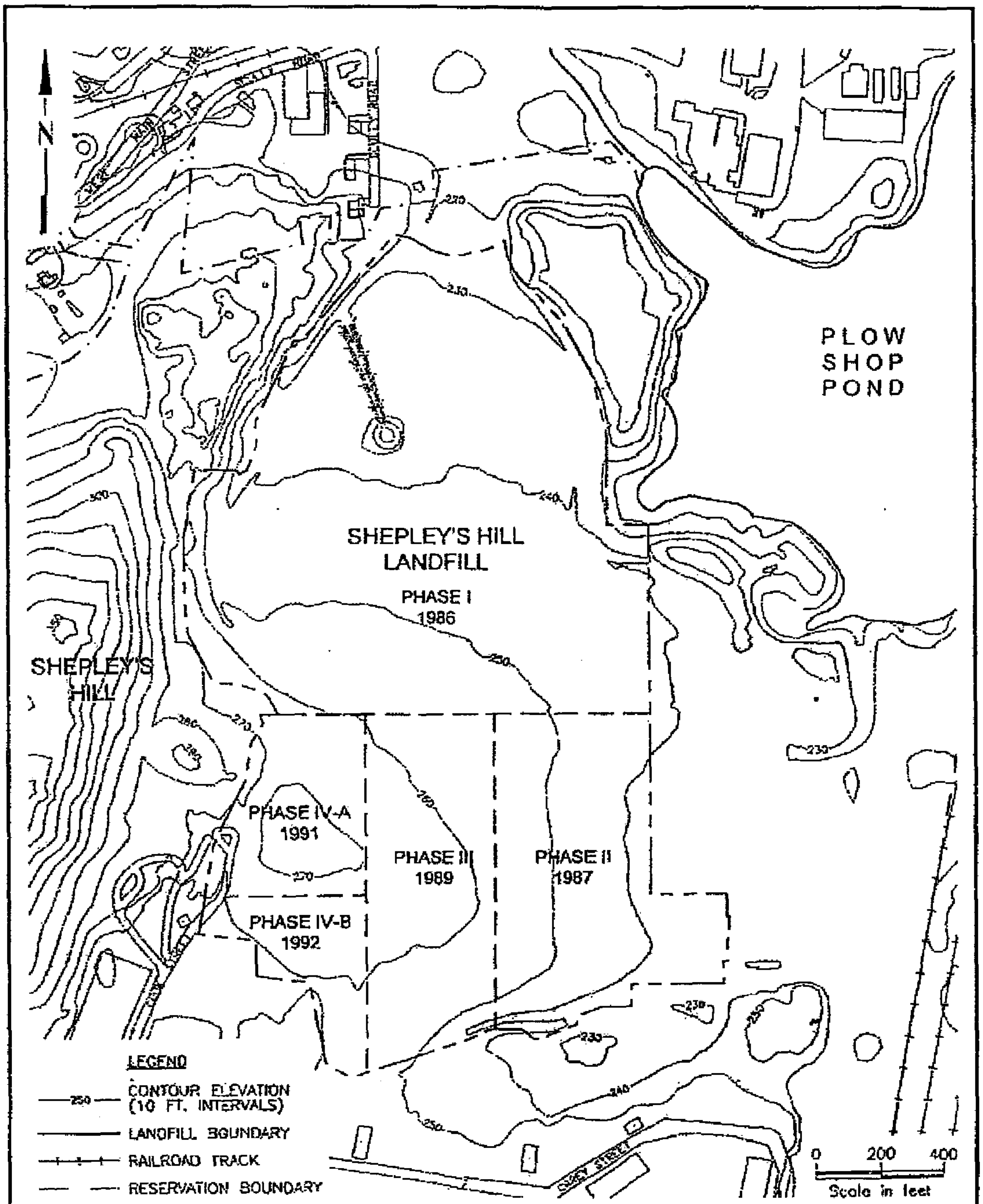
TABLE 6-8 (continued)
SYNOPSIS OF LOCATION-SPECIFIC FEDERAL AND STATE ARARS
ALTERNATIVE 5: ASPHALT BATCHING SITE/ASPHALT BATCHING HOT SPOT AREAS

AOCS 44 AND 52 SOILS
FORT DEVENS, MASSACHUSETTS

AUTHORITY	LOCATION CHARACTERISTIC AND ARAR TYPE	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State Regulatory Requirements	Soil Action-Specific	MHWMR Provisions for 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.
	Soil Action-Specific	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 for stockpiling of wastes for on-site treatment.
	Ground-water Action-Specific	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 Chemical-Specific	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.

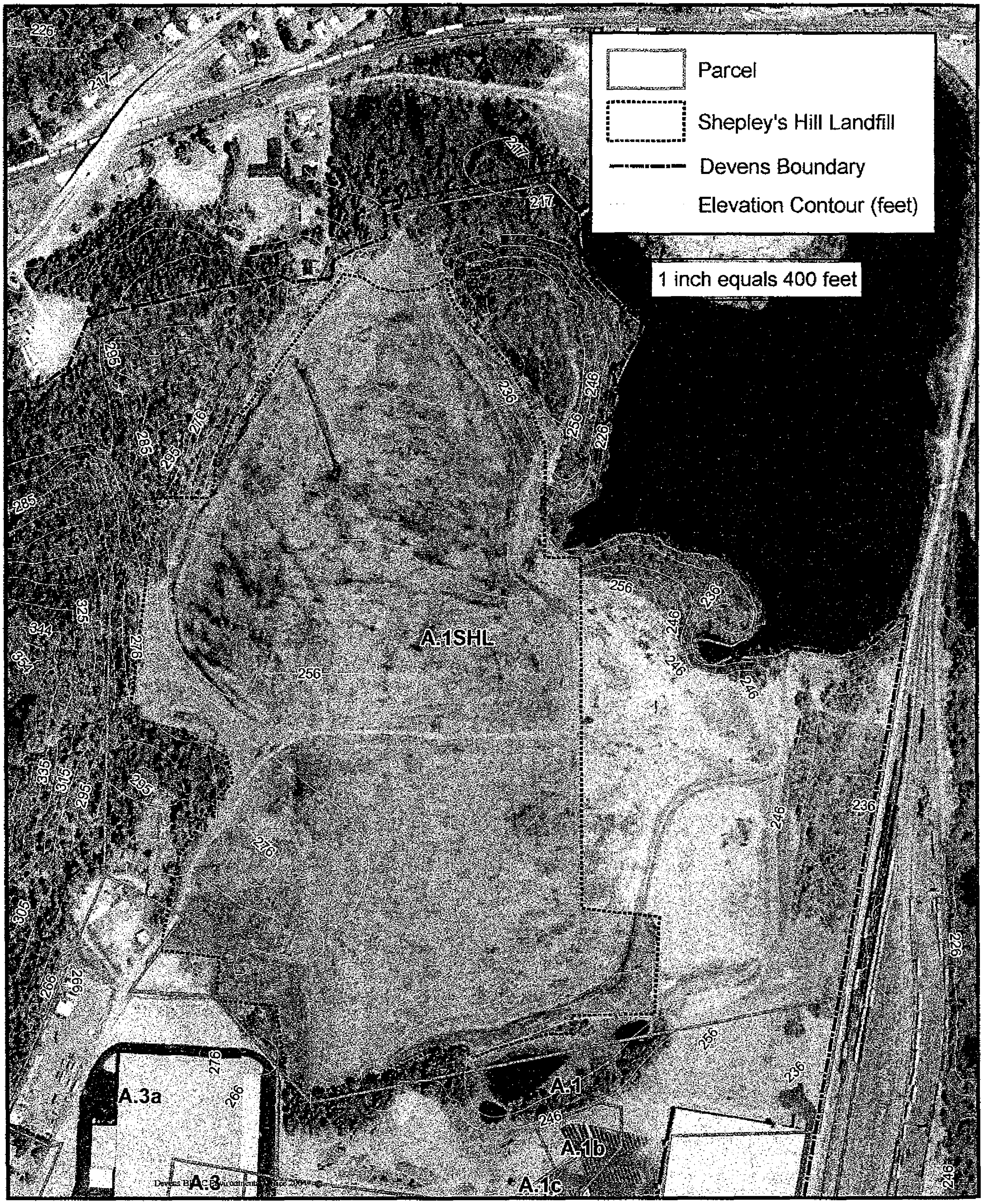
APPENDIX B

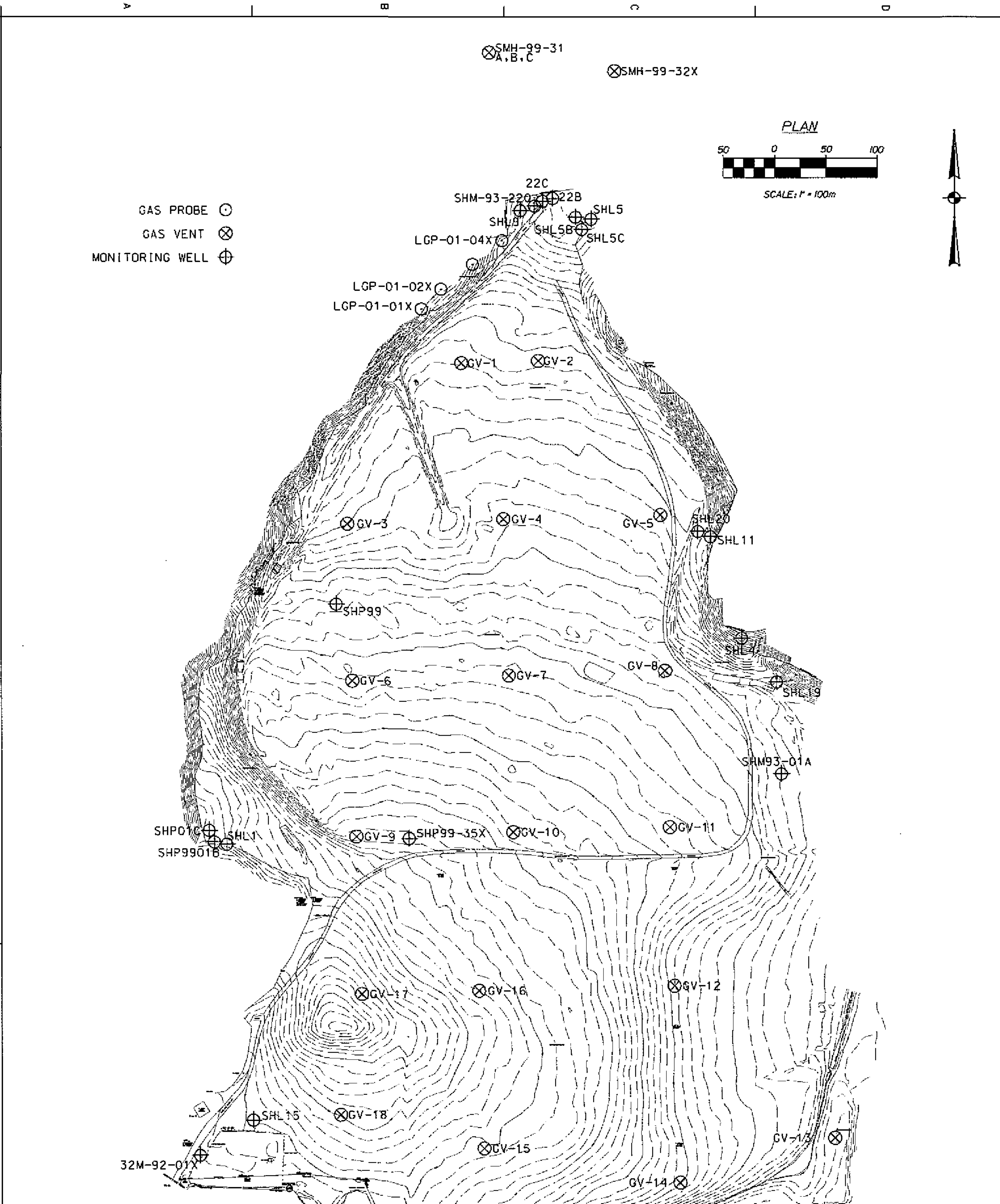
SHEPLEY'S HILL LANDFILL OPERABLE UNIT (AOCS 4, 5, AND 18)



US Army Corps of Engineers®	Shepley's Hill Landfill Closure Phases Cap Drainage Report	Figure 1-2

Shepley's Hill Landfill





Reference number: C-1

SHEPLEY'S HILL LANDFILL
FORMER FORT DEVENS
DEVENS AND AYER, MASSACHUSETTS
GAS VENT & MONITORING WELL
LOCATION PLAN

Nobis

Nobis Engineering, Inc.
18 Chenell Dr.
Concord, NH 03301
Tel (603) 224-4182
Fax (603) 224-2507
www.nobisengineering.com

Designed by: Name	Date: MM/DD/YY
Drawn by: Name	Design file
Reviewed by:	Drawing Code:
Submitted by:	File name: Plot date: Plot scale:

Symbol	Description	Date	Appr.	Symbol	Description	Date	Appr.

US Army Corps of Engineers New England District

TABLE 7-5
Comparison of Historic Arsenic Results
Shepley's Hill Landfill and Molumco Road
Groundwater Monitoring

Landfill Compliance Point	Arsenic (ug/L)																				
Monitoring Well ID	Aug-91	Dec-91	Mar-93	Jun-93	Nov-96	May-97	Oct-97	May-98	Nov-98	May-99	Nov-99	May-00	Nov-00	May-01	Oct-01	May-02	Oct-02	May-03	Nov-03	May-04	Nov-04
SHL-3	35	**120**	6.5	NS	NS	<10	<10	<5	<5.4	2.7 B	<1.9	<2.5	17.4	<4.1	<1.5	2.8 B	<3.2	<4.7	<4.1	<2.6	<5.8
SHL-4	**260**	**140**	2.54	NS	48.8	**73.6 J**	**180**	37.4	**89.1**	**78.2**	**61.3**	**116**	**91.5**	**50.8**	**66.0**	47.8 B	**56.1**	26.6	13.4	27.2	19.5
SHL-5	23	38	11.4	NS	12	<10	<10	<5	11.5	5.0 B	6.5	<2.5	13.8	13.8	14.8	11.9 B	<3.2	7.3	4.7	7.4 B	6.8 B
SHM-96-5B	NS	NS	NS	NS	**1,440**	**3,300 J**	**2,040**	**4,300**	**3,080**	**3,490**	**2,700**	**5,110**	**2,500**	**3,800**	**1,850**	**3,800**	**1,970**	**3,920**	**3,380**	**3,950**	**2,110**
SHM-96-5C	NS	NS	NS	NS	**71**	43.2	43.1	49.5	46.8	**57.0**	44.8	**52.2**	40.3	**80.5**	41.1	**50.4 B**	41.3	**55.1**	48.3	47.1	49.5
SHL-9	37	**67**	42.4	NS	46.9	16.1 J	25.2	15	27.2	**71.3**	28.5	15.0	31.4	15.1	28.1	**144**	29.0	13.4	30.6	19.8	32.2
SHL-10	**67**	**120**	**280**	NS	3.4 B	<10	**209**	<5	<5.4	2.7 B	<1.9	<2.5	<4.2	<4.1	<1.5	4.0 B	<3.2	<4.7	<4.1	<2.6	<5.8
SHM-93-10C	NS	NS	21.3	18.1	12.4	<10	10.5	7.5	10.2	10.8 B	8.7	5.9 J	8.8	6.9	10.1	11.0 B	7.1	9.8	<5.2	7.2 B	10.6
SHL-11	**320**	**320**	**340**	NS	**332**	**252 J**	**366**	**346**	**376**	**431**	**492**	**404**	**523**	**487**	**573**	**469**	**648**	**498**	**639**	**502**	**617**
SHL-19	**340**	**710**	**390**	NS	**138**	<10	**298**	**77.5**	**145**	**156**	**176**	41.4	**154**	**129**	**183**	**66.9**	**164**	36.1	**83.6**	**75.0**	**121**
SHL-20	**98**	**89**	**330**	NS	**244**	<10	**227**	**238**	**218**	**216**	**215**	**216**	**172**	**186**	**165**	**154**	**175**	**197**	**194**	**136**	**156**
SHL-22	27	25	32.9	NS	24.8	<10	34.8	10.6	<5.4	12.2 B	7.3	14.6	45.0	47.6	44.2	**55.9 B**	**77.1**	**101**	**76.4**	**88.1**	**65.4**
SHM-96-22B	NS	NS	NS	NS	**324**	**318 J**	**352**	**365**	**406**	**707**	**1,440**	**1,360**	**1,180**	**1,540**	**1,670**	**2,040**	**159**	**2,070**	**2,500**	**1,690**	**2,360**
SHM-93-22C	NS	NS	**68.9**	49.8	44.6	40.4	<10	31.6	**51.1**	42.8	33.2	34.4	47.8	19.7	31.6	30.5 B	30.1	21.0	29.8	27.8	34.9

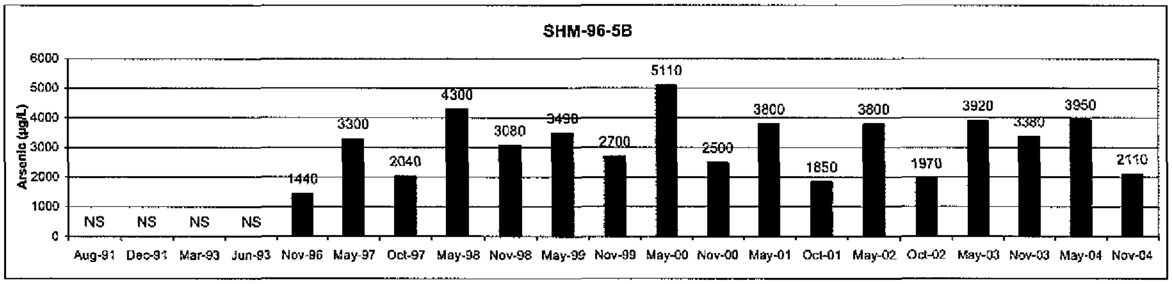
Molumco Road	Arsenic (ug/L)																				
Monitoring Well ID	Aug-91	Dec-91	Mar-93	Jun-93	Nov-96	May-97	Oct-97	May-98	Nov-98	Jun-99	Nov-99	May-00	Nov-00	May-01	Oct-01	May-02	Oct-02	May-03	Nov-03	May-04	Nov-04
SHM-99-31A*	NS	NS	NS	NS	NS	NS	NS	NS	NS	<5.2	14.5	8.1 J	21.3	14.2	9.6	16.6 B	11.6	NS	12.3	NS	NS
SHM-99-31B*	NS	NS	NS	NS	NS	NS	NS	NS	NS	**57.9**	**63.7**	44.3	**65.5**	**57.9**	**66.8**	**75.1**	**71.1**	**69.6**	**80.1**	**65.0**	NS
SHM-99-31C*	NS	NS	NS	NS	NS	NS	NS	NS	NS	**345**	**311**	**332**	**316**	**321**	**317**	**345**	**332**	**347**	**312**	**292**	NS
SHM-99-32X*	NS	NS	NS	NS	NS	NS	NS	NS	NS	**186**	**185**	**188**	**198**	**181**	**187**	**176**	NS	NS	NS	NS	NS

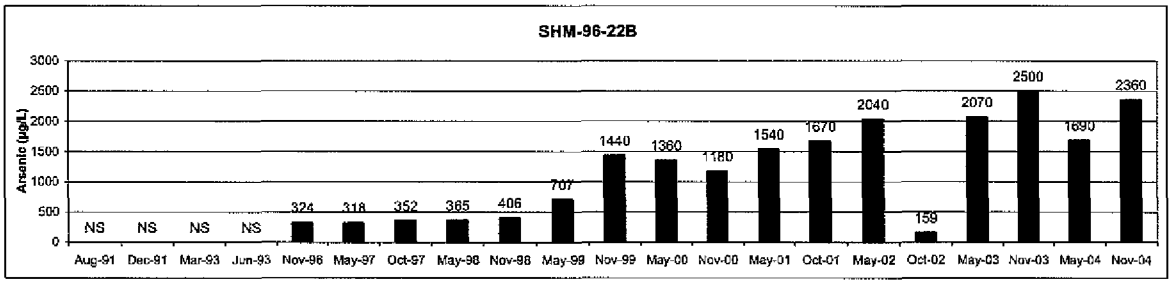
Notes:

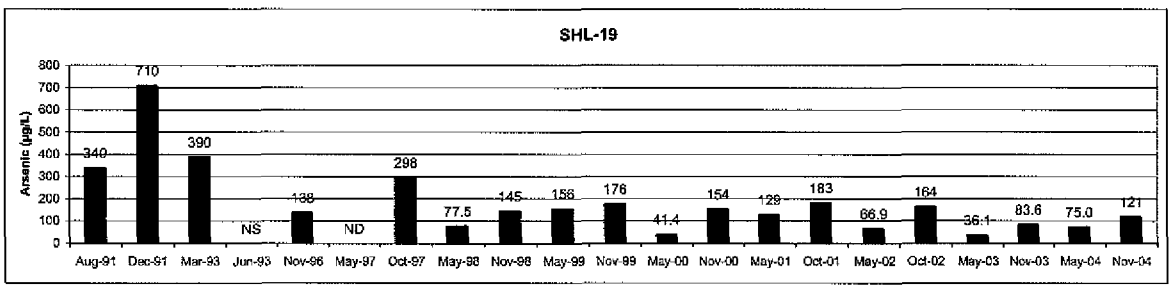
J: estimated value
B: value within five times of the greater amount detected in the equipment or preparation blank samples
NS: not sampled
*: Molumco Road monitoring wells are not compliance point wells - data is provided for comparison purposes
bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 ug/L)

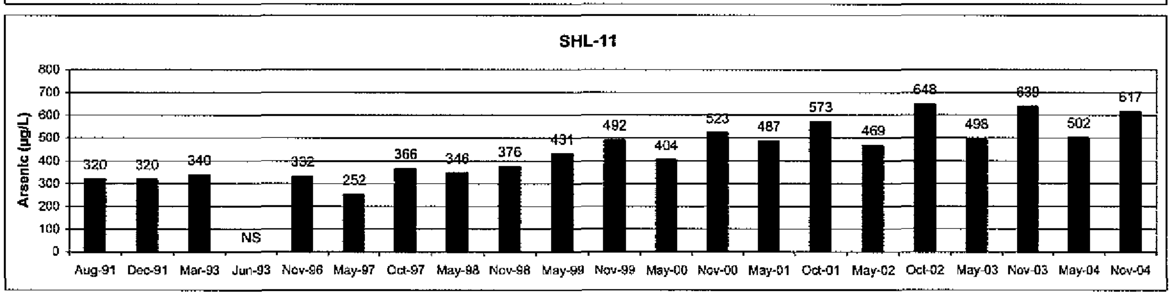
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L

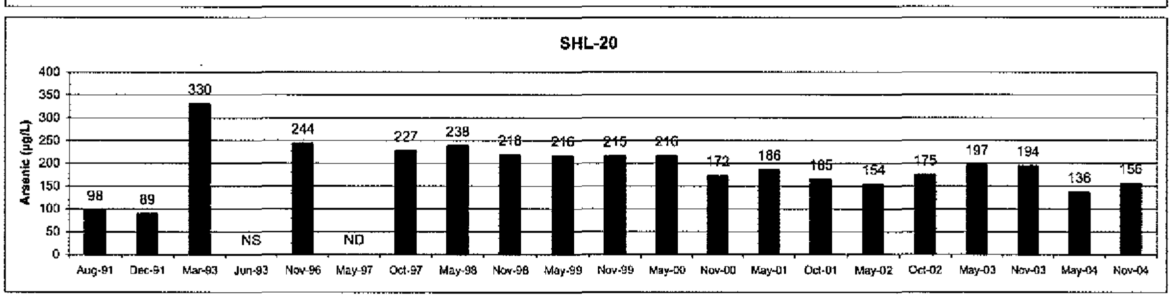
(Sheet 1 of 3)











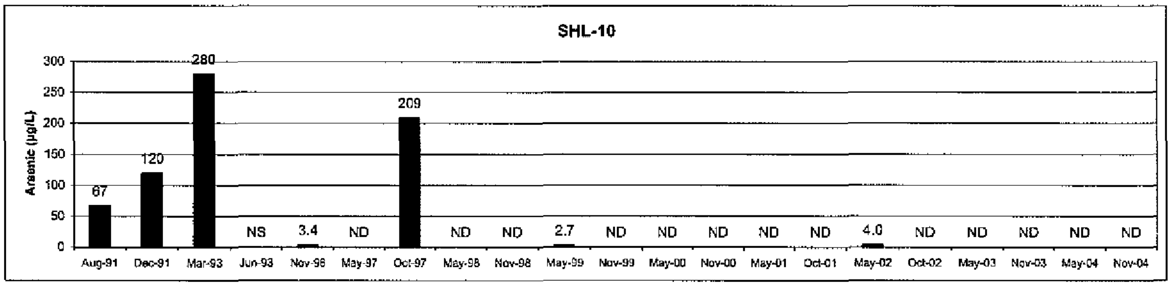
NOTES:

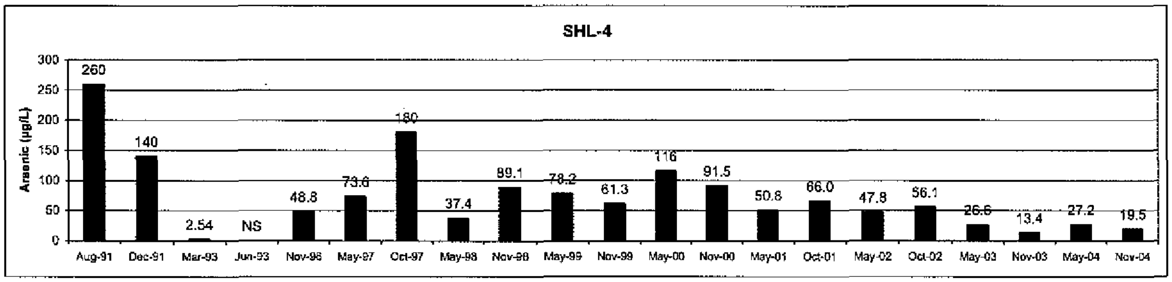
NS: Not Sampled
ND: Not Detected

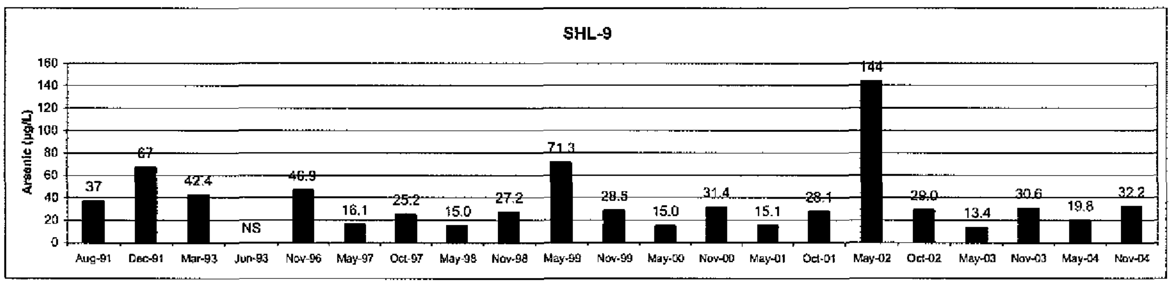
Charts are displayed in order of decreasing historical maximum arsenic concentrations

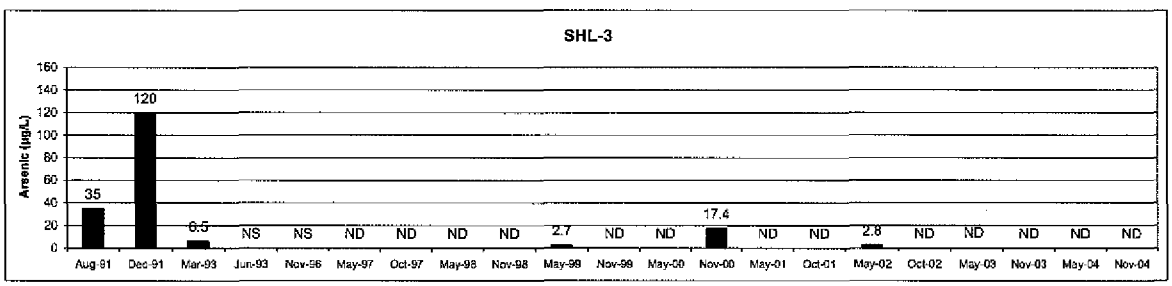
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L

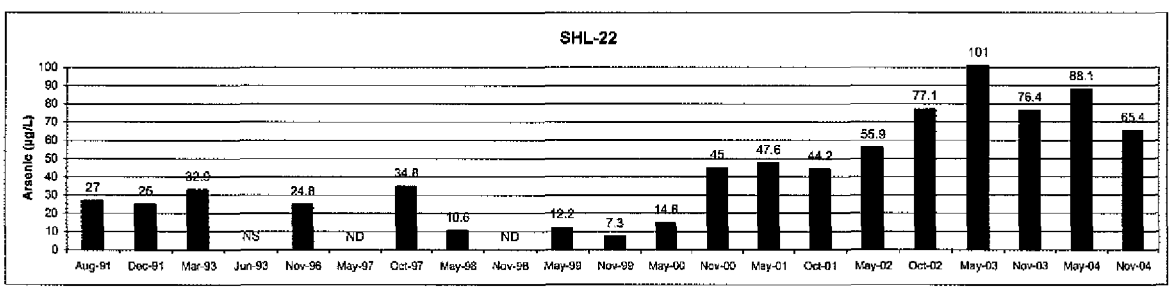
(Sheet 2 of 3)











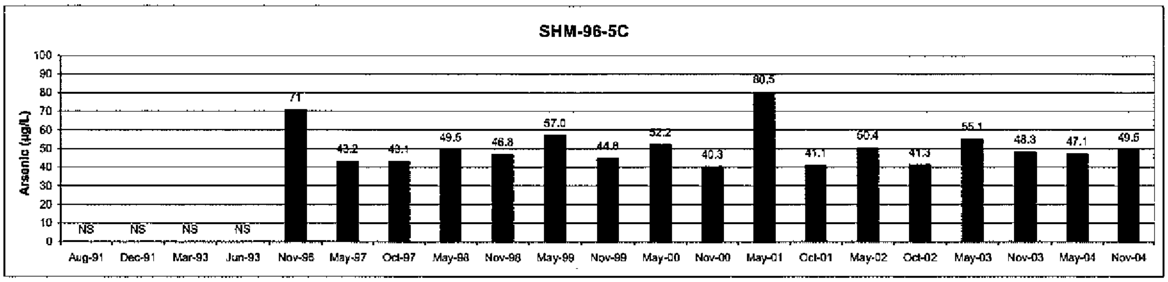
NOTES:

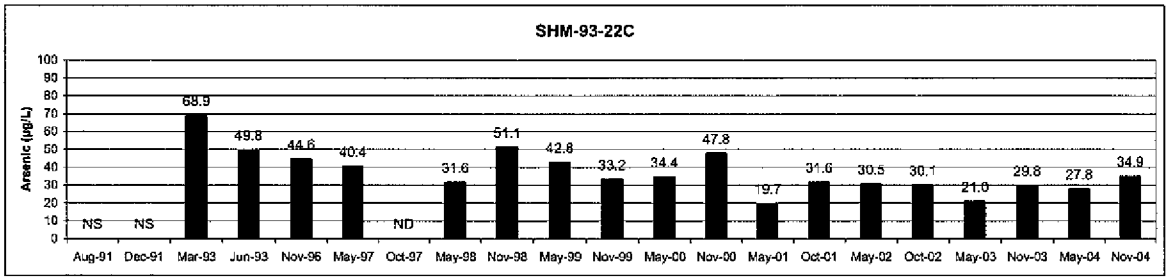
NS: Not Sampled
ND: Not Detected

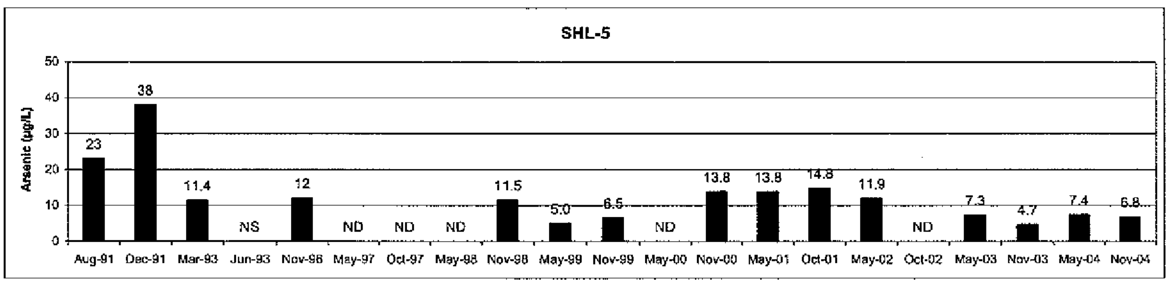
Charts are displayed in order of decreasing historical maximum arsenic concentrations

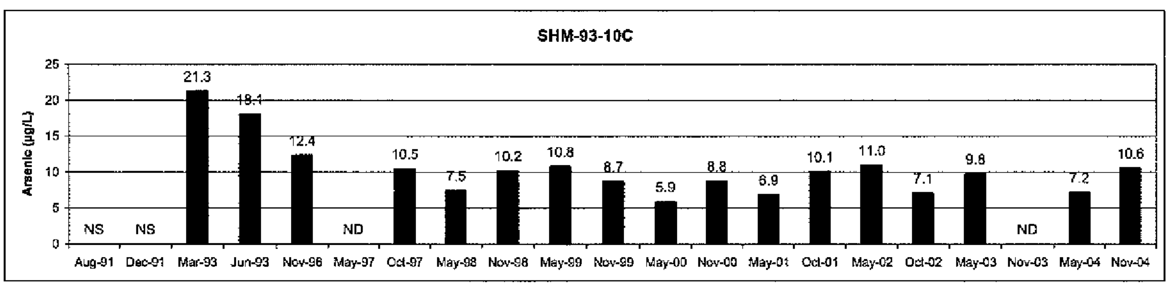
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L

(Sheet 3 of 3)









NOTES:

NS: Not Sampled
ND: Not Detected

Charts are displayed in order of decreasing historical maximum arsenic concentrations

Groundwater Analytical Results - May 2nd, 3rd and 4th, 2004 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	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	5.0 U	5.0 U	5.0 U
Acetone	3,000 (4)	5.0 U	7.4	4.4 J	2.9 J	5.0 U	3.4 J	4.9 J	5.0 U	5.0 U	4.4 J	5.0 U	4.8 J	3.9 J	4.0 J	4.3 J
2-Butanone	-	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	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	-	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	5.0 U	5.0 U	5.0 U
Benzene	5 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	5.0 U	5.0 U	5.0 U	1.5 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 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	5.0 U
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	5.0 U	1.2 J	1.2 J	1.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.4 J	1.0 J	5.0 U
1,2-Dichloroethene (total)	70 (2)	5.0 U	5.0 U	5.0 U	2.3 J	2.3 J	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	2.0 J	1.8 J	5.0 U
1,2-Dichloroethane	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	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	600 (2)	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	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	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	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	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	5.0 U	5.0 U	5.0 U
METALS (6010B or as noted)																
Aluminum	6,870	31.4 B	17.6 U	252	17.6 U	17.6 U	35.4 B	55.5 B	17.6 U	20.4 B	19.0 B	17.6 U	17.6 U	17.6 U	17.6 U	33.0 B
Arsenic	50	2.6 U	27.2	7.4 B	**3,950**	**3,890**	47.1	19.8	2.6 U	7.2 B	**502**	**75.0**	**136**	**88.1**	**1,690**	27.8
Barium	2,000 (2)	1.2 U	27.3 B	6.4 B	56.5 B	55.5 B	63.1 B	9.8 B	4.2 B	6.5 B	78.9 B	12.2 B	92.2 B	11.9 B	61.5 B	72.5 B
Cadmium	5 (2)	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.32 B	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.36 B	0.36 B	0.30 U
Chromium	100	2.2 B	1.3 B	1.5 B	2.0 B	2.5 B	2.8 B	1.2 B	1.4 B	1.9 B	1.2 B	1.2 B	2.0 B	2.0 B	1.6 B	2.5 B
Copper	1,300 (3)	0.84 B	2.0 B	0.99 B	2.0 B	2.4 B	3.0 B	1.1 B	1.1 B	2.8 B	2.2 B	0.87 B	4.7 B	2.4 B	3.3 B	2.1 B
Iron	9,100	30.0 B	4,330	1,900	**39,000**	**38,500**	**71,100**	5,680	19.2 U	31.6 B	**60,500**	**13,400**	5,640	541	**59,500**	1010
Lead	15	1.8 U	1.8 U	2.4 B	3.2	2.6 B	4.7	2.0 B	2.1 B	1.8 U	2.0 B	1.8 U	1.8 U	2.3 B	1.8 U	2.1 B
Manganese	1,715	1.9 U	856	332	**8,910**	**8,750**	**3,960**	338	1.9 U	29.8	**2,340**	1,510	**6,560**	**1,960**	798	368
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	100	2.2 B	5.3 B	1.6 B	12.4 B	13.0 B	4.8 B	1.4 U	1.4 U	3.0 B	3.6 B	6.4 B	9.8 B	10.8 B	8.9 B	2.8 B
Selenium	50 (2)	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Silver	40 (4)	1.0 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	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	20,000	1,060 B	5,390	2,040 B	**31,000**	**30,200**	**30,000**	1,620 B	1,020 B	8,650	**22,500**	2,300 B	**33,300**	**40,900**	**56,900**	15,100
Zinc	2,000 (4)	4.6 B	4.3 B	5.7 B	6.5 B	7.2 B	4.5 B	1.5 U	3.0 B	7.3 B	3.4 B	4.4 B	2.5 B	24.6	4.7 B	3.5 B
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	8,500	46,100	33,400	314,000	313,000	326,000	67,700	15,000	190,000	194,000	34,100	300,000	425,000	294,000	193,000
Biochemical Oxygen Demand$_5$	-	1,400 UJ	1,400 UJ	1,600 JH	1,400 UJH	1,400 UJH	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 JH	1,800 JH	1,400 UJ
Chloride	-	1,600	8,800	2,600	28,400	27,300	52,100	1,800	1,900	25,200	23,100	1,700	43,500	41,400	34,100	25,600
Chemical Oxygen Demand	-	20,000 U	20,000 U	23,500	29,900	27,700	32,000	34,100	20,000 U	20, 000 U	29,900	20,000 U	34,100	20,000 U	23,500	25,600
Cyanide (Total)	200 (2)	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Hardness as $CaCO_3$	-	8,900	39,000	27,100	257,000	252,000	261,000	61,200	15,200	222,000	130,000	33,500	271,000	392,000	165,000	199,000
Nitrate as Nitrogen	10,000 (2)	270	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	270	410	200 UJ	200 UJ	230 J	290	200 UJ	810	200 UJ
Sulfate	500,000 (2)	2,500	4,600	1,400	5,600	5.500	2,000	6,400	2,800	22,400	860	11,900	14,700	6,400	3,700	12,700
Total Dissolved Solids	-	15,000	78,000	59,000 H	408,000 H	415,000 H	445,000	87,000	22,000	300,000	268,000	64,000	420,000	519,000 H	393,000 H	268,000
Total Suspended Solids	-	25,200	4,900	2,000	59,500	56,400	91,100	5,900	600	2,300	65,500	18,900	9,200	2,300	117,000	2,600
Total Organic Carbon	-	1,000 J	2,500 J	6,700	5,500	5,300 J	8,000	8,300	1,000 UJ	1,500 J	3,900 J	1,400 J	4,900 J	5,600	6,900	5,600
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-	10.4	0.3	0.3	0.4	0.4	0.7	0.2	11.1	1.1	4.6	1.4	0.6	0.5	0.6	0.9
Oxidation Reduction Potential (mv)	-	196	118	193	-143	-143	-85	-36	378	306	-34	23	-21	133	-103	-44
pH	-	6.7	6.2	5.4	6.4	6.4	6.6	6.6	6.5	7.0	6.3	6.4	6.6	6.5	6.9	7.1
Specific Conductivity (µS/cm)	-	26	138	74	769	769	946	146	38	473	582	144	703	885	813	416

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = analyte analyzed for, but not dtected above the reporting limit

B = (inorganics) The result reported is less than the reporting limit, but greater than the instrument detection limit

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

= value circumspect due to potential field equipment failure

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-5
Groundwater Analytical Results - May 6th, 2004 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

Well No. PARAMETERS	CLEANUP LEVEL (1) μg/L	SHM-99-31A μg/L	SHM-99-31B μg/L	SHM-99-31C μg/L	SHM-99-32X μg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	NS	5.0 U	5.0 U	NS
Acetone	3,000 (4)	NS	2.7 J	2.5 J	NS
2-Butanone	-	NS	5.0 U	5.0 U	NS
4-Methyl-2-Pentanone	-	NS	5.0 U	5.0 U	NS
Benzene	5 (2)	NS	1.4 J	5.0 U	NS
Methyl-t-Butyl Ether	70 (4)	NS	5.0 U	1.1 J	NS
1,1-Dichloroethane	70 (4)	NS	5.0 U	1.4 J	NS
1,2-Dichloroethene (total)	70 (2)	NS	5.0 U	2.2 J	NS
1,2-Dichloroethane	5	NS	5.0 U	5.0 U	NS
1,3-Dichlorobenzene	600 (2)	NS	5.0 U	5.0 U	NS
1,4-Dichlorobenzene	5	NS	5.0 U	5.0 U	NS
1,2-Dichlorobenzene	600	NS	5.0 U	5.0 U	NS
METALS (6010B or as noted)					
Aluminum	6,870	NS	32.2 B	24.2 B	NS
Arsenic	50	NS	**65.0**	**292**	NS
Barium	2,000 (2)	NS	90.5 B	100 B	NS
Cadmium	5 (2)	NS	0.30 U	0.46 B	NS
Chromium	100	NS	1.7 B	1.8 B	NS
Copper	1,300 (3)	NS	1.9 B	2.4 B	NS
Iron	9,100	NS	**27,200**	**46,400**	NS
Lead	15	NS	2.2 B	1.9 B	NS
Manganese	1,715	NS	**1,990**	**6,390**	NS
Mercury (7470A)	2 (2)	NS	0.10 U	0.10 U	NS
Nickel	100	NS	1.9 B	16.7 B	NS
Selenium	50 (2)	NS	3.6 U	3.6 U	NS
Silver	40 (4)	NS	1.0 U	1.0 U	NS
Sodium	20,000	NS	15,200	**45,100**	NS
Zinc	2,000 (4)	NS	7.7 B	5.1 B	NS
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	NS	186,000	416,000	NS
Biochemical Oxygen Demand$_5$	-	NS	1,500 J	1,400 UJ	NS
Chloride	-	NS	20,300	56,700	NS
Chemical Oxygen Demand	-	NS	25,600	42,600	NS
Cyanide (Total)	200 (2)	NS	10.0 U	10.0 U	NS
Hardness as $CaCO_3$	-	NS	131,000	361,000	NS
Nitrate as Nitrogen	10,000 (2)	NS	200 UJ	200 UJ	NS
Sulfate	500,000 (2)	NS	4,300	1,800	NS
Total Dissolved Solids	-	NS	233,000	547,000	NS
Total Suspended Solids	-	NS	18,800	58,000	NS
Total Organic Carbon	-	NS	6,400	8,700	NS

FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	NS	0.4	0.2	NS
Oxidation Reduction Potential (mv)	-	NS	-22	-117	NS
pH	-	NS	6.3	6.0	NS
Specific Conductivity (μS/cm)	-	NS	426	1,004	NS

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = Analyte or compound was analyzed but not detected at a concentration above the reporting limit.

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Groundwater Analytical Results - November 15 th, 16th, and 17th, 2004 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	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	5.0 U	5.0 U	5.0 U
Acetone	3,000 (4)	5.0 U	5.0 U	4.4 J	5.0 U	5.0 U	5.0 U	4.9 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
2-Butanone	-	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	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	-	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	5.0 U	5.0 U	5.0 U
Benzene	5 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	5.0 U	5.0 U	5.0 U	1.6 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.1 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	5.0 U
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	5.0 U	1.1 J	1.0 J	1.7 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	1.0 J	5.0 U
1,2-Dichloroethene (total)	70 (2)	5.0 U	1.2 J	5.0 U	2.2 J	2.2 J	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	1.8 J	1.8 J	5.0 U
1,2-Dichloroethane	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	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	600 (2)	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	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	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	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	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	5.0 U	5.0 U	5.0 U
METALS (6010B or as noted)																
Aluminum	6,870	70.4 B	35.4 U	218	35.4 U	35.4 U	35.4 U	75.1 B	45.1 B	36.4 B	35.4 U	35.4 U	35.4 U	35.4	35.4 U	48.0 B
Arsenic	50	5.8 U	19.5	6.8 B	**2,110**	**2,240**	49.5	32.2	5.8 U	10.6	**617**	**121**	**158**	**65.4**	**2,360**	34.9
Barium	2,000 (2)	12.1 U	90.4 B	12.1 U	43.7 B	45.8 B	60.7 B	12.7 B	12.1 U	12.1 U	72.2 B	23.0 B	85.4 B	12.1 U	85.1 B	84.3 B
Cadmium	5 (2)	0.50 U	0.50 U	0.50 U	0.84 B	1.1 B	2.8 B	0.83 B	0.50 U	0.50 U	3.0 B	0.83 B	0.56 B	0.50 U	4.7 B	0.50 U
Chromium	100	1.2 B	0.90 U	3.6 B	0.90 U	0.90 U	0.90 U	3.0 B	6.3 B	2.2 B	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	1.2 B
Copper	1,300 (3)	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Iron	9,100	35.5 U	6,690	2,740	**21,600**	**22,400**	**55,400**	8,580	39.1 B	47.8 B	**63,000**	**20,000**	6,630	469	**82,900**	1,340
Lead	15	1.2 U	1.2 U	1.2 U	1.2 U	1.9 B	1.3 B	1.2 U	1.2 U	1.2 U	1.5 B	1.2 U	1.2 U	1.2 U	3.2	1.2 U
Manganese	1,715	1.2 B	1,240	439	**10,800**	**11,100**	**3,970**	373	1.3 B	47.5	**2,570**	**2,950**	**6,630**	**2,460**	1,690	385
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	100	3.0 U	15.8 B	3.0 U	7.8 B	8.0 B	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	7.1 B	8.4 B	10.2 B	3.0 B	3.0 U
Selenium	50 (2)	3.1 U	4.3 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Silver	40 (4)	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 B	1.1 B	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Sodium	20,000	684 B	4,060	1,870 B	**32,200**	**33,100**	**32,200**	1,550 B	845 B	8,190	**22,800**	2,280 B	**31,900**	**41,900**	**34,300**	16,100
Zinc	2,000 (4)	5.5 B	6.8 B	4.2 B	6.6 B	5.4 B	5.7 B	2.8 B	1.9 U	1.9 U	1.9 U	8.8 B	8.7 B	31.7	5.0 B	3.4 B
GENERAL CHEMISTRY	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity as $CaCO_3$	-	13.1 B	113	37.1	344	339	341	74.2	24.1 B	190	213	90.5	296	417	304	200
Biochemical Oxygen Demand$_5$	-	1.4 UB	2.0 B	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 B	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.8 B	1.4 UB
Chloride	-	1.1	18.0	9.5	27.3	26.9	41.8	1.7	1.1	25.8	23.1	2.5	34.5	36.6	32.0	26.8
Chemical Oxygen Demand	-	20.0 U	20.0 U	20.0 U	39.9*	27.9	37.9	25.9	20.0 U	37.9	23.8	20.0 U	20.0 U	25.9	25.9	20.0 U
Cyanide (Total)	2.0 (2)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Hardness as $CaCO_3$	-	14.1	127	39.9	290	298	271	71.2	23.5	237	140	72.7	286	418	235	235
Nitrate as Nitrogen	10 (2)	0.43	0.45 H	0.20 U	0.26	0.27	0.20 U	0.20 U	0.52	0.20 U	0.20 U	0.20 UH	0.32	0.20 U	0.33	0.20 U
Sulfate	500 (2)	3.5	3.7	6.2	7.5	7.3	4.4	4.0	2.4	20.2	3.4	15.6	13.3	6.1	3.6	12.9
Total Dissolved Solids	-	31.0 B	165 B	292 B	151* B	105 B	103 B	105 B	30.0 B	282 B	257 B	126 B	388 B	492 B	365 B	264 B
Total Suspended Solids	-	0.70	1.4	14.4	25.6	27.3	56.5	2.4	1.9	0.90	49.7	8.5	9.8	1.0	96.4	3.3
Total Organic Carbon	-	1.0 UB	2.1 B	6.6 B	3.8* B	4.7 B	6.2 B	7.4 B	1.0 UB	1.0 UB	3.3 B	1.0 UB	2.9 B	5.6 B	4.7 B	5.8 B
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-															
Oxidation Reduction Potential (mv)	-															
pH	-															
Specific Conductivity (µS/cm)	-															

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = analyte analyzed for, but not dected above the reporting limit

B = (metals) The result reported is less than the reporting limit, but greater than the instrument detection limit

B = (General Chemistry) The target analyte was also detected in the associated method blank or equipment blank.

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits OF 20% rpd.

H = holding time exceeded

= value circumspect due to potential field equipment failure

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-2
Groundwater Analytical Results - May 12-14, 2003 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	1.4 J	<5.0	<5.0	<5.0	1.8 J	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.4 J	1.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	1.4 J	<5.0
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.3 J	2.4 J	2.3 J	<5.0	<5.0	<5.0	<5.0	<5.0	1.4 J	2.4 J	2.1 J	<5.0
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.4 J	<5.0	2.7 J	1.4 J	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)																
Aluminum	6,870	33.3	71.0	280	<27.7	48.9	<27.7	87.9	<27.7	35.3	42.3	<27.7	32.7	<27.7	<27.7	40.3
Arsenic	50	<4.7	26.6	7.3	**3,920**	**3,900**	**55.1**	13.4	<4.7	9.8	**498**	36.1	**197**	**101**	**2,070**	21.0
Barium	2,000 (2)	<13.5	21.7	<13.5	57.2	57.6	66.9	<13.5	<13.5	<13.5	105	<13.5	107	<13.5	92.2	70.2
Cadmium	5 (2)	<0.40	<0.40	<0.40	<0.40	<0.40	0.46	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Chromium	100	3.1	<0.90	1.0	<0.90	<0.90	<0.90	1.4	5.1	1.3	1.0	1.6	<0.90	1.3	<0.90	1.4
Copper	1,300 (3)	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Iron	9,100	56.4	2,790	1,140	**37,400**	**37,300**	**78,900**	3,280	46.6	40.6	**62,200**	6,740	7,720	626	**86,600**	885
Lead	15	1.5	<1.4	<1.4	4.1	2.7	1.5	1.9	1.5	<1.4	2.0	1.4	<1.4	3.4	3.5	<1.4
Manganese	1,715	1.6	843	273	**8,500**	**9,470**	**4,230**	364	0.98	37.4	**2,180**	1,200	**7,260**	1,660	1,340	324
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<2.6	<2.6	<2.6	10.5	10.0	<2.6	<2.6	<2.6	<2.6	4.4	<2.6	6.9	7.0	5.4	<2.6
Selenium	50 (2)	4.3	<3.9	<3.9	<3.9	<3.9	<3.9	4.0	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
Silver	40 (4)	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7
Sodium	20,000	1,220	2,380	2,340	**32,600**	**33,000**	**32,000**	2,080	950	8,990	**31,100**	1,600	**36,800**	**43,400**	**137,300**	14,200
Zinc	2,000 (4)	<2.5	3.1	<2.5	6.5	6.5	8.4	2.6	<2.5	<2.5	8.8	<2.5	<2.5	16.9	9.6	3.8
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	11,600	41,900	33,900	341,000	339,000	352,000	71,500	15,300	202,000	303,000	28,500	322,000	452,000	338,000	187,000
Biochemical Oxygen Demand 5	-	<1,500	<1,500	<1,500	<1,400	<1,400	<1,400	<1,500	<1,500	<1,500	3,400	<1,500	<1,500	<1,500	1,400	1,600
Chloride	-	470	1,700	570	36,600	33,200	47,500	900	420	26,000	30,100	440	44,600	44,600	37,600	21,700
Chemical Oxygen Demand	-	<20,000	<20,000	31,300	46400 *	27000 *	50,700	<20,000	<20,000	<20,000	27,000	39,900	37,800	<20,000	24,800	<20,000
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	7,800	37,000	25,000	275,000	274,000	274,000	62,100	13,200	245,000	189,000	21,200	299,000	413,000	232,000	180,000
Nitrate as Nitrogen	10,000 (2)	<200	400	<200	<200	<200	<200	<200	240	<200	<200	300	<200	<200	<200	<200
Sulfate	500,000 (2)	2,300	6,400	2,200	5,000	4,900	3,400	6,900	2,800	20,500	890	7,700	10,300	12,400	2,800	9,700
Total Dissolved Solids	-	32000 H	64000 H	395000 H	415000 H	399000 H	394000 H	96000 H	31000 H	299000 H	322000 H	51000 H	406000 H	539000 H	59000 H	400000 H
Total Suspended Solids	-	2,000	5,500	1,400	50,500	51,000	95,600	3,900	<500	1,300	34,600	2,000	10,600	1,300	80,500	5,400
Total Organic Carbon	-	<1,000	1,500	7,400	5,100	5,400	7,300	7,100	<1,000	<1,000	4,300	<1,000	3,200	4,500	6,800	4,400
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-	10.93	2.57	0.18	5.84	5.84	0.93	2.7	11.14	1.08	0.30	1.74	0.17	4.9	2.3	0.49
Oxidation Reduction Potential (mv)	-	279	170	262.6	52.2	52.2	-70.2	23.5	273.2	299.9	-15.2	54.5	-3.9	17.3	-97.1	41.7
pH	-	6.48	5.99	5.45	6.06	6.06	6.47	6.44	6.45	7.44	6.12	6.40	6.59	6.84	6.79	7.37
Specific Conductivity (µS/cm)	-	16	74	68	7.47	7.47	866	96	32	329	496	55	506	582	539	380

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

NA = not analyzed

Table 7-3
Groundwater Analytical Results - May 14, 2003 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHM-99-31A µg/L	SHM-99-31B µg/L	SHM-99-31C µg/L	SHM-99-32X µg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	NS	<5.0	<5.0	NS
Acetone	3,000 (4)	NS	<5.0	<5.0	NS
2-Butanone	-	NS	<5.0	<5.0	NS
4-Methyl-2-Pentanone	-	NS	<5.0	<5.0	NS
Benzene	5 (2)	NS	1.4 J	1.6 J	NS
Methyl-t-Butyl Ether	70 (4)	NS	<5.0	1.2 J	NS
1,1-Dichloroethane	70 (4)	NS	<5.0	1.6 J	NS
1,2-Dichloroethene (total)	70 (2)	NS	<5.0	2.5 J	NS
1,2-Dichloroethane	5	NS	<5.0	<5.0	NS
1,3-Dichlorobenzene	600 (2)	NS	<5.0	<5.0	NS
1,4-Dichlorobenzene	5	NS	<5.0	<5.0	NS
1,2-Dichlorobenzene	600	NS	<5.0	<5.0	NS
METALS (6010B or as noted)					
Aluminum	6,870	NS	36.2	47.2	NS
Arsenic	50	NS	**69.6**	**347**	NS
Barium	2,000 (2)	NS	79.2	113	NS
Cadmium	5 (2)	NS	<0.40	<0.40	NS
Chromium	100	NS	<0.90	0.97	NS
Copper	1,300 (3)	NS	<2.4	<2.4	NS
Iron	9,100	NS	**24,600**	**54,300**	NS
Lead	15	NS	<1.4	<1.4	NS
Manganese	1,715	NS	**2,420**	**7,260**	NS
Mercury (7470A)	2 (2)	NS	<0.10	<0.10	NS
Nickel	100	NS	<2.6	15.8	NS
Selenium	50 (2)	NS	<3.9	<3.9	NS
Silver	40 (4)	NS	<1.7	<1.7	NS
Sodium	20,000	NS	14,800	**48,800**	NS
Zinc	2,000 (4)	NS	5.9	7.4	NS
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	NS	189,000	478,000	NS
Biochemical Oxygen $Demand_5$	-	NS	1,800	<1,400	NS
Chloride	-	NS	22,200	61,600	NS
Chemical Oxygen Demand	-	NS	24,800	48,600	NS
Cyanide (Total)	200 (2)	NS	<10.0	<10.0	NS
Hardness as $CaCO_3$	-	NS	136,000	397,000	NS
Nitrate as Nitrogen	10,000 (2)	NS	<200	<200	NS
Sulfate	500,000 (2)	NS	2,500	2,000	NS
Total Dissolved Solids	-	NS	228000 H	548000 H	NS
Total Suspended Solids	-	NS	12,100	58,200	NS
Total Organic Carbon	-	NS	6,100	8,700	NS

FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	NS	0.49	6.58	NS
Oxidation Reduction Potential (mv)	-	NS	-9.9	116.1	NS
pH	-	NS	6.19	6.03	NS
Specific Conductivity (µS/cm)	-	NS	409	1038	NS

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-4
Groundwater Analytical Results - November 17-19, 2003 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.1 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	5.0 U
Acetone	3,000 (4)	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	5.0 U	5.0 U	5.0 U
2-Butanone	-	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	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	-	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	5.0 U	5.0 U	5.0 U
Benzene	5 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	5.0 U	5.0 U	5.0 U	1.8 J	5.0 U	5.0 U	5.0 U	1.2 J	5.0 U
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.91 J	5.0 U	5.0 U
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	5.0 U	1.4 J	1.4 J	1.2 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.6 J	1.4 J	1.0 J
1,2-Dichloroethene (total)	70 (2)	5.0 U	2.4 J	5.0 U	2.5 J	2.5 J	2.3 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	2.3 J	2.5 J	5.0 U
1,2-Dichloroethane	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	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	600 (2)	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	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	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	2.5 J	5.0 U	2.2 J	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	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	5.0 U	5.0 U	5.0 U
METALS (6010B or as noted)																
Aluminum	6,870	153 B	22.1 U	233	22.1 U	22.1 U	22.1 U	39.0 B	22.1 U	42.2 B	22.1 U	22.1 U	22.1 U	22.1 U	22.1 U	22.1 U
Arsenic	50	4.1 U	13.4	4.7 B	**3,380**	**3,280**	46.3	30.6	4.1 U	5.2 U	**639**	**83.6**	**194**	**76.4**	**2,500**	29.8
Barium	2,000 (2)	11.5 U	53.4 B	11.5 U	54.8 B	53.3 B	64.6 B	13.7 B	11.5 U	11.5 U	93.7 B	23.1 B	102 B	12.2 B	95.0 B	82.2 B
Cadmium	5 (2)	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	1.0 B	0.50 U	0.50 U	0.50 U	1.1 B	0.50 U	0.50 U	0.50 U	1.6 B	0.50 U
Chromium	100	47.1	2.3 U	2.3 U	4.9 B	4.8 B	2.4 B	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 B	2.3 U	2.23 U	2.3 U
Copper	1,300 (3)	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 B	2.2 U	2.2 U	2.2 U
Iron	9,100	540	1,840	1,720	**32,000**	**30,600**	**63,200**	7,820	45.5 U	45.5 U	**68,700**	**15,400**	8,190	444	**87,000**	904
Lead	15	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	2.4 B	1.4 U	1.4 U	1.4 U	2.4 B	1.4 U	1.4 U	1.4 U	2.4 B	1.4 U
Manganese	1,715	19.7	324	340	**11,100**	**10,600**	**4,260**	412	1.6 U	46.3	**3,030**	**2,100**	**7,760**	**2,110**	1,950	425
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	100	33.7 B	6.8 B	4.5 U	12.9 B	12.8 B	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	13.4 B	10.4 B	9.6 B	7.3 B	4.5 U
Selenium	50 (2)	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Silver	40 (4)	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Sodium	20,000	1360 B	13,400	2030 B	**33,500**	**32,600**	**34,800**	2,310 B	1280 B	8,370	**27,000**	2,670 B	**35,800**	**42,700**	**36,300**	17,400
Zinc	2,000 (4)	4.3 B	7.9 B	9.0 B	11.5 B	11.1 B	9.3 B	13.8 B	3.3 B	1.9 U	8.3 B	7.4 B	13.2 B22.1 U	24.8	14.3 B	2.7 B
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	13,100	81,900	32,900	332,000	334,000	332,000	71,200	22,100	192,000	258,000	70,400	319,000	422,000	339,000	205,000
Biochemical Oxygen Demand$_5$	-	670 U	670 U	1,300	780 U	780 U	670 U	670 U	670 U	670 U	1,100	670 U	670 U	670 U	670 U	910
Chloride	-	620	17,100	1,500	35,700	36,900	54,300	1,400	790	31,300	31,500	1,800	48,400	51,900	46,000	32,800
Chemical Oxygen Demand	-	20,000 U	20,000 U	20,000 U	23,800	21,700	20,000 U	30,100	20,000 U	20,000 U	21,700	20,000 U	20,000 U	20,000 U	36,400	42,700
Cyanide (Total)	200 (2)	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Hardness as $CaCO_3$	-	13,500	77,500	30,100	289,000	281,000	272,000	70,700	22,700	227,000	161,000	57,800	310,000	415,000	265,000	242,000
Nitrate as Nitrogen	10,000 (2)	530	200 U	200 U	200 U	200 U	200 U	200 U	590	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Sulfate	500,000 (2)	2,900	13,900	2,100	5,400	6,200	2,500	7,400	2,100	19,100	550	16,300	10,700	5,100	3,400	12,800
Total Dissolved Solids	-	39,000	138,000	72,000	453,000	483,000	432,000	119,000	53,000	282,000	335,000	124,000	452,000	493,000	505,000	293,000
Total Suspended Solids	-	4,600	1,000	1,600	23,500	19,000	39,700	500 U	600	900	30,500	1,600	7,700	1,200	67,400	1,500
Total Organic Carbon	-	1,900	3,700	7,700	5,400	6,200	1,000 U	7,700	1,000 U	1,900	4,300	1,000 U	4,000	4,800	8,400	4,300
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-	9.77	1.22	0.36	0.41	0.41	0.53	0.39	10.47	0.39	0.26	0.31	0.39	0.55	0.42	0.54
Oxidation Reduction Potential (mv)	-	210.4	36.1	39	-89.4	-89.4	-147	-62.8	176.9	148.1	-94.6	-6.8	-62.8	4.0	-159	-205
pH	-	6.54	5.96	5.68	6.70	6.70	6.47	6.65	6.71	7.41	6.47	6.08	6.62	6.77	6.75	7.65
Specific Conductivity (µS/cm)	-	36	231	64	752	752	653	171	52	340	530	193	710	866	659	341

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = analyte analyzed for, but not dtected above the reporting limit

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

\# = value circumspect due to potential field equipment failure

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-5
Groundwater Analytical Results - November 19, 2003 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHM-99-31A µg/L	SHM-99-31B µg/L	SHM-99-31C µg/L	SHM-99-32X µg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	5.0 U	5.0 U	5.0 U	NS
Acetone	3,000 (4)	5.0 U	5.0 U	5.0 U	NS
2-Butanone	-	5.0 U	5.0 U	5.0 U	NS
4-Methyl-2-Pentanone	-	5.0 U	5.0 U	5.0 U	NS
Benzene	5 (2)	5.0 U	1.5 J	5.0 U	NS
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	1.3 J	NS
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	1.7 J	NS
1,2-Dichloroethene (total)	70 (2)	5.0 U	5.0 U	2.5 J	NS
1,2-Dichloroethane	5	5.0 U	5.0 U	5.0 U	NS
1,3-Dichlorobenzene	600 (2)	5.0 U	5.0 U	5.0 U	NS
1,4-Dichlorobenzene	5	5.0 U	5.0 U	5.0 U	NS
1,2-Dichlorobenzene	600	5.0 U	5.0 U	5.0 U	NS
METALS (6010B or as noted)					
Aluminum	6,870	72.4 B	31.5	30.7 U	NS
Arsenic	50	12.3	**80.1**	**312**	NS
Barium	2,000 (2)	11.7 U	89.4 B	128 B	NS
Cadmium	5 (2)	0.70 U	0.70 U	0.70 U	NS
Chromium	100	1.3 U	1.3 U	1.3 U	NS
Copper	1,300 (3)	2.0 U	2.0 U	2.0 U	NS
Iron	9,100	3940	**27,800**	**54,300**	NS
Lead	15	2.8 U	3.2	2.8 U	NS
Manganese	1,715	454	**2,540**	**6,160**	NS
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	NS
Nickel	100	2.8 U	2.8 U	14.1 B	NS
Selenium	50 (2)	3.6 U	3.0 U	3.1 B	NS
Silver	40 (4)	1.9 B	1.6 B	1.5 U	NS
Sodium	20,000	8660	17,900	**46,800**	NS
Zinc	2,000 (4)	2.4 B	5.4 B	2.9 B	NS
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	49,000	192,000	406,000	NS
Biochemical Oxygen Demand 5	-	1,100 U,H	1,800 H	1,100 U,H	NS
Chloride	-	6,900	20,400	57,000	NS
Chemical Oxygen Demand	-	20,000 U	25,900	38,500	NS
Cyanide (Total)	200 (2)	10, 000 U	10,000 U	10,000 U	NS
Hardness as $CaCO_3$	-	49,000	155,000	350,000	NS
Nitrate as Nitrogen	10,000 (2)	200 U	200 U	200 U	NS
Sulfate	500,000 (2)	9,200	3,400	2,400	NS
Total Dissolved Solids	-	88,000 H	223,000 H	490,000 H	NS
Total Suspended Solids	-	3,000	16,200	64,400	NS
Total Organic Carbon	-	3,600	8,000	8,400	NS

FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	0.26	0.43	0.26	NS
Oxidation Reduction Potential (mv)	-	28.6	-26.2	-95	NS
pH	-	5.92	6.24	6.60	NS
Specific Conductivity (µS/cm)	-	139	323	752	NS

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = Analyte or compound was analyzed but not detected at a concentration above the reporting limit.

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-2
Groundwater Analytical Results - May 20 & 21, 2002 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L
VOLATILES (8260B)							
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	1.0 J	1.1 J	1.4 J
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.0 J	1.1 J	1.6 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.8 J	1.8 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.7 J	2.7 J	2.8 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)							
Aluminum	6,870	<19.8	<19.8	248	<19.8	<19.8	<19.8
Arsenic	50	2.8 B	47.8 B	11.9 B	**3,800**	**3,930**	**50.4 B**
Barium	2,000 (2)	8.6	23.2	10.0	60.1	60.9	56.9
Cadmium	5 (2)	1.2 B	1.1 B	1.3 B	1.1 B	0.94 B	1.3 B
Chromium	100	5.1 B	3.1 B	2.9 B	3.2 B	2.7 B	2.9 B
Copper	1,300 (3)	4.2 B	2.4 B	3.8 B	2.9 B	4.2 B	4.3 B
Iron	9,100	30.4	1,520	1,110	**40,100**	**39,800**	**49,200**
Lead	15	1.8 B	2.2 B	2.0 B	<0.80	1.8 B	2.0 B
Manganese	1,715	14.3 B	573	269	**11,000**	**10,900**	**4,110**
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	5.5	4.3	3.3	15.2	14.9	6.2
Selenium	50 (2)	<2.0	4.6 B	3.5 B	4.4 B	2.4 B	3.3 B
Silver	40 (4)	3.0	1.6	2.4	2.1	3.1	3.0
Sodium	20,000	1,340 B	6,370	2,340 B	**26,600**	**37,000**	**34,000**
Zinc	2,000 (4)	5.1 B	4.3 B	5.1 B	8.9 B	8.8 B	29.3
GENERAL CHEMISTRY							
Alkalinity as $CaCO_3$	-	5,000	39,000	33,000	348,000	336,000	320,000
Biochemical Oxygen Demand$_5$	-	<1,300 H	<1,300 H	<1,300	<1,300	<1,300	<1,300
Chloride	-	720	4,700	1,100	41,200	39,600	49,000
Chemical Oxygen Demand	-	<5,000	<5,000	37,500	43,500 *	148,000 *	53,400
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	9,500	31,000	28,200	304,000	301,000	268,000
Nitrate as Nitrogen	10,000 (2)	400	220	<200	<200	<200	<200
Sulfate	500,000 (2)	2,700	8,700	2,900	5,400	5,400	3,700
Total Dissolved Solids	-	23,000	65,000	61,000	438,000	452,000	398,000
Total Suspended Solids	-	2,300	11,100	1,200	59,500	61,700	53,400
Total Organic Carbon	-	<1,000	2,300	6,500	5,100	5,600	6,300
FIELD READINGS (units as noted below)							
Dissolved Oxygen (mg/L)	-	11.0	0.3	0.2	0.4	0.4	0.3
Oxidation Reduction Potential (mv)	-	232.2	6.5	93.5	-40.8	-40.8	-53.9
pH	-	6.5	6.5	5.2	6.6	6.6	6.5
Specific Conductivity (µS/cm)	-	26	114	67	816	816	832

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)										
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	2.1 J	<5.0	1.4 J	<5.0	1.6 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.5 J	1.1 J	1.2 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.2 J	2.3 J	1.6 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	1.0 J	2.7 J	3.2 J	1.2 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)										
Aluminum	6,870	229	<19.8	21.2	<19.8	<19.8	<19.8	<19.8	<19.8	<19.8
Arsenic	50	**144**	4.0 B	11.0 B	**469**	**68.9**	**154**	**55.8 B**	**2,040**	30.5 B
Barium	2,000 (2)	17.5	<6.3	8.1	101	15.6	94.7	15.8	100	68.8
Cadmium	5 (2)	1.4 B	1.4 B	1.4 B	1.4 B	1.3 B	1.4 B	1.6 B	1.3 B	1.2 B
Chromium	100	2.5 B	3.1 B	2.9 B	2.3 B	2.1 B	3.0 B	4.0 B	1.8 B	4.7 B
Copper	1,300 (3)	2.6 B	2.7 B	2.4 B	2.0 B	1.9 B	3.4 B	4.0 B	3.0 B	2.3 B
Iron	9,100	**19,300**	<17.0	71.1	**56,400**	**13,900**	7,010	605	**92,000**	916
Lead	15	4.2 B	2.8 B	1.8 B	1.1 B	1.1 B	1.6 B	1.1 B	<0.80	1.2 B
Manganese	1,715	446	1.3 B	45.4 B	**2,010**	**2,280**	**5,950**	1,370	1,680	425
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<2.8	<2.8	3.7	4.9	8.8	11.7	12.6	9.1	3.5
Selenium	50 (2)	3.8 B	5.2 B	<2.0	4.2 B	3.2 B	6.3 B	2.8 B	8.7 B	4.5 B
Silver	40 (4)	<1.2	<1.2	1.3	<1.2	1.8	2.1	2.4	<1.2	1.5
Sodium	20,000	2,380 B	1,380 B	8,620	**27,600**	2,570 B	**34,000**	**43,700**	**35,900**	18,800
Zinc	2,000 (4)	6.2 B	2.8 B	3.6 B	8.9 B	5.8 B	5.4 B	21.3 B	12.0 B	4.4 B
GENERAL CHEMISTRY										
Alkalinity as $CaCO_3$	-	68,000	4,000	188,000	228,000	38,000	280,000	440,000	312,000	232,000
Biochemical Oxygen Demand$_5$	-	<1,300	<1,300 H	<1,300 H	1,200 H	<1,300 H	<1,300 H	<1,300	<1,300	2,200
Chloride	-	1,500	800	32,800	31,000	1,300	42,000	52,600	45,700	36,800
Chemical Oxygen Demand	-	53,400	<5,000	8,100	14,100	<5,000	16,100	87,200	53,400	33,600
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	68,400	18,400	237,000	162,000	37,400	250,000	433,000	249,000	238,000
Nitrate as Nitrogen	10,000 (2)	<200	1,900	<200	210	220	380	<200	220	<200
Sulfate	500,000 (2)	9,700	2,100	19,800	530	12,800	8,800	4,900	1,800	12,400
Total Dissolved Solids	-	91,000	43,000	326,000	314,000	76,000	371,000	547,000	412,000	320,000
Total Suspended Solids	-	35,500	<500	1,700	37,400	7,200	9,000	1,900	104,000	2,400
Total Organic Carbon	-	6,700	<1,000	<1,000	4,200	<1,000	3,500	4,300	5,800	3,400
FIELD READINGS (units as noted below)										
Dissolved Oxygen (mg/L)	-	0.3	10.4	0.8	0.4	1.9	0.2	6.8	0.4	0.4
Oxidation Reduction Potential (mv)	-	-19.4	255.5	65.6	-54.7	53.2	29.2	63.1	-75.8	-111.3
pH	-	6.5	8.8	7.1	6.5	5.9	6.4	6.6	6.6	7.6
Specific Conductivity (µS/cm)	-	151	47	479	659	164	627	921	848	548

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-3
Groundwater Analytical Results - May 22, 2002 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHM-99-31A µg/L	SHM-99-31B µg/L	SHM-99-31C µg/L	SHM-99-32X µg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	2.1 J	1.5 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	1.7 J	2.0 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	2.0 J	2.0 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	2.5 J	2.8 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)					
Aluminum	6,870	80.7	<19.8	<19.8	21.4
Arsenic	50	16.6 B	**75.1**	**345**	**176**
Barium	2,000 (2)	9.0	71.3	103	55.5
Cadmium	5 (2)	0.73 B	0.77 B	1.1 B	1.2 B
Chromium	100	2.0 B	1.8 B	2.3 B	1.8 B
Copper	1,300 (3)	1.7 B	1.7 B	3.2 B	3.1 B
Iron	9,100	4,670	**25,400**	**54,100**	**51,900**
Lead	15	1.3 B	1.9 B	<0.80	1.5 B
Manganese	1,715	386	**2,780**	**7,720**	**3,960**
Mercury (7470A)	2 (2)	0.40	<0.10	<0.10	<0.10
Nickel	100	<2.8	<2.8	17.5	8.8
Selenium	50 (2)	<2.0	<2.0	9.3 B	4.7 B
Silver	40 (4)	1.4	1.4	2.4	1.4
Sodium	20,000	9,130	14,200	**47,600**	**40,600**
Zinc	2,000 (4)	4.8 B	8.5 B	12.2 B	7.6 B
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	196,000	4,000	432,000	388,000
Biochemical Oxygen $Demand_5$	-	<1,300 H	2,000 H	<1,300	<1,300 H
Chloride	-	6,300	19,800	60,100	60,000
Chemical Oxygen Demand	-	14,100	22,200	36,300	28,200
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	26,100	145,000	391,000	334,000
Nitrate as Nitrogen	10,000 (2)	<200	<200	<200	<200
Sulfate	500,000 (2)	8,000	2,800	2,100	2,300
Total Dissolved Solids	-	72,000	243,000	584,000	507,000
Total Suspended Solids	-	1,200	8,900	60,000	36,900
Total Organic Carbon	-	4,200	5,800	7,100	5,300

FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	0.2	0.4	0.4	0.3
Oxidation Reduction Potential (mv)	-	51.7	32.6	-72.1	-62.8
pH	-	5.8	5.3	6.6	6.5
Specific Conductivity (µS/cm)	-	103	407	1,053	939

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-4
Groundwater Analytical Results - October 28-30, 2002 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	< 5.0	<5.0	0.92 J	<5.0	<5.0	<5.0	2.0 J	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.0 J	0.98 J	1.2 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.2 J	<5.0	1.0 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.6 J	1.6 J	1.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.9 J	<5.0	1.3 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.6 J	2.6 J	2.7 J	<5.0	<5.0	<5.0	<5.0	<5.0	1.4 J	2.4 J	<5.0	1.2 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.0 J	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)																
Aluminum	6,870	<16.1	<16.1	199	20.0	19.0	<16.1	60.0	<16.1	38.3	<16.1	<16.1	<16.1	<16.1	18.4	21.1
Arsenic	50	<3.2	**66.1**	<3.2	**1,970**	**1,980**	41.3	29.0	<3.2	7.1	**648**	**164**	**175**	**77.1**	**159**	30.1
Barium	2,000 (2)	<9.2	46.0	15.9	45.6	45.6	56.4	14.2	<9.2	<9.2	112	25.0	105	12.7	<9.2	72.7
Cadmium	5 (2)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.46	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	100	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6
Copper	1,300 (3)	1.9	<1.8	<1.8	6.8	<1.8	<1.8	<1.8	<1.8	11.3	<1.8	<1.8	19.6	<1.8	<1.8	<1.8
Iron	9,100	<22.6	4,380	1,120	**18,700**	**18,700**	**44,800**	8,430	<22.6	52.8	**64,500**	**27,600**	**9,400**	707	446	778
Lead	15	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Manganese	1,715	<2.5	436	259	**13,000**	**12,800**	**4,110**	464	<2.5	46.9	**1,990**	**3,400**	**7,200**	**1,760**	11.9	407
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5	<13.5
Selenium	50 (2)	<3.9	<3.9	<3.9	6.3	6.0	6.8	<3.9	<3.9	<3.9	4.4	4.5	6.9	<3.9	4.2	<3.9
Silver	40 (4)	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Sodium	20,000	1,570	2,840	2,160	**36,200**	**35,800**	**35,400**	2,560	1,520	8,180	**29,800**	4,240	**35,600**	**45,500**	**114,000**	19,500
Zinc	2,000 (4)	<6.9	<6.9	<6.9	8.9	7.3	<6.9	<6.9	<6.9	<6.9	7.5	7.9	<6.9	16.4	<6.9	<6.9
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	24,900	86,100	32,600	367,000	366,000	307,000	54,000	27,300	200,000	218,000	75,800	263,000	378,000	193,000	121,000
Biochemical Oxygen Demand$_5$	-	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	<1,500	1,500
Chloride	-	1,200	<200	2,100	42,200	41,200	45,600	1,800	<200	31,700	28,900	3,100	44,000	48,000	45,500	36,100
Chemical Oxygen Demand	-	27,500	19,600	35,200	87,900 *	13,700 *	41,000	25,500	11,800	23,500	37,300	29,400	21,600	17,600	39,200	17,600
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	29,700	90,600	38,900	315,000	314,000	246,000	74,500	29,400	228,000	183,000	62,800	264,000	437,000	28,000	246,000
Nitrate as Nitrogen	10,000 (2)	400	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Sulfate	500,000 (2)	7,500	11,400	13,000	6,300	6,300	6,600	10,700	2,600	18,700	390	13,600	11,600	5,600	2,900	13,500
Total Dissolved Solids	-	53,000 H	123,000 H	99,000 H	467,000 H	475,000 H	382,000 H	148,000 H	48,000 H	312,000 H	336,000 H	130,000 H	462,000 H	565,000 H	395,000 H	360,000 H
Total Suspended Solids	-	<500	1,100	7,000	26,900	25,600	44,400	<500	900	1,600	58,700	9,900	11,000	1,600	700	4,100
Total Organic Carbon	-	<1,000	2,200	8,100	5,400 *	4,200 *	6,400	8,300	<1,000	<1,000	4,000	1,200	2,100	4,100	4,000	3,400

FIELD READINGS (units as noted below)		SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
Dissolved Oxygen (mg/L)	-	7.9	0.3	0.6	0.3	0.3	0.3	0.1	9.4	0.5	0.6	0.3	0.3	0.8	0.4	0.6
Oxidation Reduction Potential (mv)	-	209.9	26.0	27.6	-62.7	-62.7	-55.8	-46.9	219.4	-5.3	-46.3	-6.9	-31.1	7.4	14.4 #	-135.1
pH	-	6.3	6.1	5.7	6.6	6.6	6.5	6.6	6.9	7.5	6.5	6.5	6.5	6.6	8.7	7.5
Specific Conductivity (µS/cm)	-	67	221	94	846	846	822	182	68	491	756	264	751	927	824	649

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

= value circumspect due to potential field equipment failure

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-5
Groundwater Analytical Results - October 31, 2002 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) µg/L	SHM-99-31A µg/L	SHM-99-31B µg/L	SHM-99-31C µg/L	SHM-99-32X µg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	<5.0	<5.0	NA	NS
Acetone	3,000 (4)	<5.0	<5.0	NA	NS
2-Butanone	-	<5.0	<5.0	NA	NS
4-Methyl-2-Pentanone	-	<5.0	<5.0	NA	NS
Benzene	5 (2)	<5.0	1.7 J	NA	NS
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	NA	NS
1,1-Dichloroethane	70 (4)	<5.0	<5.0	NA	NS
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	NA	NS
1,2-Dichloroethane	5	<5.0	<5.0	NA	NS
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	NA	NS
1,4-Dichlorobenzene	5	<5.0	<5.0	NA	NS
1,2-Dichlorobenzene	600	<5.0	<5.0	NA	NS
METALS (6010B or as noted)					
Aluminum	6,870	54.1	22.7	<16.1	NS
Arsenic	50	11.6	**71.1**	**332**	NS
Barium	2,000 (2)	<9.2	63.4	98.0	NS
Cadmium	5 (2)	<0.30	<0.30	<0.30	NS
Chromium	100	<4.6	<4.6	<4.6	NS
Copper	1,300 (3)	3.5	<1.8	<1.8	NS
Iron	9,100	3,760	**19,500**	**45,500**	NS
Lead	15	1.2	<1.1	<1.1	NS
Manganese	1,715	655	**2,270**	**6,740**	NS
Mercury (7470A)	2 (2)	<0.10	<0.10	NA	NS
Nickel	100	<13.5	<13.5	13.5	NS
Selenium	50 (2)	<3.9	<3.9	<3.9	NS
Silver	40 (4)	<1.4	<1.4	<1.4	NS
Sodium	20,000	8,200	11,600	**47,200**	NS
Zinc	2,000 (4)	<6.9	<6.9	<6.9	NS
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	23,800	155,000	448,000	NS
Biochemical Oxygen Demand$_5$	-	<1,500	1,900	<1,500	NS
Chloride	-	8,400	16,200	61,800	NS
Chemical Oxygen Demand	-	11,800	37,300	51,000	NS
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	NS
Hardness as $CaCO_3$	-	26,000	123,000	382,000	NS
Nitrate as Nitrogen	10,000 (2)	<200	<200	<200	NS
Sulfate	500,000 (2)	14,200	3,500	2,500	NS
Total Dissolved Solids	-	45,000 H	208,000 H	575,000 H	NS
Total Suspended Solids	-	1,500	2,200	49,300	NS
Total Organic Carbon	-	3,800	5,900	NA	NS

FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	0.2	0.5	0.3	NS
Oxidation Reduction Potential (mv)	-	-15.2	-4.8	-94.8	NS
pH	-	5.9	6.1	6.7	NS
Specific Conductivity (µS/cm)	-	104	362	1,059	NS

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-2
Groundwater Analytical Results - May 14 & 15, 2001 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

	Well No.	SHL-3	SHL-4	SHL-5	SHM-98-5B	SHM-98-5B DUP	SHM-98-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
PARAMETERS	CLEANUP GOAL (1) ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	2.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	2.3 J	<5.0	4.1 J	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	1.1 J	1.1 J	1.6 J	<5.0	<5.0	<5.0	2.0 J	<5.0	<5.0	<5.0	1.7 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.5 J	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.8 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.1 J	2.1 J	<5.0
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.6 J	2.6 J	2.7 J	<5.0	<5.0	<5.0	2.0 J	<5.0	1.6 J	2.6 J	2.9 J	<5.0
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<6.0	<5.0	2.4 J	<5.0	3.1 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Aluminum	6,870	<98.5	<98.5	344	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5
Arsenic	50	<4.1	**50.8**	13.8	**3,800**	**3,900**	**80.5**	15.1	<4.1	6.9	**487**	**129**	**186**	47.6	**1,540**	19.7
Barium	2,000 (2)	<3.6	61.5	9.6	57.8	59.0	62.8	15.6	4.3	7.2	102	8.3	99.5	13.4	96.8	70.0
Cadmium	5 (2)	0.32	0.81	0.40	0.80	0.79	1.5	0.71	0.42	0.23	1.4	0.44	0.43	0.67	1.5	0.46
Chromium	100	2.0	2.2	1.6	6.2	5.9	3.6	1.6	<1.4	<1.4	2.0	1.7	3.6	1.5	1.4	2.5
Copper	1,300 (3)	<11.0	<11.0	<11.0	<11.0 J	42.8 J	19.3	<11.0	<11.0	<11.0	13.4	<11.0	<11.0	<11.0	16.5	<11.0
Iron	9,100	<61.8	5,960	2,640	**38,700**	**37,600**	**77,600**	4,630	<61.8	<61.8	**73,600**	**12,600**	**9,600**	612	**92,700**	430
Lead	15	<1.3	<1.3	<1.3	2.1	1.5	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.3	1.6	<1.3
Manganese	1,715	<3.9	1,680	400	**10,800**	**11,000**	**4,700**	444	<3.9	41.1	**2,460**	1,590	**7,840**	1,040	**2,780**	376
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<7.5	8.8	<7.5	16.7	15.2	<7.5	<7.5	<7.5	<7.5	<7.5	<7.5	11.8	<7.5	<7.5	<7.5
Selenium	50 (2)	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
Silver	40 (4)	<2.4	<2.4	<2.4	2.6	2.4	3.9	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Sodium	20,000	1,540	5,300	2,280	**39,600**	**39,800**	**34,100**	2,310	<1540	8,530	**35,300**	<1540	**42,700**	**48,200**	**43,200**	18,200
Zinc	2,000 (4)	<3.4	8.0	4.9	10.7	12.9	15.3	6.6	<3.4	<3.4	<3.5	7.3	4.8	16.1	18.0	5.8
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	20,000	52,000	30,000	360,000	376,000	376,000	65,000	21,000	15,000	256,000	83,000	380,000	460,000	404,000	188,000
Biochemical Oxygen Demand	-	<2,000 J	<2,000 J	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000 J	<2,000 J	<2,000 J	<2,000 J	<2,000 J	<2,000	<2,000	<2,000
Chloride	-	800	8,100	1,900	49,000	45,600	48,000	2,500	1,100	29,800	41,700	1,200	52,600	59,000	53,100	25,200
Chemical Oxygen Demand	-	16,000 N	8,000 N	16,000 N	<5,000 N	20,000 N	22,000 N	12,000 N	18,000 N	10,000 N	83,000 N	<5,000 N	30,000 N	10,000 N	30,000 N	10,000 N
Cyanide (Total)	200 (2)	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N
Hardness as CaCO3	-	18,000 *	82,000 *	34,000 *	90,000 *	144,000 *	300,000 *	76,000 *	20,000 *	232,000 *	184,000 *	28,000 *	20,000 *	472,000 *	150,000 *	196,000 *
Nitrate as Nitrogen	10,000 (2)	210	<200	<200	<200	<200	<200	<200	<200	<200	<200	200	<200	<200	<200	<200
Sulfate	500,000 (2)	3,100	8,200	2,100	4,600	4,700	3,100	8,400	2,600	19,500	620	9,400	9,400	4,200	2,600	12,700
Total Dissolved Solids	-	23,000 B	116,000	60,000	467,000	466,000	434,000	107,000	23,000 B	305,000	401,000	39,000	485,000	551,000	470,000	255,000
Total Suspended Solids	-	500 *	8,300 *	112,000 *	44,100 *	40,400 *	15,500 *	16,300 *	500 *	800 *	39,400 *	17,500 *	19,100 *	3,200 *	116,000 *	1,900 *
Total Organic Carbon	-	<1,000	1,700	8,200	6,700	7,200	3,900	6,500	<1,000	<1,000	5,400	<1,000	3,700	4,900	7,800	4,900

FIELD PARAMETERS		SHL-3	SHL-4	SHL-5	SHM-98-5B	SHM-98-5B DUP	SHM-98-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
Dissolved Oxygen (mg/L)	-	11.79	0.18	0.19	0.43	NA	1.12	0.21	11.22	1.29	0.24	0.45	0.23	0.55	0.63	0.39
Oxidation Reduction Potential (mV)	-	215.5	74.1	69.4	-92.5	NA	-64.3	7.2	227.0	143.3	-76.4	-20.6	-18.8	-37.3	-132.0	-130.2

Notes:

Shaded areas with bold numbers indicate cleanup goal exceedance. - **25**

B = Value within 5 times of the amount detected in the equipment blank sample

J = Estimated Value

N= Matrix Spike sample recovery outside acceptance limits

* = Duplicate analysis Relative Percent Difference outside acceptance limits

NA = Not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-3

Groundwater Analytical Results - October 29 & 30, 2001 Sampling Event

Shepley's Hill Landfill

Devens, Massachusetts

(SHEET 1 of 1)

PARAMETERS	CLEANUP LEVEL (1) ug/L	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
Well No.		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.8 JN	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	1.3 J	<5.0	<5.0	<5.0	1.2 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.1 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.2 J	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.8 J	1.7 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.0 J	1.4 J	1.4 J
1,2-Dichloroethene (total)	70 (2)	<5.0	1.6 J	<5.0	2.6 J	2.4 J	2.6 J	<5.0	<5.0	<5.0	1.3 J	<5.0	1.5 J	2.4 J	2.0 J	1.0 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010B or as noted)																
Aluminum	6,870	<7.7	52.8	307	<7.7	<7.7	<7.7	49.8	<7.7	128	<7.7	<7.7	<7.7	<7.7	<7.7	8.1
Arsenic	50	<1.5	**86.0**	14.8	**1,650**	**1,830**	41.1	28.1	<1.5	10.1	**673**	**183**	**165**	44.2	**1,670**	31.6
Barium	2,000 (2)	<9.0	91.8	13.8	44.6	45.1	52.7	14.0	<9.0	<9.0	104	23.2	102	11.7	96.5	74.8
Cadmium	5 (2)	<0.20	<0.20	<0.20	<0.20	<0.20	0.51	<0.20	<0.20	<0.20	1.0	0.35	<0.20	<0.20	1.3	<0.20
Chromium	100	1.3	<0.70	<0.70	1.6 *	2.0 *	<0.70	<0.70	1.1	2.0	<0.70	0.86	1.2	<0.70	<0.70	<0.70
Copper	1,300 (3)	3.1	1.1	<1.0	<1.0 *	4.2 *	1.2	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	3.8	2.2	27.4
Iron	9,100	111	**11,100**	4,570	**18,000**	**17,800**	**43,900**	8,120	<15.7	161	**76,400**	**31,200**	8,710	618	**82,200**	753
Lead	15	0.72	1.2	<0.60	3.1 *	2.1 *	2.5	<0.60	<0.60	1.4	3.1	2.0	1.9	2.0	3.1	1.5
Manganese	1,715	<1.4	824	349	**12,900**	**12,900**	**4,320**	412	1.5	39.7	**2,880**	**4,100**	**7,720**	1,220	**1,960**	444
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<2.0	12.2	3.0	13.0	13.5	4.4	<2.0	<2.0	4.9	<2.0	9.0	12.4	8.5	7.7	<2.0
Selenium	50 (2)	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	1.7	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Silver	40 (4)	<1.5	<1.5	<1.5	3.3 *	2.4 *	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	2.7	<1.5	<1.5	<1.5
Sodium	20,000	1,960	17,200	2,660	**38,600**	**38,200**	**34,300**	2,550	1,520	8,880	**33,500**	3,680	**41,000**	**45,600**	**40,300**	**20,700**
Zinc	2,000 (4)	<0.90	4.1	3.2	2.7	2.8	1.3	<0.90	<0.90	<0.90	<0.90	4.7	0.94	13.4	5.6	<0.90
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	21,000	144,000	42,000	372,000	376,000	312,000	72,000	26,000	192,000	276,000	100,000	364,000	452,000	320,000	228,000
Biochemical Oxygen Demand$_5$	-	<1,300 H	<1,300 H	1,600	<1,300	<1,300	<1,300	<1,300	<1,300 H	<1,300 H	<1,300 H	<1,300 H	<1,300	<1,300	<1,300	1,900
Chloride	-	1,000	29,000	1,700	50,000	49,800	53,100	2,200	1,200	32,100	<200	3,100	50,700	58,000	48,400	34,300
Chemical Oxygen Demand	-	19,800 B	17,800 B	40,000 B	24,000 B*	30,000 B*	34,000 B	72,000 B	9,900 B	11900 B	33,600 B	15,600 B	18,000 B	22,000 B	43,500 B	30,000 B
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness as $CaCO_3$	-	25,900	142,000	37,000	330,000	329,000	252,000	72,100	26,400	235,000	183,000	63,100	340,000	429,000	249,000	259,000
Nitrate as Nitrogen	10,000 (2)	420	590	<200	<200	<200	<200	<200	240	<200	200	<200	<200	<200	220	<200
Sulfate	500,000 (2)	7,200	9,800	2,500	6,200	6,300	5,500	8,200	2,500	20,200	<200	15,800	10,100	4,700	2,200	14,300
Total Dissolved Solids	-	47,000	216,000	70,000	480,000	490,000	367,000	105,000	34,000 B	295,000	360,000	131,000	487,000	550,000	412,000	319,000
Total Suspended Solids	-	500 B	7,700	4,100	34,400	34,600	46,800	800 B	<500	5,000	57,600	NA	13,200	1,800 B	110,000	2,300 B
Total Organic Carbon	-	<1,000	2,800 B	10,100	6,900 B*	5,000 B*	6,400 B	8,200	<1,000	1,400 B	4,500 B	1,500 B	5,600 B	5,000 B	8,300	4,100 B

FIELD PARAMETERS		SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
Dissolved Oxygen (mg/L)	-	8.13	0.36	0.26	0.14	0.14	0.15	1.18	8.71	1.25	0.26	0.51	0.19	0.86	0.83	1.09
Oxidation Reduction Potential (mv)	-	323.7	28.6	18.1	-73.2	-73.2	-49.8	-91.8	344.7	57.1	-92.5	-31.9	-36.9	-51.4	-189.9	-173.2

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance, - **25**

B = Value within 5 times of the amount detected in the equipment blank sample

J = Estimated Value

N = Matrix Spike sample recovery outside acceptance limits

* = Duplicate analysis Relative Percent Difference outside acceptance limits

H = Holding time exceeded

NA = Not Analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-5
Groundwater Analytical Results - October 30, 2001
Well SHM-96-22B, Varying Depth
Shepley's Hill Landfill
Devens, Massachusetts

PARAMETERS	Well No. CLEANUP LEVEL (1)	SHM-96-22B mid-screen sample at 142.3-ft NGVD	SHM-96-22B near-bottom sample at 128.6-ft NGVD
	ug/L	ug/L	ug/L
VOLATILES (8260B)			
Xylenes	10,000 (2)	<5.0	<5.0
Acetone	3,000 (4)	1.8 JN	<5.0
2-Butanone	-	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0
Benzene	5 (2)	1.1 J	1.2 J
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0
1,1-Dichloroethane	70 (4)	1.4 J	1.9 J
1,2-Dichloroethene (total)	70 (2)	2.0 J	2.7 J
1,2-Dichloroethane	5	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0
METALS (6010B or as noted)			
Aluminum	6,870	<7.7	<7.7
Arsenic	50	**1,670**	**1,240**
Barium	2,000 (2)	96.5	91.0
Cadmium	5 (2)	1.3	0.91
Chromium	100	<0.70	<0.70
Copper	1,300 (3)	2.2	2.1
Iron	9,100	**82,200**	**70,600**
Lead	15	3.1	3.0
Manganese	1,715	**1,960**	**3,730**
Mercury (7470A)	2 (2)	<0.10	<0.10
Nickel	100	7.7	7.2
Selenium	50 (2)	<1.2	<1.2
Silver	40 (4)	<1.5	<1.5
Sodium	20,000	**40,300**	**40,900**
Zinc	2,000 (4)	5.6	6.4
GENERAL CHEMISTRY			
Alkalinity as $CaCO_3$	-	320,000	348,000
Biochemical Oxygen Demand$_5$	-	<1,300	<1,300
Chloride	-	48,400	51,100
Chemical Oxygen Demand	-	43,500 B	83,000 B
Cyanide (Total)	200 (2)	<10.0	<10.0
Hardness as $CaCO_3$	-	249,000	285,000
Nitrate as Nitrogen	10,000 (2)	220	<200
Sulfate	500,000 (2)	2,200	2,400
Total Dissolved Solids	-	412,000	449,000
Total Suspended Solids	-	110,000	93,200
Total Organic Carbon	-	8,300	8,900
FIELD PARAMETERS			
Dissolved Oxygen (mg/L)	-	0.83	0.66
Oxidation Reduction Potential (mv)	-	-189.9	-176.6
pH	-	6.96	6.90
Specific Conductivity (uS/cm)	-	901	935
Temperature (° C)	-	10.4	10.5
Turbidity (NTU)	-	23.4	9.0

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

B = Value within 5 times of the amount detected in the equipment blank sample

J = Estimated Value

N = Matrix Spike sample recovery outside acceptance limits

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-3
Groundwater Analytical Results - Oct 30, Nov 1-2, 2000 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) ug/L	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-18	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	3.2 J	<5.0	<5.0	<5.0	2.2 J	2.9 J	<5.0	<5.0	<5.0	2.5 J	<5.0	2.3 J	<5.0	5.4	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	1.7 J	<5.0	<5.0	<5.0	1.4 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.5 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.4 J	1.3 J	1.3 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	1.3 J	1.2 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.3 J	2.2 J	1.8 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.3 J	2.4 J	1.9 J
1,2-Dichloroethene (total)	70 (2)	<5.0	2.9 J	<5.0	3.0 J	2.8 J	3.0 J	<5.0	<5.0	<5.0	1.9 J	<5.0	1.8 J	2.4 J	2.9 J	1.4 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	1.3 J	<5.0	<5.0	<5.0	<5.0	2.3 J	<5.0	2.9 J	1.4 J	1.7 J	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	17.4 N	**91.5 N**	13.8 N	**2,600 N**	**2,610 N**	40.3 N	31.4 N	<4.2 N	8.8 N	**523 N**	**154 N**	**172 N**	45.0 N	**1,180 N**	47.8 N
Barium	2,000 (2)	10.5	107	9.7	48.9	51.0	58.7	16.8	5.0	6.6	112	23.6	109	13.2	80.4	80.9
Cadmium	5 (2)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	100	1.3	1.0	1.3	<1.0	<1.0	<1.0	4.3	1.5	1.6	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Copper	1,300 (3)	5.4	<1.8	<1.8	<1.8	4.2	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Iron	9,100	5,250	**14,800**	5,100	**25,100**	**26,300**	**65,100**	**10,600**	50.3	98.3	**88,000**	**29,300**	**10,600**	905	**71,600**	870
Lead	15	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Manganese	1,715	530	1,110	720	**12,800**	**12,900**	**5,520**	584	<1.5	37.4	**3,120**	**4,090**	**8,390**	1,300	**1,970**	505
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<3.4	16.2	4.9	15.6	16.4	6.6	3.7	3.8	6.4	4.4	8.8	15.6	9.5	8.0	<3.4
Selenium	50 (2)	<3.7 N	<3.7 N	<3.7 N	6.6 N	<3.7 N	<3.7 N	<3.7 N	<3.7 N	<3.7 N	4.5 N	3.8 N	4.0 N	<3.7 N	3.8 N	<3.7 N
Silver	40 (4)	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Zinc	2,000 (4)	<3.5	9.2	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	4.9	<3.5	11.9	<3.5	<3.5
Aluminum	6,870	196 *	229 *	279 *	12.4 J *	21.2 J *	34.1 *	130 *	14.7 *	28.4 *	76.8 *	20.8 *	49.4 *	40.8 *	32.9 *	24.6 *
Sodium	20,000	16,300	**20,600**	3,690	**40,200**	**42,400**	**37,800**	2,380	974	8,250	**36,300**	3,350	**43,600**	**48,000**	**58,100**	**23,800**
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	25,000	168,000	57,000	392,000	380,000	320,000	84,000	25,000	184,000	252,000	84,000	424,000	22,000	344,000	28,000
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	3,500	<2,000	<2,000	3,500	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000
Chloride	-	1,400	31,600	1,400	55,700	52,700	57,200	4,000	1,200	31,700	49,000	3,200	57,600	69,000	55,700	48,700
Chemical Oxygen Demand	-	<5,000	36,000	14,000	8,000 J	20,000 J	86,000	14,000	<5	<5	20,000	<5	6,000	8,000	22,000	58,000
Cyanide (Total)	200 (2)	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N
Hardness as CaCO3	-	28,000	145,000	70,000	410,000	350,000	220,000	70,000	24,000	230,000	190,000	60,000	380,000	430,000	230,000	300,000
Nitrate as Nitrogen	10,000 (2)	600	300	<200	<200	<200	<200	<200	400	<200	<200	<200	<200	<200	200	<200
Sulfate	500,000 (2)	10,000	8,000	4,100	5,300	5,200	4,900	11,800	3,600	20,800	<0.2	15,800	9,100	3,900	3,400	15,700
Total Dissolved Solids	-	62,000	241,000	100,000	494,000	490,000	391,000	126,000	39,000	297,000	386,000	142,000	535,000	586,000	447,000	368,000
Total Suspended Solids	-	3,100	17,800	1,600 B	44,200	39,500	49,600	1,100 B	2,000 B	2,100 B	63,200	6,400	13,400	2,200 B	112,000	4,100

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance.
B = Value within 5 times of the amount detected in the equipment blank sample
J = Estimated Value
N= Matrix Spike sample recovery outside acceptance limits
* = Duplicate analysis Relative Percent Difference outside acceptance limits

(1) Cleanup values as developed in the ROD (unless otherwised noted)
(2) No cleanup value was developed so the Federal Maximum Contamination Level was used
(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used
(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-2
Groundwater Analytical Results - May 8, 9 & 11, 2000 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) ug/L	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	5.6	<5.0	<5.0	<5.0	<5.0	<5.0	4.1 J	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	1.3 J	1.4 J	1.4 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.8 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.2 J	1.2 J	1.5 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	1.3 J	1.0 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.4 J	2.3 J	2.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.6 J	2.7 J	2.0 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	3.3 J	3.3 J	2.7 J	<5.0	<5.0	<5.0	1.5 J	<5.0	1.6 J	2.9 J	3.3 J	1.4 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	1.6 J	1.6 J	<5.0	<5.0	<5.0	<5.0	1.8 J	<5.0	3.9 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	<2.5	**116**	<2.5	**5,110**	**5,040**	**52.2**	15.0	<2.5	5.9 J	**404**	41.4	**216**	14.6	**1,360**	34.4
Barium	2,000 (2)	<10.7 N	34.7 JN	<10.7 N	67.5 JN	65.2 JN	55.8 JN	12.9 JN	<10.7 N	<10.7 N	116 JN	<10.7 N	111 JN	12.2 JN	97.9 JN	76.1 JN
Cadmium	5 (2)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.33 J	<0.30	0.35 J	<0.30	<0.30	<0.30	0.33 J	<0.30	0.34 J
Chromium	100	10.2	2.6 J	3.6 J	4.0 J	2.5 J	4.2 J	3.5 J	6.7 J	4.0 J	3.3 J	2.6 J	4.0 J	3.3 J	3.1 J	4.2 J
Copper	1,300 (3)	27.7 N	2.9 JN	4.7 JN	12.8 JN	5.8 JN	9.5 JN	4.4 JN	17.2 JN	4.4 JN	4.6 JN	12.1 JN	4.6 JN	4.9 JN	7.1 JN	9.0 JN
Iron	9,100	648	**9,400**	2,130	**45,000**	**44,400**	**67,000**	3,620	176	91.1 J	**71,300**	6,110	**10,500**	396	**86,800**	437
Lead	15	2.4 J*	2.8 J*	4.4 *	2.7 J*	3.3 *	3.1 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	3.4 *	2.7 J*
Manganese	1,715	17.4	826	506	**11,200**	**11,100**	**4,460**	482	7.1 J	40.6	**3,220**	925	**8,640**	830	**2,280**	586
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	4.8 J	<2.9	<2.9	17.5 J	16.2 J	4.6 J	<2.9	<2.9	<2.9	11.7 J	<2.9	14.7 J	7.4 J	6.7 J	<2.9
Selenium	50 (2)	<4.0	<4.0	<4.0	<4.0	4.8 J	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Silver	40 (4)	3.8 J	4.6 J	5.1 J	6.4 J	4.7 J	7.6 J	5.2 J	5.0 J	6.3 J	5.8 J	4.2 J	5.0 J	4.6 J	5.6 J	4.8 J
Zinc	2,000 (4)	15.2 J	3.2 J	6.9 J	3.6 J	2.6 J	2.3 J	4.5 J	2.1 J	2.8 J	1.7 J	3.0 J	2.9 J	15.4 J	3.2 J	7.4 J
Aluminum	6,870	535	49.9 J	400	73.3 J	49.4 J	63.7 J	119 J	231	142 J	48.8 J	54.2 J	50.4 J	41.3 J	33.9 J	69.1 J
Sodium	20,000	692 J	3,460 J	1,950 J	**45,700**	**44,500**	**35,300**	1,300 J	617 J	8,040	**40,400**	981 J	**48,400**	**51,700**	**45,000**	**23,700**
GENERAL CHEMISTRY																
Alkalinity	-	3,000 *	47,000 *	33,000 *	400,000 *	316,000 *	296,000 *	48,000 *	9,000 *	192,000 *	232,000 *	21,000 *	344,000 *	436,000 *	340,000 *	252,000 *
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	2,200
Chloride	-	1,200 *	6,900 *	1,700 *	52,500 *	53,500 *	50,600 *	4,200 *	1,600 *	30,500 *	50,100 *	2,100 *	59,300 *	67,800 *	61,100 *	44,600 *
Chemical Oxygen Demand	-	<5,000	<5,000	20,000	20,000	18,000	24,000	12,000	<5,000	6,000	24,000	<5,000	<5,000	6,000	36,000	<5,000
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness	-	8,000	54,000	32,000	330,000	330,000	330,000	62,000	13,000	226,000	192,000	24,000	72,000	440,000	270,000	300,000
Nitrate as Nitrogen	10,000 (2)	300	300	<200	<200	<200	<200	<200	400	<200	<200	500	<200	<200	<200	300
Sulfate	500,000 (2)	3,400 N	9,900 N	2,000 N	5,200 N	5,200 N	4,400 N	10,500 N	3,900 N	22,700 N	4,400 N	7,200 N	8,500 N	5,200 N	4,400 N	18,000 N
Total Dissolved Solids	-	32,000	71,000	68,000	473,000	474,000	401,000	78,000	59,000	299,000	344,000	36,000	507,000	577,000	460,000	385,000
Total Suspended Solids	-	3,100	4,900	2,000 B	54,200	52,700	67,800	3,400	19,800	12,900	36,700	7,600	13,200	2,300 B	99,800	5,100

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance.

B = Value within 5 times of the amount detected in the equipment blank sample

J = Value below the Contract Required Detection Limit or Practical Quantitation Limit

N = Matrix spike sample recovery outside acceptance limits

* = Duplicate analysis Relative Percent Difference outside acceptance limits

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

APPENDIX B
Landfill Gas Monitoring
Table 1

INSPECTOR: Kullberg TITLE: Civil Engineer DATE: 11/16/04

ORGANIZATION: CENAE-EP WEATHER: Sunny, 45 d F

BAROMETER: 30.0 in Hg TIME: 1020 BAROMETER: 30.0 in Hg TIME: 1345

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0	16.9	0	0	0	3.1	0	CGI O2 – 16.9
V-2	0	2.9	0	>100	0	15.4	11.0	CGI O2 – 3.9
V-3	0	8.9	0	>100	0	10.3	7.6	CGI O2 – 10.8
V-4	0	8.0	0	>100	0	9.5	3.0	CGI O2 – 9.2
V-5	0	11.7	0	33	0	7.0	0.7	CGI O2 – 12.7
V-6	0	11.6	0	78	0	6.8	2.2	CGI O2 – 12.5
V-7	0	7.9	0	19	0	8.2	1.3	CGI O2 – 9.4
V-8	0	7.5	0	31	0	9.6	0.9	CGI O2 – 8.7
V-9	0	4.1	0	>100	0	18.6	23.9	CGI O2 – 5.0
V-10	0	0.3	0	>100	4	17.6	6.5	CGI O2 – 2.2
V-11	0	8.4	0	>100	0	7.4	4.2	CGI O2 – 7.7
V-12	0	20.6	0	46	0	0.8	0.5	CGI O2 – 19.4
V-13	0	21.2	0	75	0	0.1	0.2	CGI O2 – 18.4
V-14	0	4.4	0	>100	13	19.9	33.5	CGI O2 – 4.8
V-15	0	0	0	>100	11	26.1	32.4	CGI O2 – 2.8
V-16	0	0.1	0	>100	10	24.6	22.6	CGI O2 – 2.6
V-17	0	0	0	>100	10	27.6	37.5	CGI O2 – 2.4
V-18	0	21.2	0	0	0	0	0	CGI O2 – 20.9
PGP-1	0	20.6	0	0	0	0.4	0	CGI O2 – 20.5
PGP-2	0	20.0	0	0	0	1.7	0	CGI O2 – 19.8
PGP-3	0	21.3	0	0	0	0	0	CGI O2 – 20.9
PGP-4	0	21.3	0	0	0	0	0	CGI O2 – 20.9

CALIBRATION INFORMATION:

Instrument: PID, 10.6 eV lamp
Results: 0.0/100 ppm isobutylene **Calibrated by:** US Environmental

Instrument: Industrial Scientific MG 140 CGI
Results: 25% LEL Methane/Pentane, 20.9% O_2, 25 ppm H_2S, 100 ppm CO **Calibrated by:** US Environmental Co

Instrument: Landtech GA-90
Results: 20.9% O2, 15% CO2, 15% CH4 **Calibrated by:** US Environmental Co

APPENDIX B
Landfill Gas Monitoring
Table 1

INSPECTOR: Kullberg TITLE: Civil Engineer DATE: 11/17/03

ORGANIZATION: CENAE-EP WEATHER: Cloudy, 45 d F

BAROMETER: 30.0 in Hg TIME: 1020 BAROMETER: 30.2 in Hg TIME: 1400

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0.0	21.0	0	0	0	0	0	CGI O2 – 20.9
V-2	0.0	20.8	0	75	0	0	0	CGI O2 – 21.0
V-3	0.0	20.6	0	0	0	0	0	CGI O2 – 21.0
V-4	0.0	20.7	0	0	0	0	0	CGI O2 – 20.9
V-5	0.0	20.8	0	0	0	0	0	CGI O2 – 20.9
V-6	0.0	20.4	0	1	0	0	0	CGI O2 – 20.9
V-7	0.0	20.4	0	1	0	0	0	CGI O2 – 20.9
V-8	0.0	19.7	0	0	0	0.2	0	CGI O2 – 20.5
V-9	0.0	11.5	0	>100	1	9.9	15.0	CGI O2 – 13.5
V-10	0.4	20.3	0	2	0	0	0	CGI O2 – 20.7
V-11	0.0	19.0	0	5	0	0.5	0	CGI O2 – 19.8
V-12	0.0	19.8	0	0	0	0	0	CGI O2 – 20.9
V-13	0.0	19.2	0	2	0	0.3	0	CGI O2 – 20.2
V-14	0.0	5.8	0	57	0	7.8	3.8	CGI O2 – 7.4
V-15	0.0	8.2	0	74	0	7.4	5.1	CGI O2 – 10.3
V-16	0.0	15.0	0	29	0	2.3	1.0	CGI O2 – 16.2
V-17	0.4	14.8	0	7	0	2.1	0.4	CGI O2 – 19.3
V-18	0.0	19.5	0	2	0	0.4	0.3	CGI O2 – 20.9
PGV-1	0.8	20.0	0	0	0	0.3	0	CGI O2 – 20.8
PGV-2	0.9	18.8	0	0	0	1.7	0	CGI O2 – 20.1
PGV-3	0.9	19.6	0	0	0	0.8	0	CGI O2 – 20.7
PGV-4	0.9	19.9	0	0	0	0.4	0	CGI O2 – 20.7

CALIBRATION INFORMATION:
Instrument: PID, 10.6 eV lamp
Results: 0.0/100 ppm isobutylene Calibrated by: US Environmental

Instrument: Industrial Scientific MG 140 CGI
Results: 25% LEL Methane/Pentane, 20.9% O_2, 25 ppm H_2S, 100 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech GA-90
Results: 20.9% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

APPENDIX B
Landfill Gas Monitoring
Table 1

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 11/05/02

ORGANIZATION: CENAE-EP WEATHER: Sunny, 50 d F.

BAROMETER: 29.92 in Hg TIME: 1050 BAROMETER: 29.86 in Hg TIME: 1330

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0.0	18.3	0	0	0	1.2	0	CGI O2 – 18.9
V-2	0.0	18.1	0	75	0	1.3	1.4	CGI O2 – 18.1
V-3	0.0	10.7	0	>100	0	5.7	3.4	CGI O2 – 10.7
V-4	0.0	14.1	0	>100	0	4	0.9	CGI O2 – 14.0
V-5	0.0	18.8	0	0	0	0.8	0	CGI O2 – 19.0
V-6	0.0	15.4	0	>100	0	3.4	2.8	CGI O2 – 15.9
V-7	0.0	18.0	0	16	0	0.8	0.2	CGI O2 – 18.3
V-8	0.0	16.1	0	40	0	2.4	0.6	CGI O2 – 16.3
V-9	0.0	7.2	0	>100	0	14.7	19.8	CGI O2 – 9.3
V-10	0.0	17.8	0	9	0	0.6	0	CGI O2 – 17.7
V-11	0.0	16.3	0	62	0	1.5	1	CGI O2 – 16.5
V-12	0.0	20.5	0	0	0	0	0	CGI O2 – 20.7
V-13	0.0	9.3	0	>100	0	6.3	4.9	CGI O2 – 9.0
V-14	0.0	2.2	0	>100	0	15.7	18.6	CGI O2 – 2.0
V-15	0.0	4.2	0	>100	0	12.2	10.6	CGI O2 – 4.4
V-16	0.0	20.7	0	0	0	0	0	CGI O2 – 20.9
V-17	0.0	14.9	0	17	0	3	0.5	CGI O2 – 19.2
V-18	0.0	3.2	0	>100	0	19	23.5	CGI O2 – 3.4
PGV-1	0.0	20.2	0	0	0	0.2	0	CGI O2 – 21.7
PGV-2	0.0	19.3	0	0	0	1.4	0	CGI O2 – 19.5
PGV-3	0.0	20.2	0	0	0	0.6	0	CGI O2 – 20.3
PGV-4	0.0	20.2	0	0	0	0.2	0	CGI O2 – 21.7

CALIBRATION INFORMATION:
Instrument: PID, 10.6 eV lamp
Results: 0.0/248 ppm isobutylene Calibrated by: Michalak

Instrument: Industrial Scientific TMX 412 CGI
Results: 53% LEL Methane/Pentane, 14%, 20.9% O_2, 26 ppm H_2S, 54 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90
Results: 20.9% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

APPENDIX B
Landfill Gas Monitoring
Table 1

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 12/05/01

ORGANIZATION: CENAE-EP WEATHER: Sunny, 60's,

BAROMETER: 29.9 in Hg TIME: 0900 BAROMETER: 29.8 in Hg TIME: 1200

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0.0	20.8	0	0	0	0	0	CGI O2 – 21.0
V-2	0.0	15.2	0	93	0	4.7	2.4	CGI O2 – 15.0
V-3	0.0	10.3	0	>100	0	8.3	6.3	CGI O2 – 10.9
V-4	0.0	14.5	0	61	0	4.4	1.3	CGI O2 – 15.0
V-5	0.0	15.3	0	5	0	3.6	0.1	CGI O2 – 16.3
V-6	0.0	14.8	0	37	0	3.9	0.7	CGI O2 – 15.1
V-7	0.0	16.4	0	31	0	2.4	0.7	CGI O2 – 16.5
V-8	0.0	14.8	0	50	0	4.2	1.3	CGI O2 – 15.2
V-9	0.0	6.7	0	>100	0	10.2	9.2	CGI O2 - 10.2
V-10	0.0	13.8	0	55	0	4.1	1.4	CGI O2 – 14.4
V-11	0.0	14.7	0	69	0	3.4	2.5	CGI O2 – 15.1
V-12	0.0	1.2	0	>100	4	13.6	8.0	CGI O2 – 2.5
V-13	0.0	4.3	0	>100	1	10.1	11.3	CGI O2 – 7.0
V-14	0.0	1.6	0	>100	2	22.2	33.1	CGI O2 – 3.6
V-15	0.0	0.3	0	>100	0	22.9	23.4	CGI O2 – 2.1
V-16	0.0	0.4	0	68	1	19.7	12.5	CGI O2 – 2.3
V-17	0.0	2.2	0	>100	3	19.6	17.1	CGI O2 – 4.5
V-18	0.0	3.7	0	>100	0	21.7	29.1	CGI O2 – 6.1
PGV-1	0.0	20.9	0	0	0	0	0	CGI O2 – 20.9
PGV-2	0.0	20.3	0	0	0	0.8	0	CGI O2 – 20.6
PGV-3	0.0	20.7	0	0	0	0.3	0	CGI O2 – 20.8
PGV-4	0.0	20.8	0	0	0	0.1	0	CGI O2 – 20.9

CALIBRATION INFORMATION:
Instrument: PID, 10.6 eV lamp
Results: 0.0/248 ppm isobutylene Calibrated by: Michalak

Instrument: Industrial Scientific TMX 412 CGI
Results: 0.7% Pentane, 50% LEL, 14%/ 21% O_2, 29ppm H_2S, 50 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90
Results: 4% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

APPENDIX B
Landfill Gas Monitoring

Form to be completed in indelible ink *Monitoring is to be performed annually*

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 10/30-11/1/00

ORGANIZATION: CENAE-EP WEATHER: 10/30 – Rainy, 40's 11/1 – Sunny 50's

BAROMETER: 10/30 754 mm Hg TIME: 0900 BAROMETER: 11/1 759 mm Hg TIME: 0900
757 mm Hg TIME: 1500 754 mm Hg TIME: 1200

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO Ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0.0	8.3	0	0	0	9.5	1.0	10/30/00
V-2	0.0	21.0	0	0	0	2.6	1.3	"
V-3	0.0	11.5	0	7	0	7.9	5.8	"
V-4	0.0	17.4	0	0	0	1.7	0.5	"
V-5	0.0	16.3	0	0	0	2.4	0	"
V-6	0.4	11.6	0	4	0	7.2	3.1	"
V-7	0.0	18.1	0	0	0	1.0	0	"
V-8	0.0	19.3	0	0	0	0.1	0	"
V-9	0.0	19.0	0	0	0	0.2	0	"
V-10	0.0	19.1	0	0	0	0.2	0	"
V-11	0.0	19.3	0	0	0	0.1	0	"
V-12	0.0	4.9	0	20	0	8.2	2.7	"
V-13	0.0	0.1	0	>100	0	14.5	19.1	11/1/00 Odor
V-14	0.0	0	0	>100	0	26.6	41.0	11/1/00 Odor
V-15	0.0	0.1	0	>100	0	26.6	27.7	11/1/00 Odor
V-16	30	0.5	0	68	0	21.8	14.6	11/1/00 Odor
V-17	40	0.1	0	>100	0	29.2	32.0	11/1/00 Odor
V-18	0.0	0.2	0	>100	0	30	39.5	11/1/00 Odor

CALIBATION INFORMATION:

Instrument: PID, 10.6 eV lamp

Results: 0.0/248 ppm isobutylene Calibrated by: Kullberg

Instrument: Industrial Scientific TMX 412 CGI

Results: 0.7% Pentane, 50% LEL, 14%/ 21% O_2, 29ppm H_2S, 50 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90

Results: 4% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

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/archeo-logical 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 C

AOC 57

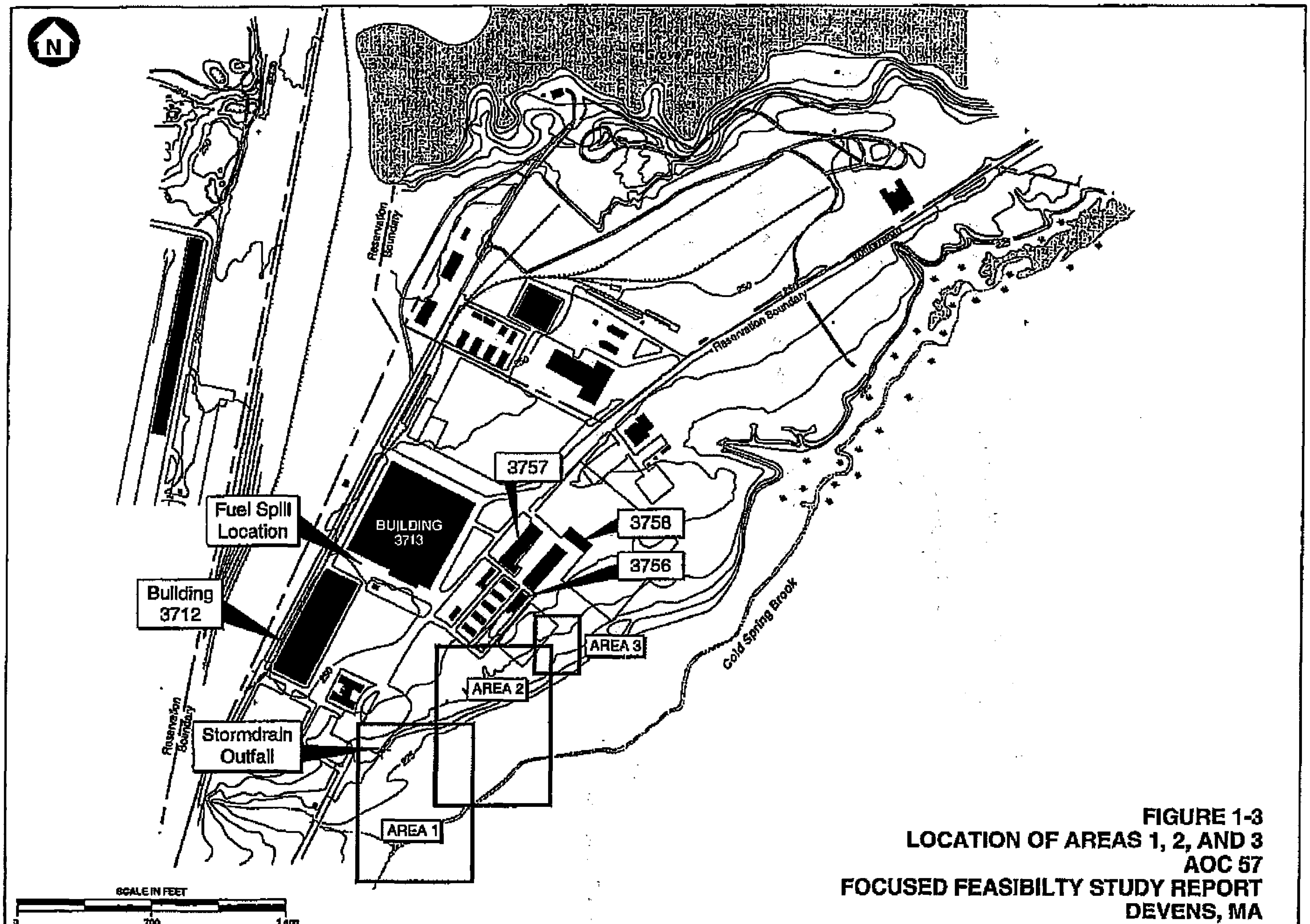


FIGURE 1-3
LOCATION OF AREAS 1, 2, AND 3
AOC 57
FOCUSED FEASIBILTY STUDY REPORT
DEVENS, MA

Harding Lawson Associates

2000012(I).mac 12

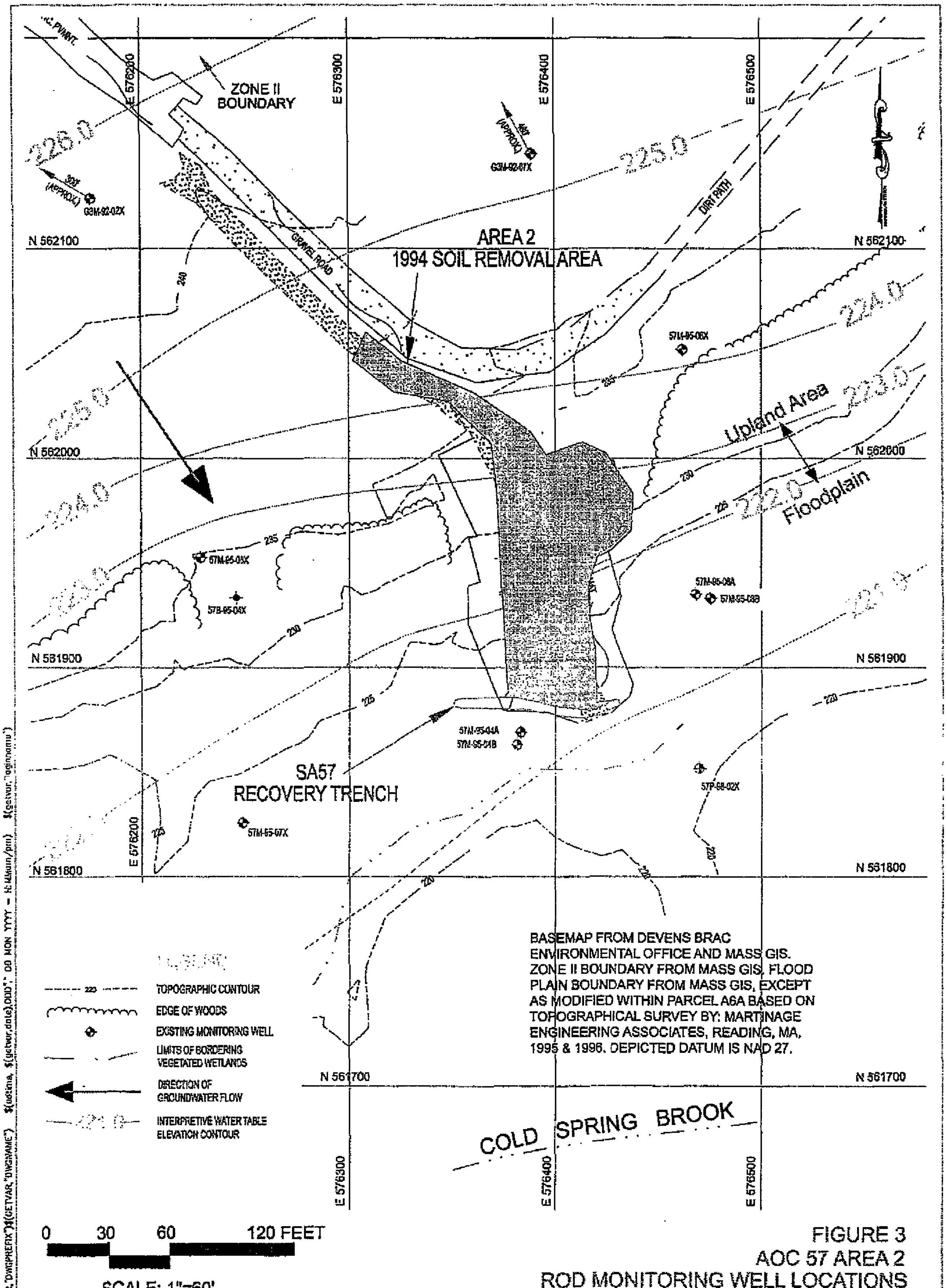
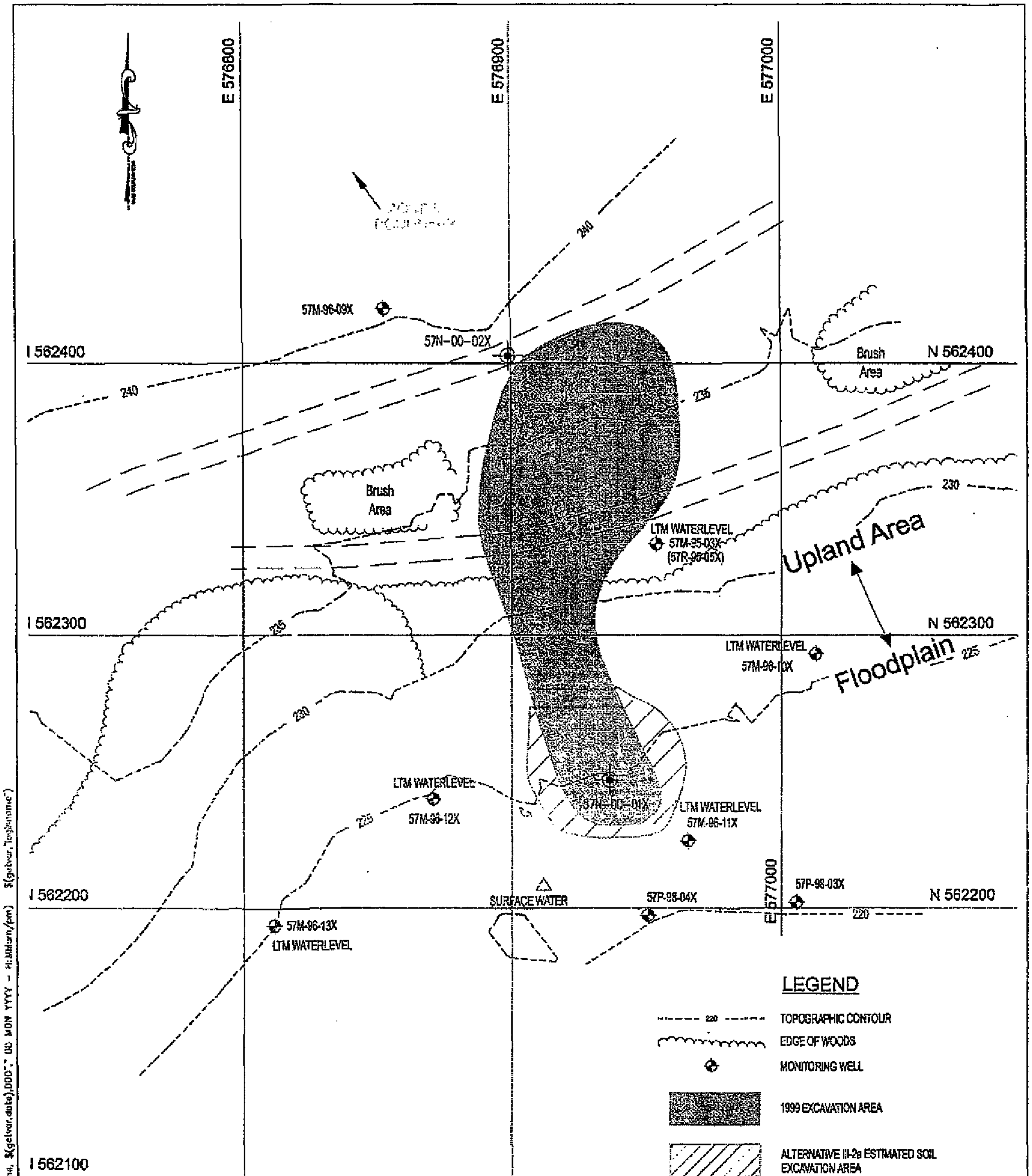


FIGURE 3
AOC 57 AREA 2
ROD MONITORING WELL LOCATIONS
DEVENS RFTA, DEVENS, MASSACHUSETTS
Harding ESE, modified by USACE



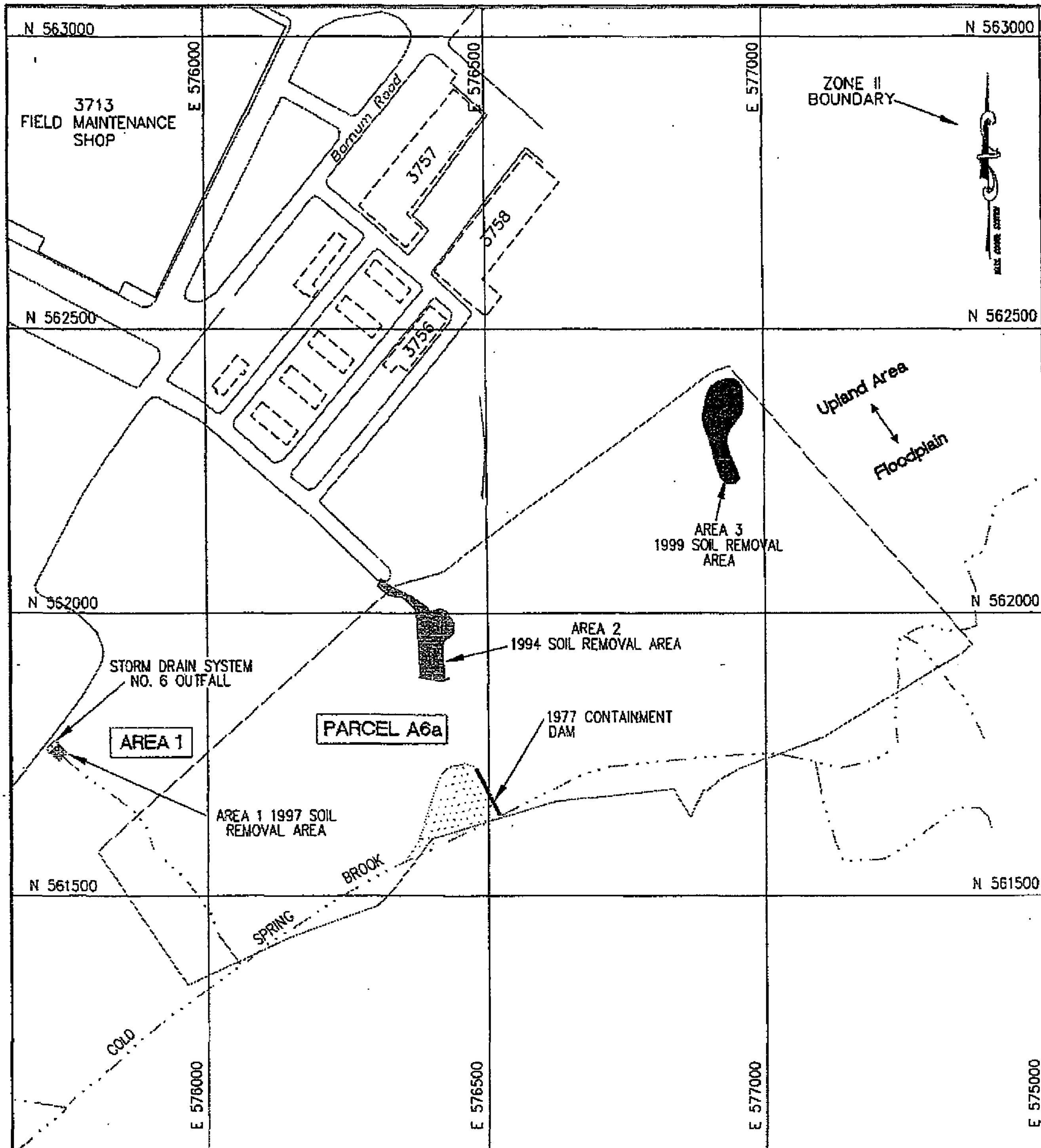
BASEMAP FROM DEVENS BRAC ENVIRONMENTAL OFFICE AND MASS GIS. ZONE II BOUNDARY FROM MASS GIS. FLOOD PLAIN BOUNDARY FROM MASS GIS, EXCEPT AS MODIFIED WITHIN PARCEL A6A BASED ON TOPOGRAPHICAL SURVEY BY: MARTINAGE ENGINEERING ASSOCIATES, READING, MA, 1995 & 1996. DEPICTED DATUM IS NAD 27.

0 25 50 100 FEET

SCALE: 1"=50'

FIGURE 5
AREA 3 - LTM SAMPLE LOCATIONS
AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

Harding ESE modified by USACE



BASEMAP FROM DEVENS BRAC ENVIRONMENTAL OFFICE AND MASS GIS. ZONE II BOUNDARY FROM MASS GIS. FLOOD PLAIN BOUNDARY FROM MASS GIS, EXCEPT AS MODIFIED WITHIN PARCEL A6A BASED ON TOPOGRAPHICAL SURVEY BY: MARTINAGE ENGINEERING ASSOCIATES, READING, MA, 1995 & 1996. DEPICTED DATUM IS NAD 27.

0 125 250 500 FEET

SCALE: 1"=250'

FIGURE 2
AREA 1, 2, AND 3 SITE MAP
AOC 57 RECORD OF DECISION
DEVENS RFTA, DEVENS, MASSACHUSETTS

Harding ESE modified by USACE

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Table 3
Groundwater Analytical Results - December 22, 2003
AOC 57
Devens Massachusetts
(Sheet 1 of 3)

PARAMETERS (Analytical Method)	Well No. GW STANDARD (1)	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B)	ug/L												
Dichlorodifluoromethane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Chloromethane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Vinyl chloride	2	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	**1.3 J**	2U
Chloroethane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Bromomethane	10	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Trichlorofluoromethane	NS	2U	2U	2U	2U	2U	2U	**3**	2U	2U	2U	2U	2U
Diethyl ether	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Acetone	3,000	10U	10U	10U	10U	10U	10U	10U	10U	10U	10UJ	10UJ	10UJ
1,1-Dichloroethene	7	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
Carbon disulfide	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Methylene chloride	5	5U	**0.77 JB**	**0.69 JB**	**0.59 JB**	**0.56 JB**	**0.83 JB**	**0.84 JB**	**0.66 JB**	**0.81 JB**	**0.56 JB**	**0.71 JB**	**1.4 JB**
Methyl tert-butyl ether	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
trans-1,2-Dichloroethene	100	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1-Dichloroethane	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
2-Butanone	350	10U	10U	10U	10U	10U	10U	10U	10U	**7.3 J**	10U	10U	10U
2,2-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
cis-1,2-Dichloroethene	70	2U	**3.2**	2U	2U	**1.7 J**	**9.8**	2U	2U	**0.85 J**	2U	**2.3**	2U
Chloroform	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Tetrahydrofuran	NS	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Bromochloromethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1,1-Trichloroethane	200	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1-Dichloropropene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Carbon tetrachloride	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2-Dichloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Benzene	5	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
Trichloroethene	5	2U	**3.9**	2U	2U	**0.71 J**	2U	2U	2U	2U	2U	**0.56 J**	2U
1,2-Dichloropropane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromodichloromethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Dibromomethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
4-Methyl-2-pentanone	350	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U

(1) - MCP Method 1 GW-1 Groundwater Standards

U - Below laboratory reporting limit

J - Estimated concentration below laboratory reporting limit but above the MDL

UJ - Estimated reporting limit values due to low matrix spike recovery

B - Compound is detected in the sample and the associated method blank and equipment blank

Table 3
Groundwater Analytical Results - December 22, 2003
AOC 57
Devens Massachusetts
(Sheet 2 of 3)

PARAMETERS (Analytical Method)	Well No. GW STANDARD (1)	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B) cont'd	ug/L												
Toluene	1,000	2U	**0.64 J**	2U	2U	2U	2U	2U	**0.73 J**	**4.5**	2U	2U	2U
trans-1,3-Dichloropropene	1	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
1,1,2-Trichloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2-Dibromoethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
2-Hexanone	NS	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
1,3-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Tetrachloroethene	5	2U	**4.1**	2U	2U	**4.1**	2U	2U	2U	2U	2U	2U	2U
Dibromochloromethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Chlorobenzene	100	2U	2U	2U	2U	2U	**1.8 J**	2U	2U	**2.8**	2U	**0.5 J**	2U
1,1,1,2-Tetrachloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Ethylbenzene	700	2U	2U	2U	2U	2U	**26**	2U	**3.6**	**2**	2U	2U	2U
m,p-Xylene	10,000	2U	2U	2U	2U	2U	2U	2U	**11**	**5**	2U	2U	2U
o-Xylene	10,000	2U	2U	2U	2U	2U	**1.6 J**	2U	**7.4**	**2.6**	2U	2U	2U
Styrene	100	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromoform	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Isopropylbenzene	NS	2U	2U	2U	2U	2U	**0.85 J**	2U	**1.4 J**	**0.66 J**	2U	2U	2U
1,1,2,2-Tetrachloroethane	2	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2,3-Trichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromobenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
n-Propylbenzene	NS	2U	2U	2U	2U	2U	**1.3 J**	2U	**2.6**	**1.5 J**	2U	2U	2U
2-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
4-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,3,5-Trimethylbenzene	NS	2U	2U	2U	2U	2U	2U	2U	**14**	**4.3**	2U	2U	2U
tert-Butylbenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2,4-Trimethylbenzene	NS	2U	2U	2U	2U	**1.1 J**	**6.8**	2U	**35**	**16**	2U	2U	2U
sec-Butylbenzene	NS	2U	2U	2U	2U	**0.73 J**	**1.1 J**	2U	**0.75 J**	**0.52 J**	2U	2U	2U
4-Isopropyltoluene	NS	2U	2U	2U	2U	2U	2U	2U	**1.3 J**	**0.51 J**	2U	2U	**1.9 J**
1,3-Dichlorobenzene	600	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,4-Dichlorobenzene	5	2U	2U	2U	2U	2U	**0.55 J**	2U	**1.4 J**	**3.4**	2U	2U	2U
n-Butylbenzene	NS	2U	2U	2U	2U	2U	**0.86 J**	2U	2U	2U	2U	2U	2U
1,2-Dichlorobenzene	600	2U	2U	2U	2U	2U	**0.52 J**	2U	**2**	**8.8**	2U	2U	2U
1,2-Dibromo-3-chloropropane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
1,2,4-Trichlorobenzene	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Hexachlorobutadiene	0.6	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Naphthalene	20	5U	**1.1 J**	5U	5U	5U	**1.5**	5U	**3.1 J**	**2.9 J**	5U	5U	5U
1,2,3-Trichlorobenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL
UJ - Estimated reporting limit values due to low matrix spike recovery

Table 3
Groundwater Analytical Results - December 22, 2003
AOC 57
Devens Massachusetts
(Sheet 3 of 3)

PARAMETERS (Analytical Method)	Well No. GW STANDARD (1)	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PCBs (8082)	ug/L												
Aroclor 1016	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1221	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1232	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1242	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1248	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1254	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Aroclor 1260	0.5	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U
Metals (206.2, 213.2, 239.2)													
Arsenic	50	5U	**4.2 J**	5U	5U	**41**	**22**	5U	**36**	**270**	**3.3 J**	**14**	**35**
Cadmium	5	2U	**0.31 J**	2U	**0.5 J**	**0.33 J**	2U	**0.28 J**	**1.1 J**	2U	**0.33 J**	2U	**0.75 J**
Lead	15	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	**2.6 J**	**34**
EPH (MADEP-EPH)													
C_{11}-C_{22} Aromatics	200	87 U	86 U	88 U	88 U	88 U	88 U	88 U	87 U	91 U	88 U	88 U	92 U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL
25 Result exceeds GW-1 Groundwater Standard

Table 4-2a
Groundwater and Surface WaterAnalytical Results
May 19, 2004
AOC 57
Devens Massachusetts
(SHEET 1 of 3)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B)	ug/L												
Dichlorodifluoromethane	NS	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ
Chloromethane	NS	**2.7J**	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ
Vinyl chloride	2	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Chloroethane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Bromomethane	10	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Trichlorofluoromethane	NS	2U	2U	**2J**	2U	2U	2U	**3.7**	2U	2U	2U	2U	2U
Diethyl ether	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Acetone	3,000	10UJ	10UJ	10UJ	**4 J**	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
1,1-Dichloroethene	7	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
Carbon disulfide	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2UJ	2UJ	2UJ
Methylene chloride	5	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
Methyl tert-butyl ether	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
trans-1,2-Dichloroethene	100	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1-Dichloroethane	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
2-Butanone	350	10U	10U	10U	**7.4 J**	10U	10U	10U	10U	**7.3 J**	10U	10U	10U
2,2-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
cis-1,2-Dichloroethene	70	**0.71J**	**7.1**	2U	**1.5 J**	**7.3**	**4.3**	2U	2U	**1.6 J**	2U	2U	2U
Chloroform	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Tetrahydrofuran	NS	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Bromochloromethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1,1-Trichloroethane	200	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,1-Dichloropropene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Carbon tetrachloride	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2-Dichloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Benzene	5	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
Trichloroethene	5	**0.75J**	**4.3**	2U	2U	**2.2**	2U	2U	2U	**0.52 J**	2U	2U	2U
1,2-Dichloropropane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromodichloromethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2UJ	2UJ	2UJ
Dibromomethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
4-Methyl-2-pentanone	350	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL

Source wells: 57M-95-03X
Sentry wells: 57M-96-11X

Table 4-2a
Groundwater and Surface Water Analytical Results
May 19, 2004
AOC 57
Devens Massachusetts
(SHEET 2 of 3)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
VOLATILES (8260B) cont'd	GW STANDARD (1) ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Toluene	1,000	2U	**1.2 J**	2U	**8.9**	2U	**16**	2U	**1.6 J**	**8.5**	2U	**0.88 J**	2U
trans-1,3-Dichloropropene	1	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U
1,1,2-Trichloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2-Dibromoethane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
2-Hexanone	NS	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,3-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Tetrachloroethene	5	2U	**2.3**	**2J**	2U	**3.4**	2U	2U	**0.82 J**	2U	2U	2U	2U
Dibromochloromethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2UJ	2UJ	2UJ
Chlorobenzene	100	2U	2U	2U	**2.9**	2U	**0.72 J**	2U	2U	**2.6**	2U	2U	2U
1,1,1,2-Tetrachloroethane	5	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Ethylbenzene	700	2U	2U	2U	**3.6**	2U	**26**	2U	**7.5**	**3.4**	2U	2U	2U
m,p-Xylene	10,000	2U	2U	2U	**5.3**	2U	2U	2U	**21**	**4.7**	2U	2U	2U
o-Xylene	10,000	2U	2U	2U	**3.1**	2U	**0.56 J**	2U	**15**	**2.8**	2U	2U	2U
Styrene	100	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromoform	5	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ
Isopropylbenzene	NS	2U	2U	2U	**1.2 J**	2U	**0.76 J**	2U	**2.6**	**1 J**	2U	2U	2U
1,1,2,2-Tetrachloroethane	2	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2,3-Trichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Bromobenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
n-Propylbenzene	NS	2U	2U	2U	**2.3**	2U	**1.5 J**	2U	**4**	**2.2**	2U	2U	2U
2-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
4-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,3,5-Trimethylbenzene	NS	2U	2U	2U	**5.2**	2U	2U	2U	**14**	**4.5**	2U	2U	2U
tert-Butylbenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,2,4-Trimethylbenzene	NS	2U	2U	2U	**18**	2U	**7.4**	2U	**49**	**17**	2U	2U	2U
sec-Butylbenzene	NS	2U	2U	2U	**0.7 J**	2U	**1.1 J**	2U	**1.1 J**	**0.59 J**	2U	2U	2U
4-Isopropyltoluene	NS	2U	2U	2U	**0.64 J**	2U	**1 J**	2U	**1.1 J**	**0.61 J**	2U	2U	2U
1,3-Dichlorobenzene	600	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
1,4-Dichlorobenzene	5	2U	2U	2U	**4.2**	2U	5U	2U	**2.2**	**3.8**	2U	2U	2U
n-Butylbenzene	NS	2U	2U	2U	2U	2U	**1 J**	2U	2U	2U	2U	2U	2U
1,2-Dichlorobenzene	600	2U	2U	2U	**10**	**0.6 J**	**0.89 J**	2U	**3.3**	**9.9**	2U	2U	2U
1,2-Dibromo-3-chloropropane	NS	5U	5U	5U	5U	5U	5U	5U	5U	5U	5UJ	5UJ	5UJ
1,2,4-Trichlorobenzene	70	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Hexachlorobutadiene	0.6	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Naphthalene	20	5U	5U	5U	**5.3**	5U	**2.6 J**	5U	**5.5**	**5.3**	5U	5U	5U
1,2,3-Trichlorobenzene	NS	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL

Source wells: 57M-95-03X
Sentry wells: 57M-96-11X

Table 4-2a
Groundwater and Surface Water Analytical Results
May 19, 2004
AOC 57
Devens Massachusetts
(SHEET 3 of 3)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-DUP	57M-03-04X	57M-03-05X	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PCBs (8082)	ug/L												
Aroclor 1016	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1221	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1232	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1242	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1248	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1254	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Aroclor 1260	0.5	0.24 U	0.24 U	0.22 U	0.23 U	0.22 U	0.22U	0.22U	0.21 U	0.22U	0.21 U	0.21 U	0.22UJ
Metals (206.2, 213.2, 239.2)		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Arsenic	50	5U	**6.4 J**	5U	**240**	**30 J**	**21 J**	5U	**44**	**210**	**4.4 J**	**8.1**	**3.1 J**
Cadmium	5	**0.3 J**	**0.65 J**	**0.55 J**	**0.5 J**	**0.31 J**	**0.47 J**	**0.5 J**	**0.6 J**	**0.32 J**	**0.42 J**	**0.51 J**	**0.59 J**
Lead	15	5U	**0.88 J**	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U
EPH (MADEP-EPH)		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
C_{11}-C_{22} Aromatics	200	120U	120U	100U	110U	100U	110U	110U	110U	120U	110U	110U	110U

(1) - MCP Method 1 GW-1 Groundwater Standards

U - Below laboratory reporting limit

J - Estimated concentration below laboratory reporting limit but above the MDL

25	Exceeds MCP GW-1 Groundwater Standard

Table 4-2b
Sump Water Analytical Results
June 2, 2004
AOC 57
Devens Massachusetts
(SHEET 1 of 3)

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B)	ug/L				
Dichlorodifluoromethane	NS	5UJ	5UJ	5UJ	5UJ
Chloromethane	NS	5U	5U	5U	5U
Vinyl chloride	2	2U	2U	2U	2U
Chloroethane	NS	5U	5U	5U	5U
Bromomethane	10	2U	2U	2U	2U
Trichlorofluoromethane	NS	2U	2U	2U	2U
Diethyl ether	NS	5U	5U	5U	5U
Acetone	3,000	10U	10U	10U	10U
1,1-Dichloroethene	7	1U	1U	1U	1U
Carbon disulfide	NS	2U	2U	2U	2U
Methylene chloride	5	5U	5U	5U	5U
Methyl tert-butyl ether	70	2U	2U	2U	2U
trans-1,2-Dichloroethene	100	2U	2U	2U	2U
1,1-Dichloroethane	70	2U	2U	2U	2U
2-Butanone	350	10U	10U	10U	10U
2,2-Dichloropropane	NS	2U	2U	2U	2U
cis-1,2-Dichloroethene	70	**0.84 J**	**0.86 J**	2U	2U
Chloroform	NS	2U	2U	2U	2U
Tetrahydrofuran	NS	10U	10U	10U	10U
Bromochloromethane	NS	2U	2U	2U	2U
1,1,1-Trichloroethane	200	2U	2U	2U	2U
1,1-Dichloropropene	NS	2U	2U	2U	2U
Carbon tetrachloride	5	2U	2U	2U	2U
1,2-Dichloroethane	5	2U	2U	2U	2U
Benzene	5	1U	1U	1U	1U
Trichloroethene	5	2U	2U	2U	2U
1,2-Dichloropropane	5	2U	2U	2U	2U
Bromodichloromethane	5	2U	2U	2U	2U
Dibromomethane	NS	2U	2U	2U	2U
4-Methyl-2-pentanone	350	10U	10U	10U	10U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U

(1) - MCP Method 1 GW-1 Groundwater Standards

U - Below laboratory reporting limit

J - Estimated concentration below laboratory reporting limit but above the MDL

Table 4-2b
Sump Water Analytical Results
June 2, 2004
AOC 57
Devens Massachusetts
(SHEET 2 of 3)

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B) cont'd	ug/L				
Toluene	1,000	2U	2U	2U	2U
trans-1,3-Dichloropropene	1	1U	1U	1U	1U
1,1,2-Trichloroethane	5	2U	2U	2U	2U
1,2-Dibromoethane	NS	2U	2U	2U	2U
2-Hexanone	NS	10U	10U	10U	10U
1,3-Dichloropropane	NS	2U	2U	2U	2U
Tetrachloroethene	5	**0.57 J**	**0.58 J**	2U	**0.98 J**
Dibromochloromethane	5	2U	2U	2U	2U
Chlorobenzene	100	2U	2U	2U	2U
1,1,1,2-Tetrachloroethane	5	2U	2U	2U	2U
Ethylbenzene	700	2U	2U	2U	2U
m,p-Xylene	10,000	2U	2U	2U	2U
o-Xylene	10,000	2U	2U	2U	2U
Styrene	100	2U	2U	2U	2U
Bromoform	5	2U	2U	2U	2U
Isopropylbenzene	NS	2U	2U	2U	2U
1,1,2,2-Tetrachloroethane	2	2U	2U	2U	2U
1,2,3-Trichloropropane	NS	2U	2U	2U	2U
Bromobenzene	NS	2U	2U	2U	2U
n-Propylbenzene	NS	2U	2U	2U	2U
2-Chlorotoluene	NS	2U	2U	2U	2U
4-Chlorotoluene	NS	2U	2U	2U	2U
1,3,5-Trimethylbenzene	NS	2U	2U	2U	2U
tert-Butylbenzene	NS	2U	2U	2U	2U
1,2,4-Trimethylbenzene	NS	2U	2U	2U	2U
sec-Butylbenzene	NS	2U	2U	2U	2U
4-Isopropyltoluene	NS	2U	2U	2U	2U
1,3-Dichlorobenzene	600	2U	2U	2U	2U
1,4-Dichlorobenzene	5	**0.62 J**	**0.53 J**	2U	2U
n-Butylbenzene	NS	2U	2U	2U	2U
1,2-Dichlorobenzene	600	2U	2U	2U	2U
1,2-Dibromo-3-chloropropane	NS	5U	5U	5U	5U
1,2,4-Trichlorobenzene	70	2U	2U	2U	2U
Hexachlorobutadiene	0.6	2U	2U	2U	2U
Naphthalene	20	5U	5U	5U	5U
1,2,3-Trichlorobenzene	NS	2U	2U	2U	2U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL

Table 4-2b
Sump Water Analytical Results
June 2, 2004
AOC 57
Devens Massachusetts
(SHEET 3 of 3)

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
PCBs (8082)	ug/L				
Aroclor 1016	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1221	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1232	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1242	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1248	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1254	0.5	0.23 U	0.23 U	0.22U	0.23 U
Aroclor 1260	0.5	0.23 U	**0.34**	0.22U	0.23 U

Metals (206.2, 213.2, 239.2)		µg/L	µg/L	µg/L	µg/L
Arsenic	50	**55**	**28**	**22**	**21**
Cadmium	5	**0.37 J**	**0.47 J**	2U	**0.28 J**
Lead	15	**1.3 J**	**1.1 J**	**1.2 J**	**0.8 J**

EPH (MADEP-EPH)		µg/L	µg/L	µg/L	µg/L
C_{11}-C_{22} Aromatics	200	120U	120U	110U	120U

(1) - MCP Method 1 GW-1 Groundwater Standards
U - Below laboratory reporting limit
J - Estimated concentration below laboratory reporting limit but above the MDL

25	**Exceeds MCP GW-1 Groundwater Standard**

Table 4-2
Groundwater Analytical Results - November 2004
AOC 57
Devens Massachusetts
(SHEET 1 of 6)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-03-04X	57M-03-05X	57M-DUP	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B)	ug/L												
Dichlorodifluoromethane	NS	5U	5U	5U	5U	5U	5U	5U	50U	5U	5U	5U	5U
Chloromethane	NS	5U	5U	5U	5U	5U	5U	5U	50U	5U	5U	5U	5U
Vinyl chloride	2	2U	**0.62J**	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Chloroethane	NS	5U	5U	5U	5U	5U	5U	5U	50U	5U	5U	5U	5U
Bromomethane	10	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Trichlorofluoromethane	NS	**0.67J**	2U	2U	2U	2U	2U	**0.8J**	20U	2U	2U	2U	2U
Diethyl ether	NS	5U	5U	5U	5U	5U	5U	5U	50U	5U	5U	5U	5U
Acetone	3,000	**3.7J**	**4.5J**	10U	10U	10U	10U	10U	100U	10U	10U	10U	10U
1,1-Dichloroethene	7	1U	1U	1U	1U	1U	1U	1U	10U	1U	1U	1U	1U
Carbon disulfide	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Methylene chloride	5	5U	5U	5U	5U	5U	5U	5U	50U	5U	5U	5U	5U
Methyl tert-butyl ether	70	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
trans-1,2-Dichloroethene	100	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,1-Dichloroethane	70	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
2-Butanone	350	10U	10U	10U	10U	10U	10U	10U	100U	10U	10U	10U	10U
2,2-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
cis-1,2-Dichloroethene	70	2U	**7.3**	**8.3**	**2.6**	**0.57J**	**0.57J**	2U	20U	**1.3J**	2U	**2.3**	2U
Chloroform	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Tetrahydrofuran	NS	10U	10U	10U	10U	10U	10U	10U	100U	10U	10U	10U	10U
Bromochloromethane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,1,1-Trichloroethane	200	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,1-Dichloropropene	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Carbon tetrachloride	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,2-Dichloroethane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Benzene	5	1U	1U	1U	1U	1U	1U	1U	10U	1U	1U	1U	1U
Trichloroethene	5	2U	**5.3**	**2.7**	**1.5J**	2U	2U	2U	20U	2U	2U	**1.3 J**	2U
1,2-Dichloropropane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Bromodichloromethane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Dibromomethane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
4-Methyl-2-pentanone	350	10U	10U	10U	10U	10U	10U	10U	100U	10U	10U	10U	10U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U	1U	1U	1U	10U	1U	1U	1U	1U

(1) MCP Method 1 GW-1 Groundwater Standards

U = Not detected at or above the Reporting Limit indicated.

J = Estimated concentration below laboratory reporting limit but above the MDL

Source wells: 57M-95-03X

Sentry wells: 57M-96-11X

Table 4-2
Groundwater Analytical Results - November 2004
AOC 57
Devens Massachusetts
(SHEET 2 of 6)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-03-04X	57M-03-05X	57M-DUP	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B) *cont'd*	ug/L												
Toluene	1,000	2U	**2U**	2U	2U	2U	2U	2U	**30**	**2.0J**	2U	2U	2U
trans-1,3-Dichloropropene	1	1U	1U	**1U**	1U	1U	1U	1U	10U	1U	**1U**	1U	1U
1,1,2-Trichloroethane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,2-Dibromoethane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
2-Hexanone	NS	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	100U	10UJ	10UJ	10UJ	10UJ
1,3-Dichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Tetrachloroethene	5	2U	**2.7**	2U	**1.4J**	2U	2U	2U	20U	2U	2U	1.1 J	2U
Dibromochloromethane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Chlorobenzene	100	2U	2U	2U	2U	**2U**	2U	2U	20U	**2.6**	2U	**2U**	2U
1,1,1,2-Tetrachloroethane	5	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Ethylbenzene	700	2U	2U	2U	2U	**0.55J**	2U	2U	**140**	**2.1**	2U	2U	2U
m,p-Xylene	10,000	2U	2U	2U	2U	2U	2U	2U	**200**	**1.4J**	2U	2U	2U
o-Xylene	10,000	2U	2U	2U	2U	**2U**	2U	2U	**250**	**1.4J**	2U	2U	2U
Styrene	100	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Bromoform	5	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	20U	2UJ	2UJ	2UJ	2UJ
Isopropylbenzene	NS	2U	2U	0.69J	1.1J	**2U**	2U	2U	**27**	**0.86J**	2U	2U	2U
1,1,2,2-Tetrachloroethane	2	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	2UJ	20U	2UJ	2UJ	2UJ	2UJ
1,2,3-Trichloropropane	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Bromobenzene	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
n-Propylbenzene	NS	2U	2U	0.59J	2U	**2U**	2U	2U	**55**	**1.7J**	2U	2U	2U
2-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
4-Chlorotoluene	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,3,5-Trimethylbenzene	NS	2U	2U	2U	2U	2U	2U	2U	**140**	**0.75J**	2U	2U	2U
tert-Butylbenzene	NS	2U	2U	2U	1.1J	2U	2U	2U	5.1J	2U	2U	2U	2U
1,2,4-*Trimethylbenzene*	NS	2U	2U	13	**2U**	**2U**	2U	2U	**640**	**6.6**	2U	2U	2U
sec-Butylbenzene	NS	2U	2U	2U	**2.6**	**2U**	2U	2U	**14J**	**0.68J**	2U	2U	2U
4-Isopropyltoluene	NS	2U	2U	2U	2U	2U	2U	2U	**20**	**2U**	2U	2U	**2U**
1,3-Dichlorobenzene	600	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
1,4-Dichlorobenzene	5	2U	2U	2U	2U	**2U**	2U	2U	**13J**	**2.4**	2U	2U	2U
n-Butylbenzene	NS	2U	2U	2U	2U	**2U**	2U	2U	20U	2U	2U	2U	2U
1,2-Dichlorobenzene	600	2U	2U	2U	2.4	**2U**	2U	2U	**27**	**4.8**	2U	2U	2U
1,2-Dibromo-3-chloropropane	NS	5UJ	5UJ	5UJ	5UJ	5UJ	5UJ	5U	50U	5UJ	5UJ	5UJ	5UJ
1,2,4-Trichlorobenzene	70	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Hexachlorobutadiene	0.6	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U
Naphthalene	20	5U	**5U**	5U	5U	**5U**	5U	5U	**96**	**1.8J**	5U	5U	5U
1,2,3-Trichlorobenzene	NS	2U	2U	2U	2U	2U	2U	2U	20U	2U	2U	2U	2U

(1) MCP Method 1 GW-1 Groundwater Standards
U = Not detected at or above the Reporting Limit indicated.
J = Estimated concentration below laboratory reporting limit but above the MDL

Source wells: 57M-95-03X
Sentry wells: 57M-96-11X

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B)	ug/L				
Dichlorodifluoromethane	NS	5U	5U	5U	5U
Chloromethane	NS	5U	5U	5U	5U
Vinyl chloride	2	2U	2U	2U	**0.55J**
Chloroethane	NS	5U	5U	5U	5U
Bromomethane	10	2U	2U	2U	2U
Trichlorofluoromethane	NS	2U	2U	2U	2U
Diethyl ether	NS	5U	5U	5U	5U
Acetone	3,000	**2.8J**	**3.4J**	**3.6J**	**3J**
1,1-Dichloroethene	7	1U	1U	1U	1U
Carbon disulfide	NS	2U	2U	2U	2U
Methylene chloride	5	5U	5U	5U	5U
Methyl tert-butyl ether	70	2U	2U	2U	2U
trans-1,2-Dichloroethene	100	2U	2U	2U	2U
1,1-Dichloroethane	70	2U	2U	2U	2U
2-Butanone	350	10U	10U	10U	10U
2,2-Dichloropropane	NS	2U	2U	2U	2U
cis-1,2-Dichloroethene	70	**0.63J**	**1.6J**	**1.1J**	**2.9J**
Chloroform	NS	2U	2U	2U	2U
Tetrahydrofuran	NS	10U	10U	10U	10U
Bromochloromethane	NS	2U	2U	2U	2U
1,1,1-Trichloroethane	200	2U	2U	2U	2U
1,1-Dichloropropene	NS	2U	2U	2U	2U
Carbon tetrachloride	5	2U	2U	2U	2U
1,2-Dichloroethane	5	2U	2U	2U	2U
Benzene	5	1U	1U	1U	1U
Trichloroethene	5	2U	**0.79J**	**0.76J**	**1.7J**
1,2-Dichloropropane	5	2U	2U	2U	2U
Bromodichloromethane	5	2U	2U	2U	2U
Dibromomethane	NS	2U	2U	2U	2U
4-Methyl-2-pentanone	350	10U	10U	10U	10U
cis-1,3-Dichloropropene	1	1U	1U	1U	1U

(1) MCP Method 1 GW-1 Groundwater Standards

U = Not detected at or above the Reporting Limit indicated.

J = Estimated concentration below laboratory reporting limit but above the MDL

Table 4-2
SUMP Analytical Results - November 2004
AOC 57
Devens Massachusetts
(SHEET 4 of 6)

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
VOLATILES (8260B) cont'd	ug/L				
Toluene	1,000	2U	2U	2U	2U
trans-1,3-Dichloropropene	1	1U	1U	1U	1U
1,1,2-Trichloroethane	5	2U	2U	2U	2U
1,2-Dibromoethane	NS	2U	2U	2U	2U
2-Hexanone	NS	10UJ	10UJ	10UJ	10UJ
1,3-Dichloropropane	NS	2U	2U	2U	2U
Tetrachloroethene	5	2U	2U	2U	**0.75J**
Dibromochloromethane	5	2U	2U	2U	2U
Chlorobenzene	100	2U	2U	2U	2U
1,1,1,2-Tetrachloroethane	5	2U	2U	2U	2U
Ethylbenzene	700	2U	2U	2U	2U
m,p-Xylene	10,000	2U	2U	2U	2U
o-Xylene	10,000	2U	2U	2U	2U
Styrene	100	2U	2U	2U	2U
Bromoform	5	2UJ	2UJ	2UJ	2UJ
Isopropylbenzene	NS	2U	2U	2U	2U
1,1,2,2-Tetrachloroethane	2	2UJ	2UJ	2UJ	2UJ
1,2,3-Trichloropropane	NS	2U	2U	2U	2U
Bromobenzene	NS	2U	2U	2U	2U
n-Propylbenzene	NS	2U	2U	2U	2U
2-Chlorotoluene	NS	2U	2U	2U	2U
4-Chlorotoluene	NS	2U	2U	2U	2U
1,3,5-Trimethylbenzene	NS	2U	2U	2U	2U
tert-Butylbenzene	NS	2U	2U	2U	2U
1,2,4-Trimethylbenzene	NS	2U	2U	**0.56J**	2U
sec-Butylbenzene	NS	2U	2U	2U	2U
4-Isopropyltoluene	NS	2U	2U	2U	2U
1,3-Dichlorobenzene	600	2U	2U	2U	2U
1,4-Dichlorobenzene	5	2U	2U	2U	2U
n-Butylbenzene	NS	2U	2U	2U	2U
1,2-Dichlorobenzene	600	2U	2U	2U	2U
1,2-Dibromo-3-chloropropane	NS	5UJ	5UJ	5UJ	5UJ
1,2,4-Trichlorobenzene	70	2U	2U	2U	2U
Hexachlorobutadiene	0.6	2U	2U	2U	2U
Naphthalene	20	5U	5U	5U	5U
1,2,3-Trichlorobenzene	NS	2U	2U	2U	2U

(1) MCP Method 1 GW-1 Groundwater Standards

U = Not detected at or above the Reporting Limit indicated.

J = Estimated concentration below laboratory reporting limit but above the MDL

Table 4-2
Groundwater Analytical Results - November 2004
AOC 57
Devens Massachusetts
(SHEET 5 of 6)

PARAMETERS	Well No.	57M-03-01X	57M-03-02X	57M-03-03X	57M-03-04X	57M-03-05X	57M-DUP	57M-03-06X	57M-95-03X	57M-96-11X	57-AREA 2-SW2	57-AREA 2-SW3	57-AREA 3-SW1
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PCBs (8082)	ug/L												
Aroclor 1016	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1221	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1232	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1242	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1248	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1254	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Aroclor 1260	0.5	0.22 U	0.23 U	0.22 U	0.23 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.22 U	0.21 U	0.22 U
Metals (206.2, 213.2, 239.2)													
Arsenic	50	5U	**8.9**	5U	**50**	**19**	**17**	5U	**230**	**120**	5U	**46**	**4.9J**
Cadmium	5	**1J**	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Lead	15	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	**0.81J**
EPH (MADEP-EPH)													
C_{11}-C_{22} Aromatics	200	110U	120U	110U	120U	100U	110U	110U	110U	100U	110U	110U	100U
FIELD PARAMETERS													
ORP (mv)		183.4	156.4	246.8	103.7	20.4	NA	348.1	-249.7	-93.4	NA	NA	NA
DO (mg/L)		8.19	2.87	0.32	1.62	0.26	NA	5.06	0.45	0.10	NA	NA	NA

(1) MCP Method 1 GW-1 Groundwater Standards
U = Not detected at or above the Reporting Limit indicated.
J = Estimated concentration below laboratory reporting limit but above the MDL
ug/L = Micrograms per Liter

Table 4-2
SUMP Analytical Results - November 2004
AOC 57
Devens Massachusetts
(SHEET 6 of 6)

PARAMETERS	Well No.	SUMP 1	SUMP 2	SUMP 3	SUMP 4
	GW STANDARD (1)	µg/L	µg/L	µg/L	µg/L
PCBs (8082)	ug/L				
Aroclor 1016	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1221	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1232	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1242	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1248	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1254	0.5	0.20 U	0.21 U	0.20 U	0.21 U
Aroclor 1260	0.5	0.20 U	0.21 U	0.20 U	0.21 U

Metals (206.2, 213.2, 239.2)					
Arsenic	50	**7.8**	**24**	**25**	**62**
Cadmium	5	2U	2U	**0.36J**	2U
Lead	15	5U	5U	5U	**1.4J**

EPH (MADEP-EPH)					
C_{11}-C_{22} Aromatics	200	100U	100U	100U	110U

(1) MCP Method 1 GW-1 Groundwater Standards
U = Not detected at or above the Reporting Limit indicated.
J = Estimated concentration below laboratory reporting limit but above the MDL
ug/L = Micrograms per Liter

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

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

APPENDIX D

AOC 43G & J

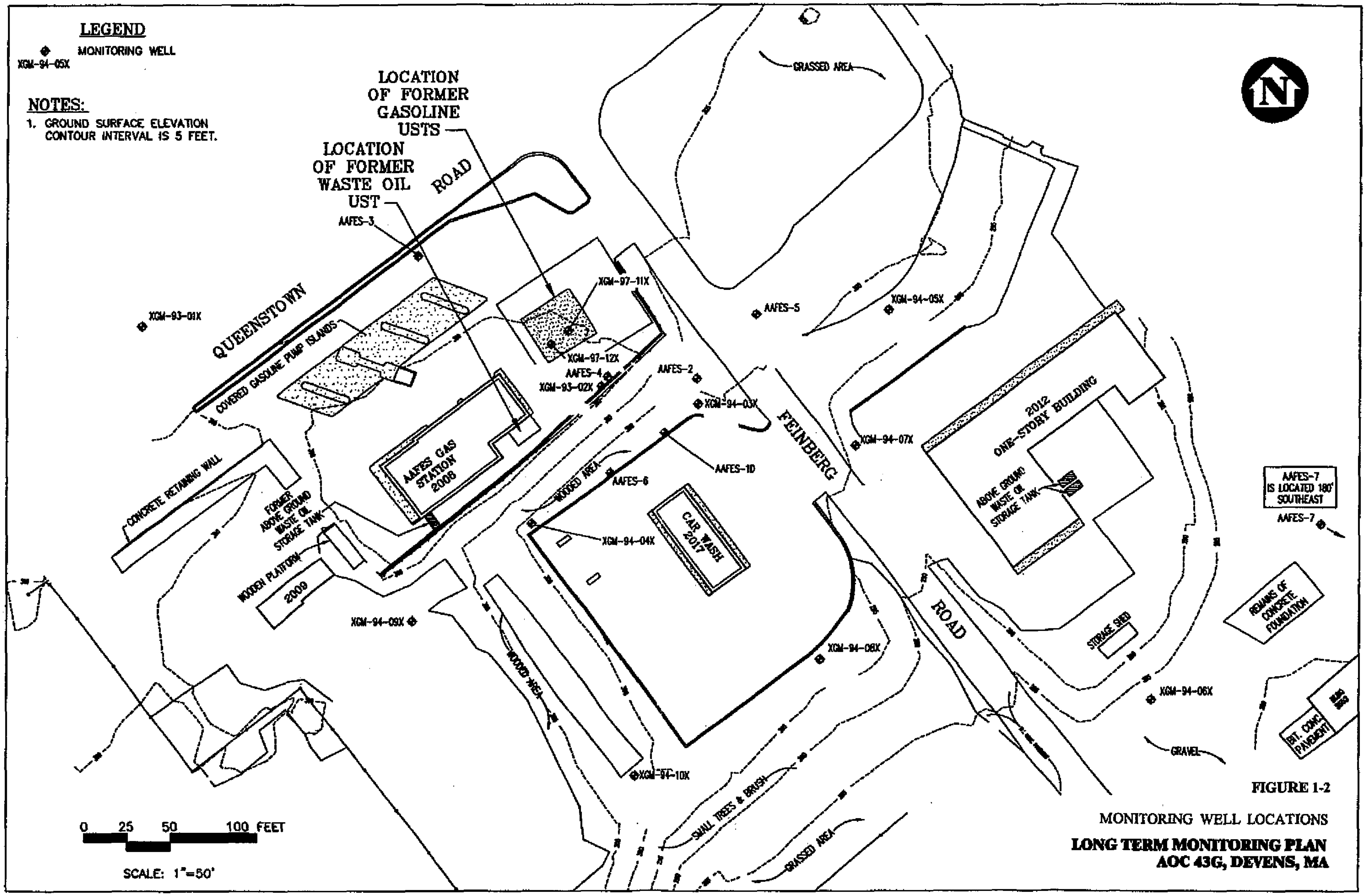


FIGURE 1-2

MONITORING WELL LOCATIONS

LONG TERM MONITORING PLAN
AOC 43G, DEVENS, MA

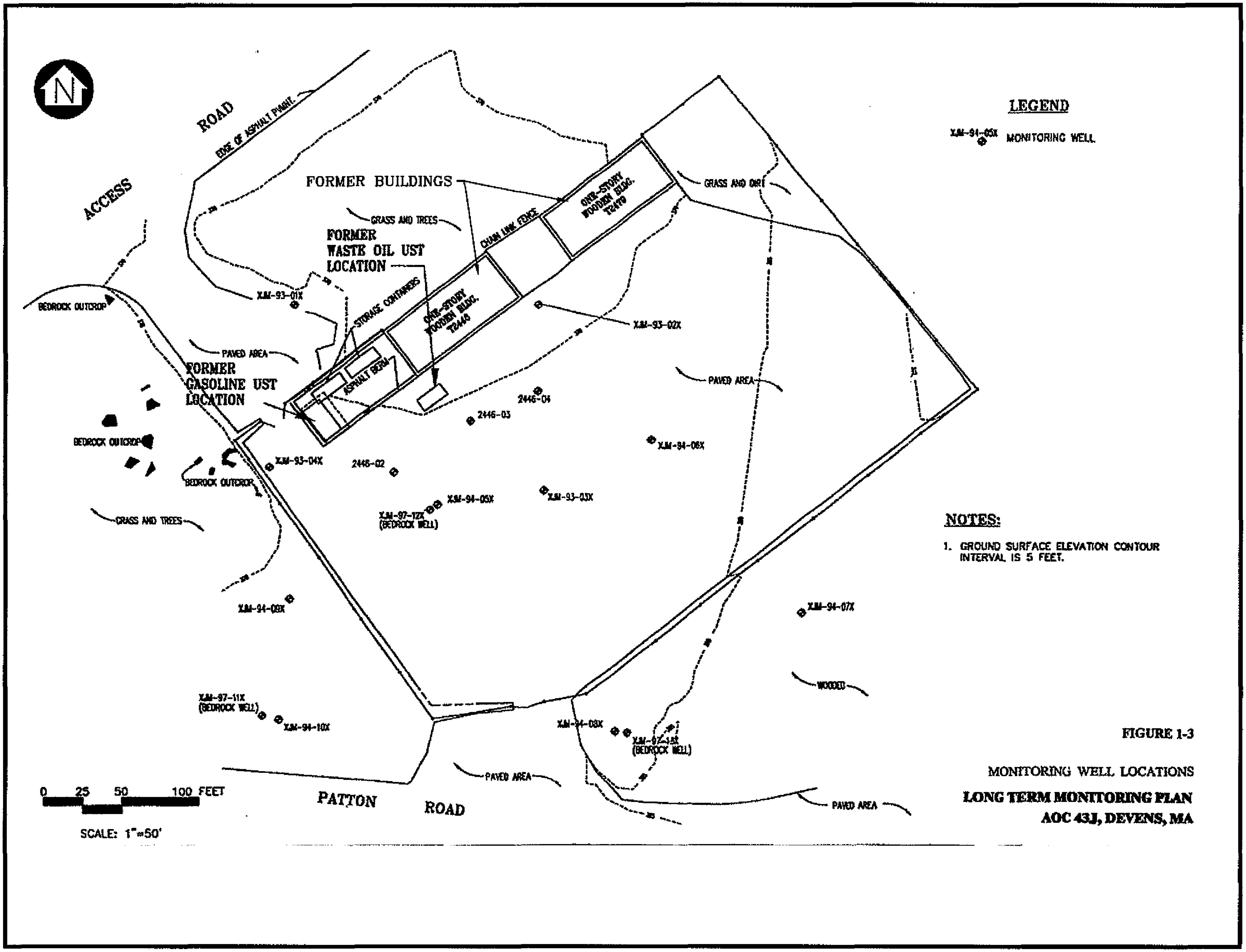


FIGURE 1-3

MONITORING WELL LOCATIONS

LONG TERM MONITORING PLAN

AOC 43J, DEVENS, MA

TABLE 4-6
AOC 43J HISTORICAL GROUNDWATER ANALYTICAL DATA (1993 - 2004)
DEVENS, MASSACHUSETTS

CONCENTRATION (ug/L)
SAMPLING ROUND

MONITORING WELL	ANALYTE	SSI/RI					IRA							LTM					
		3 (9/93)	4 (1/94)	5 (12/94)	6 (3/95)	BL (3/97)	1 (6/97)	2 (9/97)	3 (12/97)	4 (3/98)	5 (6/98)	6 (9/98)	7 (12/98)	1 (12/99)	2 (11/00)	3 (11/01)	4 (11/02)	5 (11/03)	6 (10/04)
SOURCE AREA																			
2446-02	ARSENIC	-	-	-	-	121	86	85	147	111	NA	NA	NA	80	150	110	110	150	93
	IRON	-	-	-	-	51000	23000	22000	49800	46200	34600	20800	13400	33000	30000	26000	31000	35000	34000
	MANGANESE	-	-	-	-	11200	16700	13800	12300	8540	4520	8730	16200	17000	16000	11000	13000	7700	12000
	BENZENE	200	200	200	40	J 4	< 140	J 33	J 19	J 2.3	< 5	J 39	< 80	34	20	40	21	6.3	14
	ETHYLBENZENE	3000	4000	3000	1000	120	J 2200	1100	1300	87	37	600	2300	2600	3100	2600	2700	1200	2500
	TOLUENE	6000	8000	7000	2000	86	J 3500	2200	1400	35	31	97	3000	2400	2600	1900	1200	430	700
	XYLENE	9000	9000	8000	3000	230	J 6100	3400	4000	100	52	410	7000	7500	7400	6400	5600	2380	4850
	CARBON TET.	< 60	< 60	< 60	< 10	< 0.5	< 0.5	< 0.5	< 0.5	< 5	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL BTEX	18200	21200	18200	6040	440	< 11940	J 6733	J 6719	J 224	< 125	J 1146	12380	12534	13120	10940	9521	4016.3	8064
2446-03	ARSENIC	-	-	-	-	59	79	107	43.2	66.4	NA	NA	NA	69	48	110	31	46	78
	IRON	-	-	-	-	28000	27000	25000	22900	34000	28600	24200	20200	33000	10000	21000	16000	26000	38000
	MANGANESE	-	-	-	-	13800	11900	9600	12500	14100	13200	9460	9880	11000	4800	6600	4500	7400	10000
	BENZENE	70	50	< 60	< 50	< 38	< 50	< 44	J 3.8	< 23	< 22	< 18	< 23	< 20	1.2	J 5.8	J 0.8	1.0	2.2
	ETHYLBENZENE	3000	2000	3000	2000	880	1000	1000	730	J 940	820	600	750	780	J 0.50	1100	160	210	410
	TOLUENE	900	1000	2000	800	140	< 180	210	130	100	100	97	110	91	2.9	100	9.9	13	15
	XYLENE	3000	2000	5000	2000	600	660	830	550	J 690	500	410	550	500	J 5.0	630	87	113	195
	CARBON TET.	< 60	< 10	< 80	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			NA	NA	NA	NA	NA	NA
	TOTAL BTEX	6970	5050	< 10060	< 4850	< 1658	< 1890	< 2084	J 1414	J 1753	< 1442	< 1125	< 1433	< 1391	J 9.6	J 1835.8	J 257.7	337	622.2
2446-04	ARSENIC	-	-	-	-	U 10	11.8	U 10	66.6	10.9	NA	NA	NA	J 17	110	70	24	30	100
	IRON	-	-	-	-	5900	7500	2600	20200	9530	10800	2900	10300	7600	32000	19000	10000	13000	25000
	MANGANESE	-	-	-	-	5100	6700	9100	7230	4010	3620	4830	4560	6400	11000	4900	4000	5400	4300
	BENZENE	50	70	70	60	9	14	8.7	J 1.2	J 4.3	J 2.8	J 12	J 4.2	4.2	< 5.0	4.1	J 0.74	J 0.88	U 2.0
	ETHYLBENZENE	300	1000	1000	1000	52	69	< 5	< 6	110	130	13	J 1.2	7.7	720	J 0.88	U 2.0	U 2.0	U 2.0
	TOLUENE	200	500	500	400	< 4	18	< 5	< 5	26	9.9	12	6.6	16	56	2.4	U 2.0	U 2.0	U 2.0
	XYLENE	500	1000	1000	2000	10	36	< 5.5	< 5	71	43	28	10	42	400	JU 1.5	U 2.0	U 2.0	3.6
	CARBON TET.	< 3	< 10	< 10	20	< 0.5	< 0.5	< 0.5	< 5	< 5	< 0.5	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL BTEX	1050	2570	2570	3460	< 75	127	< 24.2	< 16	J 211	J 186	J 65	J 22	69.9	< 1181	JU 8.88	J 0.74	J 0.88	3.6
XJM-93-03)	ARSENIC	-	-	-	-	U 10	U 10	U 10	B 4.8	U 3.6	NA	NA	NA	< 25	J 20	J 4.9	U 5.0	U 5.0	6.4
	IRON	-	-	-	-	69	2100	670	187	1920	648	968	503	B 670	540	1100	300	630	1400
	MANGANESE	-	-	-	-	20	2300	1380	98.8	76.7	102	1420	505	110	45	1200	23	67	660
	BENZENE	200	100	60	20	< 5	10	< 5	< 5	< 5	J< 5	5.2	< 1	< 2.0	< 0.50	1.1	U 1.0	U 1.0	U 2.0
	ETHYLBENZENE	500	100	200	200	< 5	< 30	< 5	< 5	< 5	J< 5	J 2.6	< 1	< 2.0	< 2.0	J 1.3	U 2.0	U 2.0	U 2.0
	TOLUENE	600	100	400	300	< 5	< 5	< 5	< 5	< 5	J< 5	< 2.9	J 0.42	< 2.0	< 2.0	J 0.61	U 2.0	U 2.0	U 2.0
	XYLENE	800	40	300	300	< 5	< 5	< 5	< 6	< 5	J< 5	< 2.9	2.1	< 2.0	< 2.0	J 3.5	U 2.0	U 2.0	U 2.0
	CARBON TET.	< 6	< 3	< 3	< 1	< 0.5	< 5	< 0.5	< 6	< 5	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL BTEX	2100	340	960	820	-	-	-	-	-	-	-	-	-	-	J 6.41	-	-	-
XJM-94-05)	ARSENIC	-	-	-	-	41	72	77	59.9	43	NA	NA	NA	32	73	130	J 4.5	13	40
	IRON	-	-	-	-	14500	22000	2300	30100	17900	15500	23100	31200	13000	14000	31000	550	3600	15000
	MANGANESE	-	-	-	-	5200	7700	8500	17000	5650	5380	6740	14200	5400	6600	5800	340	2100	6400
	BENZENE	NA	NA	300	300	J 39	48	J 49	J 18	31	J 35	J 33	J 16	16	< 5.0	13	U 1.0	U 1.0	U 2.0
	ETHYLBENZENE	NA	NA	2000	2000	690	930	1800	920	530	650	1300	900	150	110	1300	7.3	58	620
	TOLUENE	NA	NA	3000	2000	330	< 470	530	100	350	430	490	130	66	< 2.0	200	U 2.0	J 1.5	6
	XYLENE	NA	NA	5000	4000	1400	1800	3800	2300	1100	1200	2300	1600	580	218	2130	14	82.8	764
	CARBON TET.	NA	NA	< 30	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL BTEX	-	-	10300	8300	2459	< 3248	J 6179	J 3338	2011	J 2315	J 4123	J 2646	812	< 335	3643	21.3	142.3	1390
XJM-97-12)	ARSENIC	-	-	-	-	39	71	77	B 7.9	32.2	NA	NA	NA	54	130	94	87	72	78
	IRON	-	-	-	-	14300	16600	15000	3460	14900	17100	12400	14300	18000	17000	12000	16000	15000	15000
	MANGANESE	-	-	-	-	5400	6100	6200	3760	5500	6330	5640	6020	6400	6300	5800	5500	5000	5100
	BENZENE	NA	NA	NA	NA	27	55	42	41	20	37	J 24	J 34	27	24	31	25	21	19
	ETHYLBENZENE	NA	NA	NA	NA	390	630	670	740	300	720	890	1100	620	720	1800	840	1000	1500
	TOLUENE	NA	NA	NA	NA	220	< 380	260	250	150	440	320	230	180	190	260	200	200	220
	XYLENE	NA	NA	NA	NA	< 800	1100	890	1000	570	1400	720	1100	971	996	1482	1045	1049	1470
	CARBON TET.	NA	NA	NA	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL BTEX	-	-	-	-	< 1439	< 2165	1862	2031	1040	2597	J 1954	J 2464	1798	1930	3573	2110	2270	3209

Table 4-2
Groundwater Analytical Results - October 26, 2004
AOC 43 G
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	AAFES-2	AAFES-5	AAFES-6	XGM-93-02X	XGM-94-04X	XGM-94-07X	XGM-94-08X	XGM-94-10X	XGM-97-12X	43G - Dup
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL (1)										
VOLATILES (MADEP-VPH	ug/L										
Benzene	5	**6.6**	2.0 U	N/S	**39**	2.0 U	2.0 U	2.0 U	2.0 U	**260**	**250**
Toluene	1,000	2.0 U	2.0 U	N/S	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	460	480
Ethylbenzene	700	130	2.0 U	N/S	160	2.0 U	2.0 U	2.0 U	2.0 U	240	240
m,p-Xylene		160	2.0 U	N/S	79	2.0 U	2.0 U	2.0 U	2.0 U	3000	2900
o-Xylene		19	2.0 U	N/S	7.3	2.0 U	2.0 U	2.0 U	2.0 U	1100	1100
Total Xylenes	10,000	179	2.0 U	N/S	86	2.0 U	2.0 U	2.0 U	2.0 U	4100	4000
VPH (MADEP)											
Aliphatic Hydrocarbons											
C5 - C8	400	1100 U	100 U	N/S	**570 U**	100 U	100 U	100 U	100 U	**1100 U**	**1200 U**
C9 - C12	4,000	57	25 U	N/S	34	25 U	25 U	25 U	25 U	90	94
Aromatic Hydrocarbons											
C9 - C10	200	**6700**	25 U	N/S	**3700**	25 U	25 U	25 U	25 U	**7400**	**8100**
METALS (6010B)											
Iron	9,100	**20000**	170	N/S	**28000**	350	300	2500	120	**32000**	**31000**
Manganese	291	**4000**	89	N/S	**2600**	**790**	**1000**	**3800**	**960**	**3000**	**2900**
Nickel	100	40 U	17	N/S	40 U	4.1 J	6.0 J	9.5 J	6.8 J	40 U	40 U
FIELD PARAMETERS											
ORP/Eh (mv)	NA	-269.2	247.7	N/S	-106.4	260.2	-238.0	-11.1	232.8	-80.1	NA
DO (mg/L)	NA	0.33	5.07	N/S	0.60	0.81	2.34	1.61	2.50	0.83	NA

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance.
J = Estimated value detected below the PQL
B = Analyte is within 5 times of the amount detected in the equipment blank sample
U = Analyte is undetected at the laboratorys' PQL
(1) Cleanup values as developed in the ROD (unless otherwise noted)
NA = Not Applicable
N/S = Not Sampled
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter
43G - Dup is a duplicate of XGM-97-12X

Source wells: AAFES-2, AAFES-6, XGM-93-02X and XGM-97-12X
Sentry wells: AAFES-5, XGM-94-04X, XGM-94-07X, XGM-94-08X and XGM-94-10X

TABLE 4-3
Groundwater Analytical Results - October 27 & 28, 2004 Sampling Event
AOC 43 J
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	2446-02	43J - Dup	2446-03	2446-04	XJM-93-02X	XJM-93-03X	XJM-94-05X	XJM-94-06X	XJM-94-08X	XJM-94-10X	XJM-97-11X	XJM-97-12X	XJM-97-13X
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL (1)													
	ug/L													
VOLATILES (MA-VPH)														
Benzene	5	**14**	**19**	2.2	2.0 U	3.8	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**19**	2.0 U
Toluene	1000	700	210	15	2.0 U	2.0 U	2.0 U	6.0	2.0 U	2.0 U	2.0 U	2.0 U	220	2.0 U
Ethylbenzene	700	**2500**	**1500**	410	2.0 U	2.0 U	2.0 U	620	2.0 U	2.0 U	2.0 U	2.0 U	**1500**	2.0 U
m,p-Xylene		4000	1300	130	3.6	2.0 U	2.0 U	670	2.0 U	2.0 U	2.0 U	2.0 U	1400	2.0 U
o-Xylene		850	67	65	2.0 U	2.0 U	2.0 U	94	2.0 U	2.0 U	2.0 U	2.0 U	70	2.0 U
Total Xylenes	10,000	4850	1367	195	3.6	2.0 U	2.0 U	764	2.0 U	2.0 U	2.0 U	2.0 U	1470	2.0 U
VPH														
Aliphatic Hydrocarbons														
C5 - C8	400	**4600**	**8800 J**	**1900**	320	100 U	100 U	**480**	100 U	100 U	100 U	100 U	**8500**	100 U
C9 - C12	4,000	62	37 J	30	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	40	25 U
Aromatic Hydrocarbons														
C9 - C10	200	**8100**	**5500 J**	**2900**	**310**	58	25 U	**1800**	25 U	50	25 U	25 U	**6500**	25 U
METALS (6010)														
Arsenic	50	**93**	**76**	**78**	**100**	5.0 U	6.4	40	5.0 U	5.8	2.5 J	2.7 J	**78**	2.3 J
Iron	9,100	**34000**	**14000**	**38000**	**25000**	1100	1900	**15000**	140	510	310	43 J	**15000**	19 J
Manganese	291	**12000**	**5100**	**10000**	**4300**	**12000**	**660**	**6400**	38	**640**	33	**640**	**5100**	20
FIELD PARAMETERS														
ORP/Eh (mv)	NA													
DO (mg/L)	NA													

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - 25

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

U = Analyte is undetected at the laboratorys' PQL

(1) Cleanup values as developed in the ROD (unless otherwise noted)

NA = Not Applicable

ORP (mv) = Oxidation Reduction Potential in millivolts

DO (mg/L) = Dissolved Oxygen in milligrams per Liter

43J - Dup is a duplicate of 2446-02

Source wells: 2446-02, 2446-03, XJM-94-05X, XJM-97-12X

Sentry wells: 2446-04, XJM-93-02X, XJM-93-03X, XJM-94-06X, XJM-94-08X, XJM-94-10X, XJM-97-11X, XJM-97-13X

TABLE 4-2
AOC 43G
GROUNDWATER ANALYTICAL RESULTS - NOVEMBER 12, 2003
DEVENS, MASSACHUSETTS
(Sheet 1 of 1)

PARAMETERS	Well No.	AAFES-2	AAFES-5	AAFES-6	XGM-93-02X	XGM-94-04X	XGM-94-07X	XGM-94-08X	XGM-94-10X	XGM-97-12X	43G - Dup
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL (1)										
VOLATILES (8260B)	ug/L										
Benzene	5	**9.0 J**	1.0 U	N/S	**24**	1.0 U	1.0 U	1.0 U	1.0 U	**290**	**310**
Toluene	1,000	20 U	2.0 U	N/S	20 U	2.0 U	2.0 U	2.0 U	2.0 U	610	650
Ethylbenzene	700	180	2.0 U	N/S	87	2.0 U	2.0 U	2.0 U	2.0 U	440	460
m,p-Xylene		280	2.0 U	N/S	30	2.0 U	2.0 U	2.0 U	2.0 U	4,400	4,600
o-Xylene		32	2.0 U	N/S	16 J	2.0 U	2.0 U	2.0 U	2.0 U	1,600	1,600
Total Xylenes	10,000	312	2.0 U	N/S	46	2.0 U	2.0 U	2.0 U	2.0 U	6,000	6,200
VPH (MADEP)											
Aliphatic Hydrocarbons											
C5 - C8	400	**1,200**	100 U	N/S	**410**	100 U	100 U	120	100 U	**1,100**	**1,300**
C9 - C12	4,000	250 U	25 U	N/S	33	25 U	25 U	25 U	25 U	250 U	250 U
Aromatic Hydrocarbons											
C9 - C10	200	**6,600**	25 U	N/S	**1,600**	25 U	25 U	25 U	25 U	**8,700**	**8,800**
METALS (6010B)											
Iron	9,100	**14,000**	660	N/S	**15,000**	210	1,000	3,200	250	**33,000**	**32,000**
Manganese	291	**3,100**	21	N/S	**1,900**	**1,400**	**3,600**	**8,600**	120	**4,100**	**4,300**
Nickel	100	5.4 J	18 J	N/S	4.8 J	9.3 J	66	6.8 J	8.7 J	3.3 J	2.7 J
FIELD PARAMETERS											
ORP/Eh (mv)	NA	-133.0	202.1	N/S	-112.8	22.9	33.0	-56.8	237.8	-102.1	NA
DO (mg/L)	NA	0.54	5.58	N/S	0.39	0.50	1.80	0.78	7.84	0.33	NA

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

U = Analyte is undetected at the laboratorys' PQL

(1) Cleanup values as developed in the ROD (unless otherwise noted)

NA = Not Applicable

N/S = Not Sampled

ORP (mv) = Oxidation Reduction Potential in Millivolts

DO (mg/L) = Dissolved Oxygen in milligrams per Liter

43G - Dup is a duplicate of XGM-97-12X

Source wells: AAFES-2, AAFES-6, XGM-93-02X and XGM-97-12X

Sentry wells: AAFES-5, XGM-94-04X, XGM-94-07X, XGM-94-08X and XGM-94-10X

TABLE 4-3
AOC 43J
GROUNDWATER ANALYTICAL RESULTS - NOVEMBER 13, 14, 2003
DEVENS, MASSACHUSETTS
(Sheet 1 of 1)

PARAMETERS	Well No.	2446-02	43J - Dup	2446-03	2446-04	XJM-93-02X	XJM-93-03X	XJM-94-05X	XJM-94-06X	XJM-94-08X	XJM-94-10X	XJM-97-11X	XJM-97-12X	XJM-97-13X
	CLEANUP GOAL (1) ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260B)														
Benzene	5	**6.3**	**5.8 J**	1.0	0.88 J	1.3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**21**	1.0 U
Toluene	1000	430	410	13	0.71 J	2.0 U	2.0 U	1.5 J	2.0 U	2.0 U	2.0 U	2.0 U	200	2.0 U
Ethylbenzene	700	**1,200**	**1,100**	210	2.0 U	2.0 U	2.0 U	58	2.0 U	2.0 U	2.0 U	0.72 J	**1,000**	2.0 U
m,p-Xylene		2,000	1,800	72	2.0 U	2.0 U	2.0 U	73	2.0 U	2.0 U	2.0 U	0.9 J	1,000	2.0 U
o-Xylene		380	380	41	2.0 U	2.0 U	2.0 U	9.8	2.0 U	2.0 U	2.0 U	2.0 U	49	2.0 U
Total Xylenes	10,000	2,380	2,180	113	2.0 U	2.0 U	2.0 U	82.8	2.0 U	2.0 U	2.0 U	0.9 J	1,049	2.0 U
VPH														
Aliphatic Hydrocarbons														
C5 - C8	400	**2,700**	**2,700**	**950**	110	100 U	100 U	100 U	100 U	100 U	100 U	100 U	**6,900**	100 U
C9 - C12	4,000	53	51	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	52	25 U
Aromatic Hydrocarbons														
C9 - C10	200	**4,500**	**4,400**	**1,300**	170	25 U	25 U	**240**	25 U	50	25 U	25 U	**5,000**	25 U
METALS (6010)														
Arsenic	50	**150**	**150**	46	30	5.0 U	5.0 U	13	5.0 U	5.0 U	4.8 J	5.0 U	**72**	5.0 U
Iron	9,100	**35,000**	**35,000**	**26,000**	**13,000**	84 J	630	3600	68 J	260	480	51 J	**15,000**	21 J
Manganese	291	**7,700**	**7,800**	**7,400**	**5,400**	**330**	67	**2,100**	7.5 J	**1,200**	120	**690**	**5,000**	25
FIELD PARAMETERS														
ORP/Eh (mv)	NA	-122.7	NA	-71.9	-21.9	197.0	143.6	48.0	235.6	-52.8	-38.6	88.1	-86.5	154.7
DO (mg/L)	NA	0.60	NA	2.77	2.66	1.78	3.94	1.10	6.79	0.86	4.90	2.19	1.06	0.31

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

U = Analyte is undetected at the laboratorys' PQL

(1) Cleanup values as developed in the ROD (unless otherwise noted)

NA = Not Applicable

ORP (mv) = Oxidation Reduction Potential in millivolts

DO (mg/L) = Dissolved Oxygen in milligrams per Liter

43J - Dup is a duplicate of 2446-02

Source wells: 2446-02, 2446-03, XJM-94-05X, XJM-97-12X

Sentry wells: 2446-04, XJM-93-02X, XJM-93-03X, XJM-94-06X, XJM-94-08X, XJM-94-10X, XJM-97-11X, XJM-97-13X

Table 1-1

CLEANUP GOAL EXCEEDANCES OVER TIME
AOC 43G
1999 to 2003

Well Number	1999	2000	2001	2002	2003
		Benzene – 5 ug/L Cleanup Goal			
AAFES-2	62	36	43	26	9
XGM-93-02X	81	32	12	140	24
XGM-97-12X	270	550	700	780	290
		Toluene –1000 ug/L Cleanup Goal			
XGM-97-12X	(390)	1100	(870)	1000	(610)
		C5-C8 Aliphatics – 400 ug/L Cleanup Goal			
AAFES-2	ND	1400*	ND	1200	1200
AAFES-6	(370)	420*	(290)	ND	N/S
XGM93-02X	ND	570*	(270)	790	410
XGM-94-04X	ND	420*	(140)	ND	ND
XGM-97-12X	970	1300*	1100	1100	1100
		C9-C10 Aromatics – 200 ug/L Cleanup Goal			
AAFES-2	9400	7200	5300	13000	6600
XGM-93-02X	510	2300	1100	3600	1600
XGM-94-04X	200	570	(170)	(28)	ND
XGM-97-12X	4500	5500	5400	7500	8700
		Iron – 9100 ug/L Cleanup Goal			
AAFES-2	24000	20000	27000	26000	14000
AAFES-6	11000	9200	13000	9400	N/S
XGM-93-02X	30000	18000	11000	24000	15000
XGM-94-08X	(4800)	13000	(4500)	(4600)	(3200)
XGM-97-12X	32000	26000	33000	46000	33000
		Manganese – 291 ug/L Cleanup Goal			
AAFES-2	4600	3900	4800	3700	3100
AAFES-5	710	180*	(190)	(27)	(21)
AAFES-6	2900	9200	3400	3000	N/S
XGM-93-02X	3900	2500	1900	2500	1900
XGM-94-04X	2900	2200	3400	2000	1400
XGM-94-07X	5700	3700	6100	4500	3600
XGM-94-08X	4500	4600	4900	3600	3600
XGM-94-10X	830	2000	2600	(31)	(120)
XGM-97-12X	6300	4100	4200	3900	4100

Notes:

ND = Non detect
N/S = Not sampled
(#) = Less than Cleanup Goal
* = Analyte detected within 5 times of the amount detected in the equipment blank sample

Table 1-2

CLEANUP GOAL EXCEEDANCES OVER TIME
AOC 43J
1999 to 2003

Well Number	1999	2000	2001	2002	2003
		Benzene – 5 ug/L Cleanup Goal			
2446-02	34	20	40	21	6.3
2446-03	ND	(1.2)	5.8	(0.8)	(1.0)
XJM-93-02X	22	(0.59)	ND	ND	(1.3)
XJM-94-05X	16	ND	13	ND	ND
XJM-97-11X	ND	ND	13	(3.5)	ND
XJM-97-12X	27	24	31	25	21
		Toluene –1000 ug/L Cleanup Goal			
2446-02	2400	2600	1900	1200	(430)
		Ethylbenzene – 700 ug/L Cleanup Goal			
2446-02	2600	3100	2600	2700	1200
2446-03	780	(0.50)	1100	(160)	(210)
2446-04	(7.7)	720	(0.88)	ND	ND
XJM-94-05X	(110)	(150)	1300	(7.3)	(58)
XJM-97-12X	(620)	720	1800	840	1000
		C5-C8 Aliphatics – 400 ug/L Cleanup Goal			
2446-02	2800	5400	ND	2100	2700
2446-03	ND	(360)	ND	1200	950
2446-04	ND	1900	ND	(240)	(110)
XJM-97-11X	(110)	(290)	ND	1100	ND
XJM-97-12X	2100	5100	6700	5700	6900
		C9-C10 Aromatics – 200 ug/L Cleanup Goal			
2446-02	7100	9400	4300	6400	4500
2446-03	3600	330	3300	1500	1300
2446-04	430	4600	350	(170)	(170)
XJM-94-05X	1200	330	3900	(38)	240
XJM-97-11X	(33)	260	590	380	ND
XJM-94-12X	4400	6300	4000	4700	5000
		Arsenic – 50 ug/L Cleanup Goal			
2446-02	80	150	110	110	150
2446-03	69	(48)	110	(31)	(46)
2446-04	(17)	110	70	(24)	(30)
XJM-93-02X	ND	54	ND	(4.7)	ND
XJM-94-05X	(32)	73	130	(4.5)	(13)
XJM-97-12X	54	130	94	87	72
		Iron – 9100 ug/L Cleanup Goal			
2446-02	33000	30000	26000	31000	35000
2446-03	33000	10000	21000	16000	26000
2446-04	(7600)	32000	19000	10000	13000
XJM-94-05X	13000	14000	31000	(550)	(3600)
XJM-97-12X	18000	17000	12000	16000	15000

Table 1-2 (cont.)

CLEANUP GOAL EXCEEDANCES OVER TIME
AOC 43J
1999 to 2003

		Manganese – 291 ug/L Cleanup Goal			
2446-02	17000	16000	11000	13000	7700
2446-03	11000	4800	6600	4500	7400
2446-04	6400	11000	4900	4000	5400
XJM-93-02X	3100	(61)	630	(200)	330
XJM-93-03X	(110)	(45)	1200	(23)	(67)
XJM-94-05X	5400	6600	5800	340	2100
XJM-94-08X	540	780	3400	1000	1200
XJM-94-10X	330	(58)	3400	(240)	(120)
XJM-97-11X	390	1300	2800	2800	690
XJM-97-12X	6400	6300	5800	5500	5000

Notes:

ND = Non detect
(#) = Less than Cleanup Goal

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 Sp-ecific 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:

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 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

APPENDIX E

SOUTH POST IMPACT AREA (AOCS 25, 26, 27, AND 41) GROUNDWATER

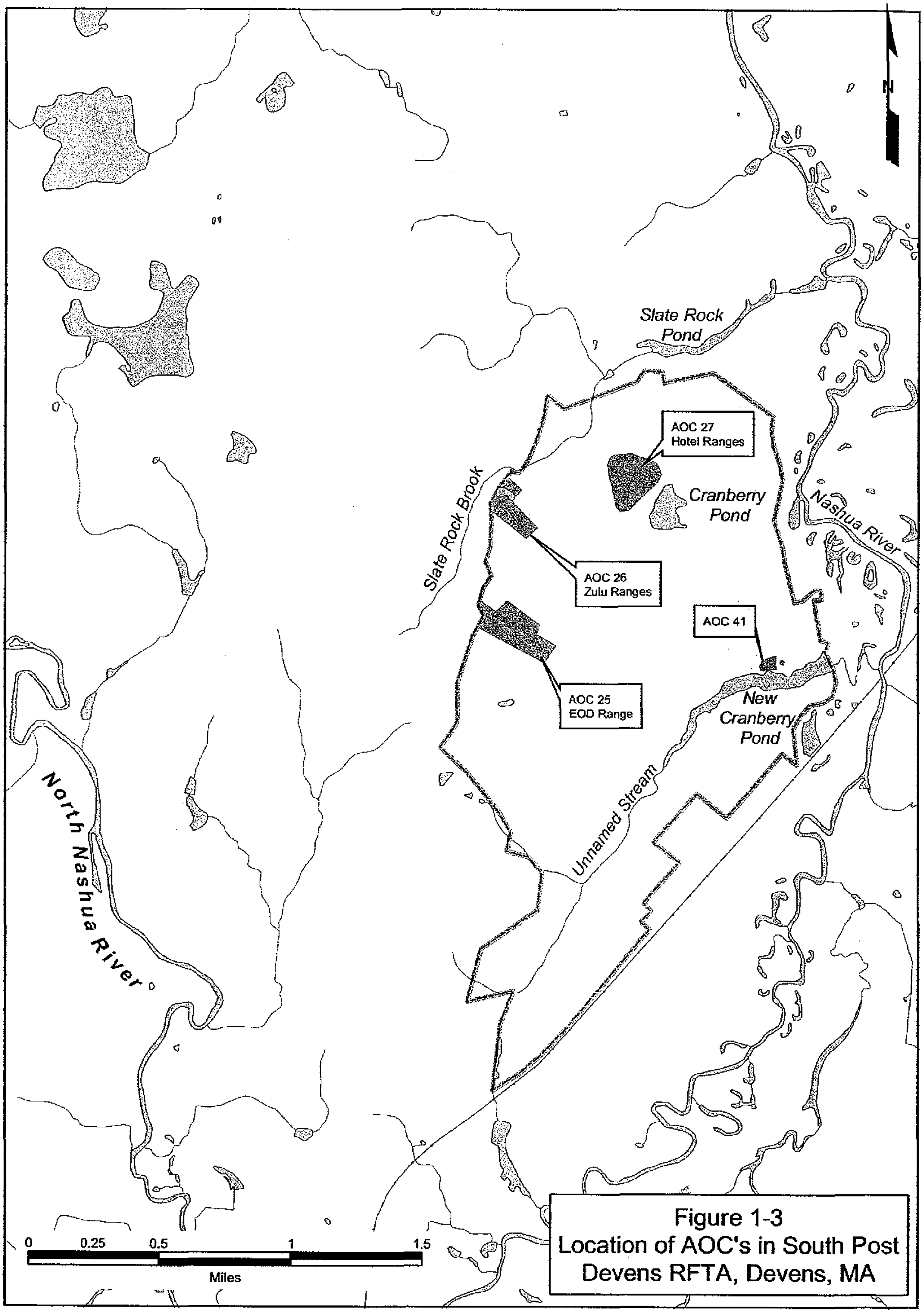


Figure 1-3
Location of AOC's in South Post
Devens RFTA, Devens, MA

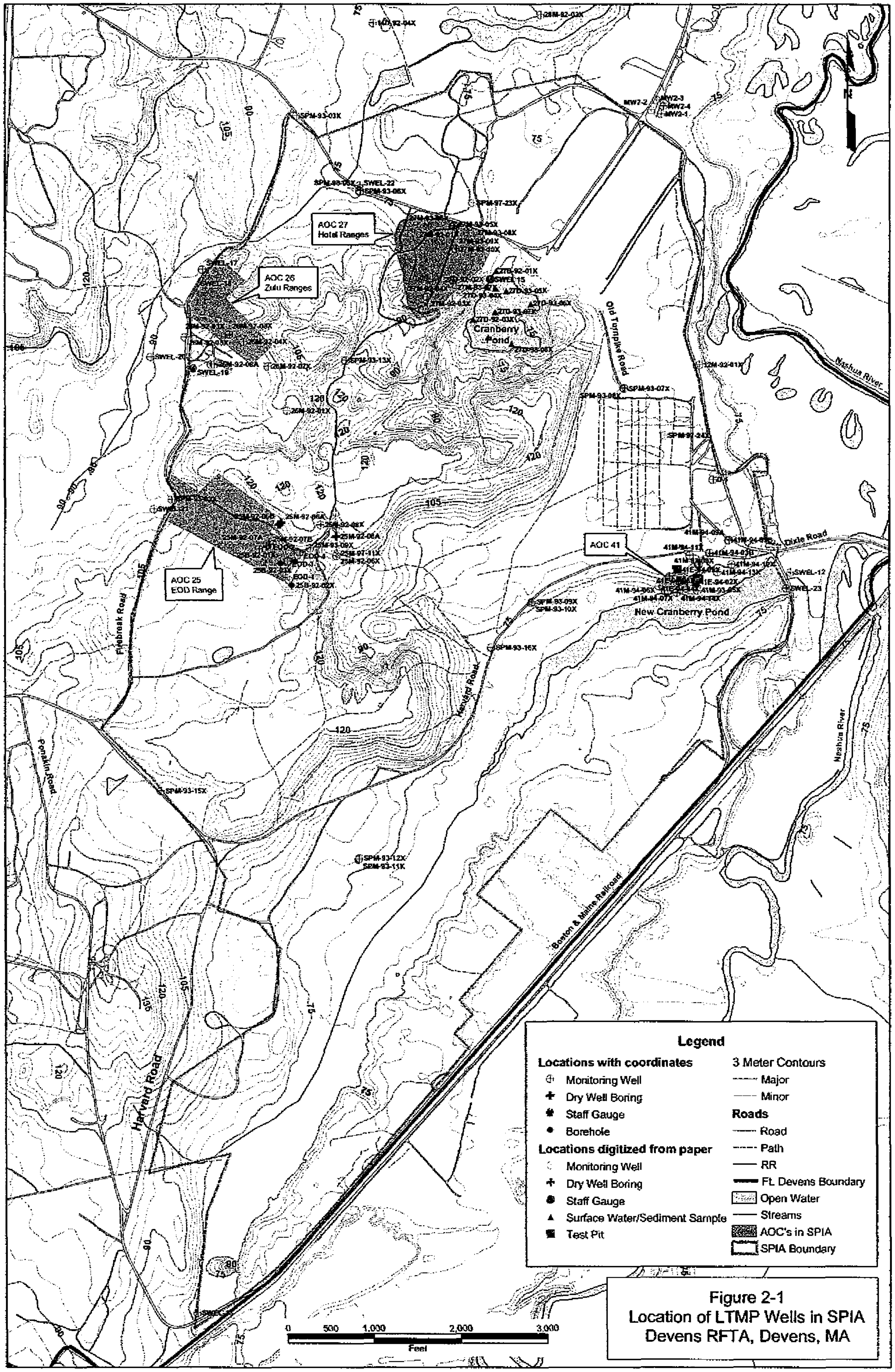
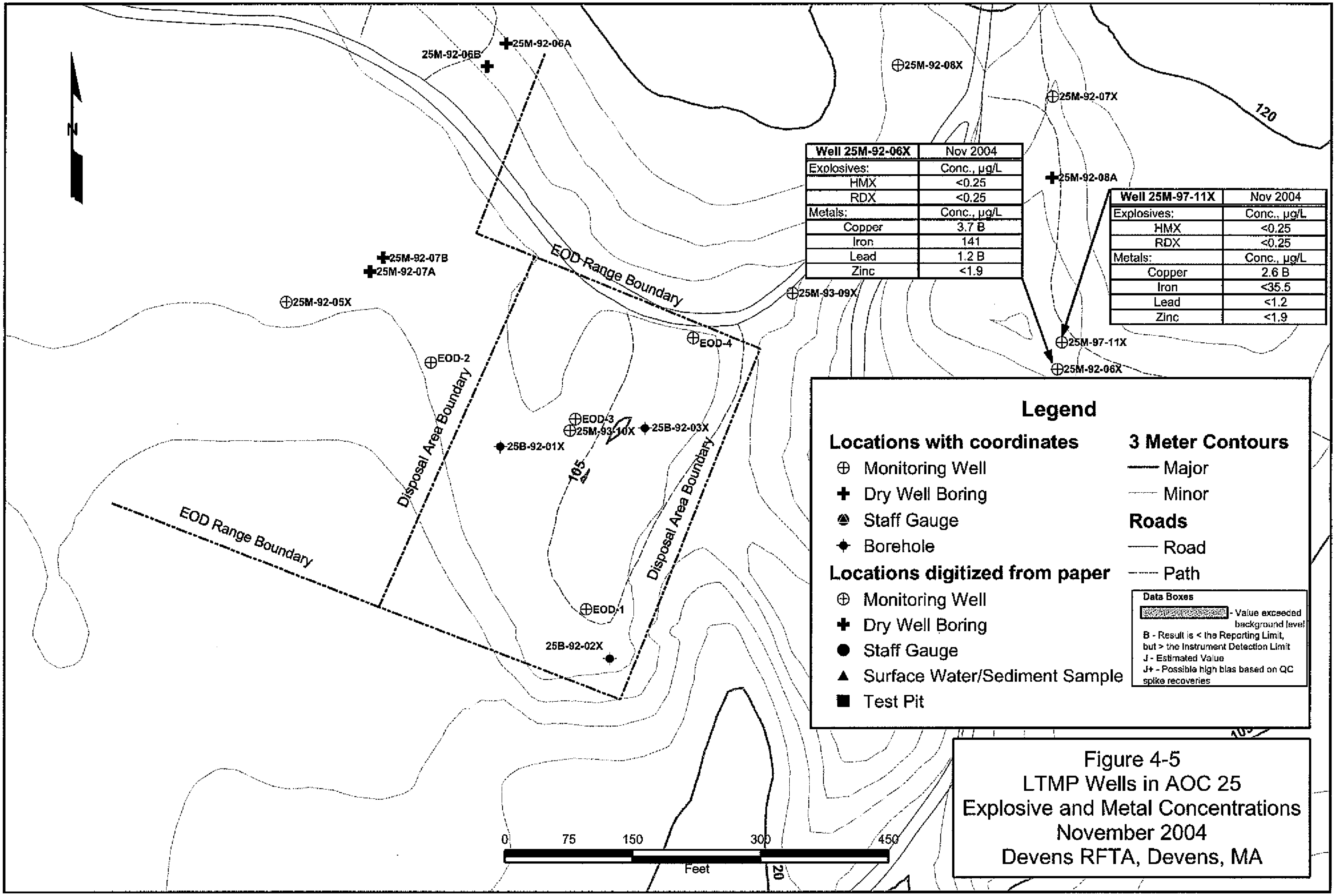


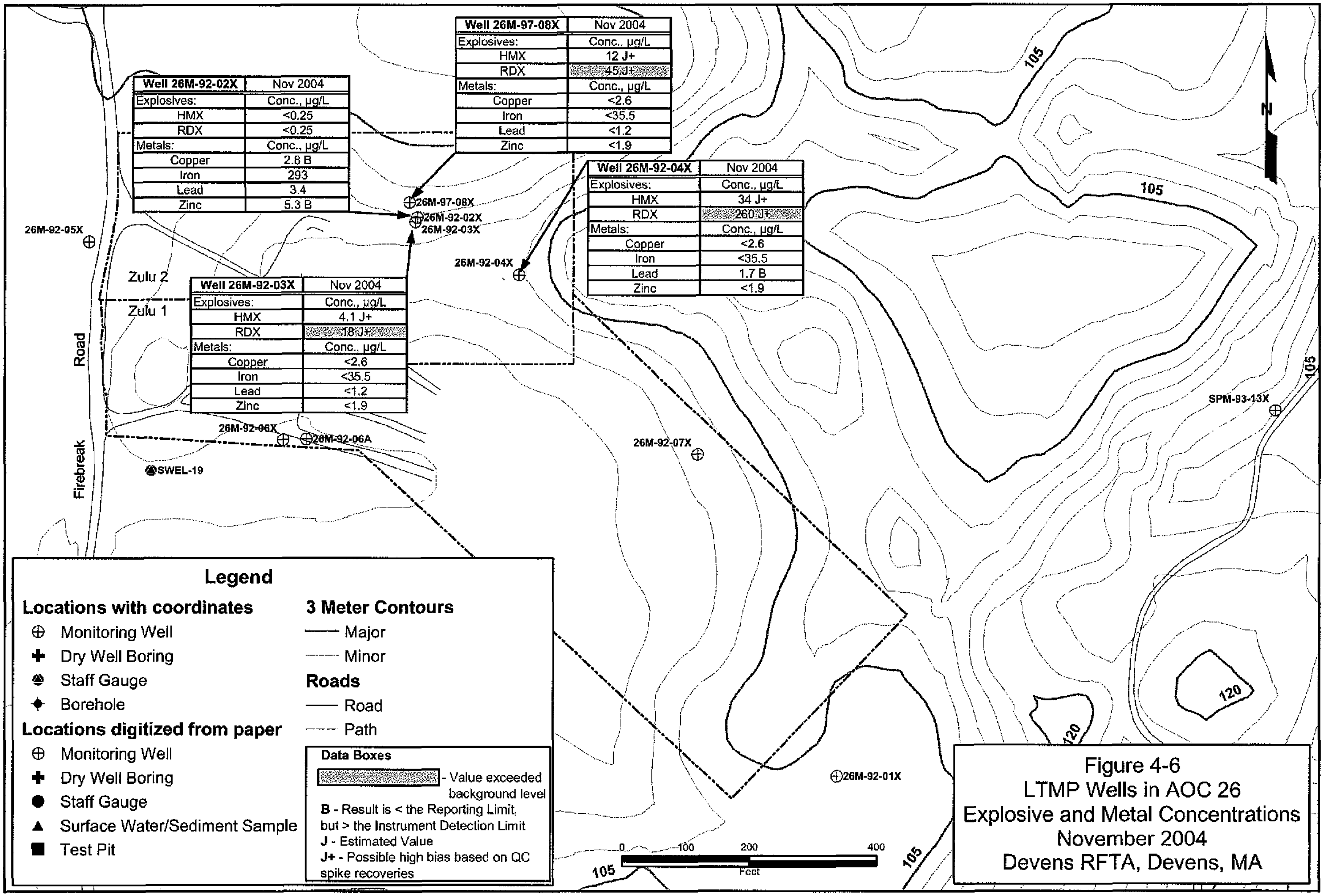
Figure 2-1
Location of LTMP Wells in SPIA
Devens RFTA, Devens, MA



Well 25M-92-06X	Nov 2004
Explosives:	Conc., µg/L
HMX	<0.25
RDX	<0.25
Metals:	Conc., µg/L
Copper	3.7 B
Iron	141
Lead	1.2 B
Zinc	<1.9

Well 25M-97-11X	Nov 2004
Explosives:	Conc., µg/L
HMX	<0.25
RDX	<0.25
Metals:	Conc., µg/L
Copper	2.6 B
Iron	<35.5
Lead	<1.2
Zinc	<1.9

Figure 4-5
LTMP Wells in AOC 25
Explosive and Metal Concentrations
November 2004
Devens RFTA, Devens, MA



Well 26M-97-08X	Nov 2004
Explosives:	Conc., µg/L
HMX	12 J+
RDX	45 J+
Metals:	Conc., µg/L
Copper	<2.6
Iron	<35.5
Lead	<1.2
Zinc	<1.9

Well 26M-92-02X	Nov 2004
Explosives:	Conc., µg/L
HMX	<0.25
RDX	<0.25
Metals:	Conc., µg/L
Copper	2.8 B
Iron	293
Lead	3.4
Zinc	5.3 B

Well 26M-92-04X	Nov 2004
Explosives:	Conc., µg/L
HMX	34 J+
RDX	260 J+
Metals:	Conc., µg/L
Copper	<2.6
Iron	<35.5
Lead	1.7 B
Zinc	<1.9

Well 26M-92-03X	Nov 2004
Explosives:	Conc., µg/L
HMX	4.1 J+
RDX	18 J+
Metals:	Conc., µg/L
Copper	<2.6
Iron	<35.5
Lead	<1.2
Zinc	<1.9

Figure 4-6
LTMP Wells in AOC 26
Explosive and Metal Concentrations
November 2004
Devens RFTA, Devens, MA

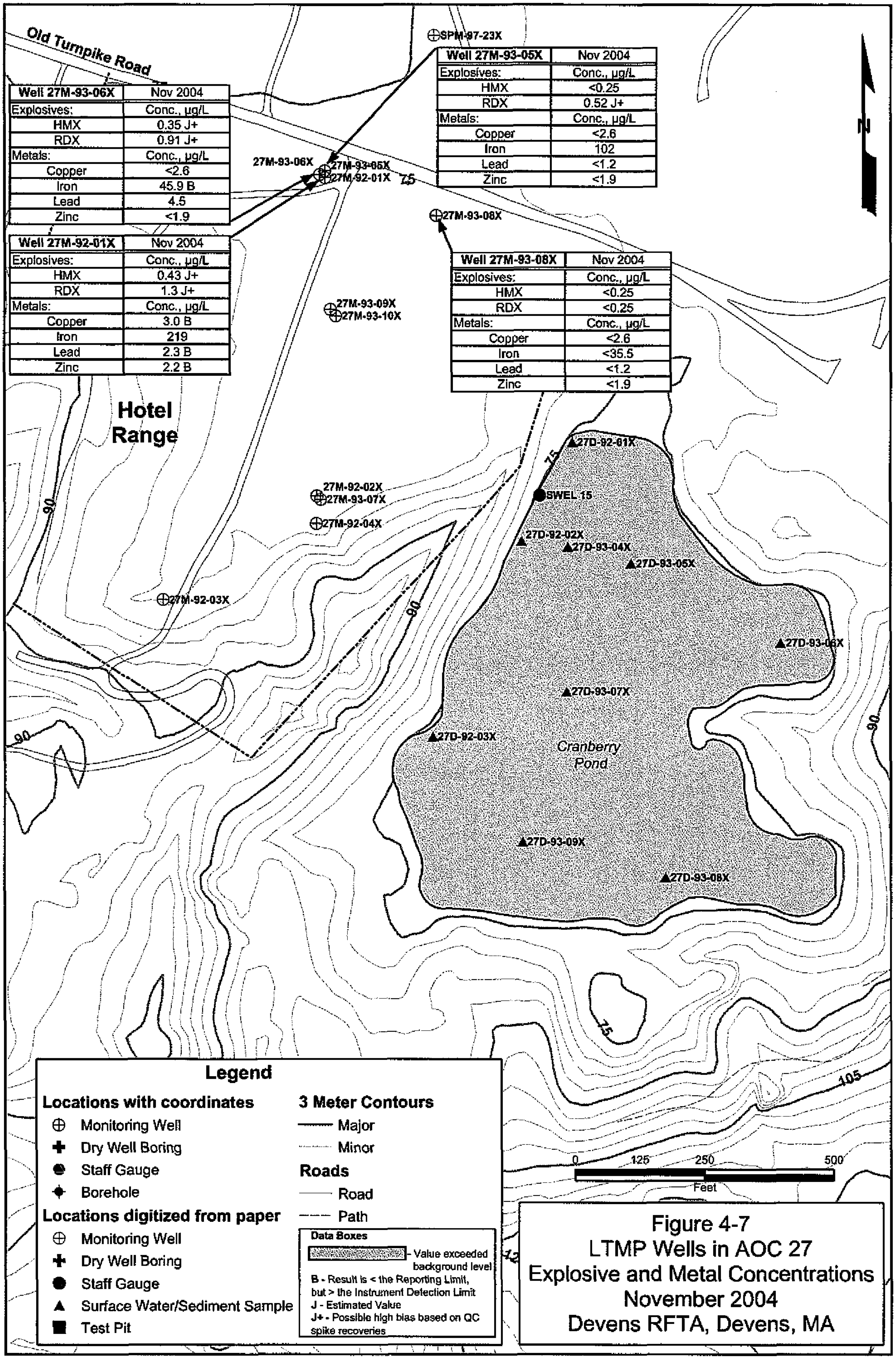


Figure 4-7
LTMP Wells in AOC 27
Explosive and Metal Concentrations
November 2004
Devens RFTA, Devens, MA

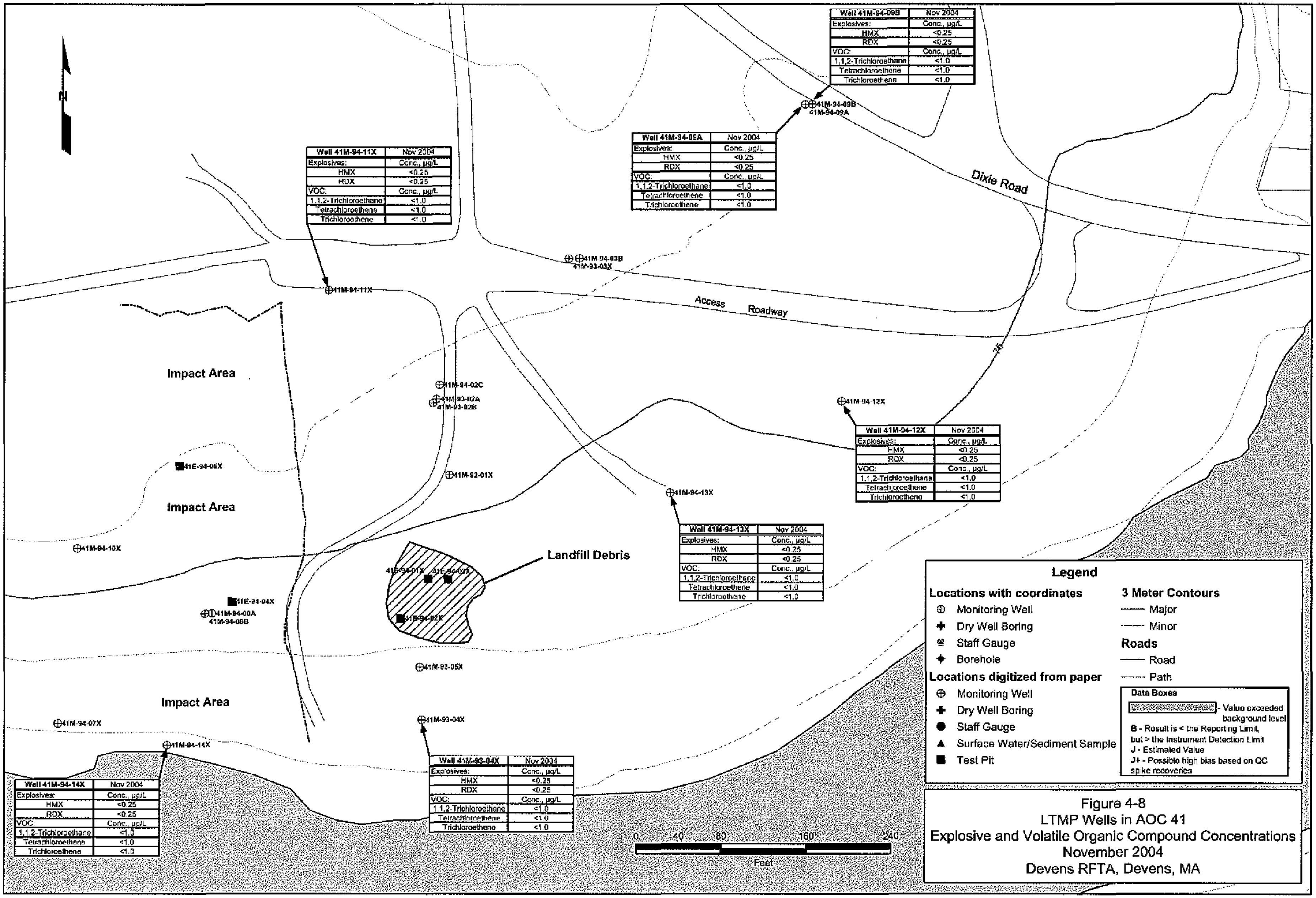


Figure 4-8
LTMP Wells in AOC 41
Explosive and Volatile Organic Compound Concentrations
November 2004
Devens RFTA, Devens, MA

TABLE 4-2

GROUNDWATER ANALYTICAL RESULTS - November 1-3, 2004

SOUTH POST IMPACT AREA WELLS (Sheet 1 of 3)

Devens, Massachusetts
(concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	25M-92-06X	25M-97-11X	26M-92-02X	26M-92-03X	26M-92-03XD	26M-92-04X	26M-92-04XD	26M-97-08X	26M-97-08XD	27M-92-01X
DATE				11/1/04	11/1/04	11/1/04	11/1/04	11/1/04	11/1/04	11/1/04	11/1/04	11/1/04	11/3/04
				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)											
Silver, Total Ag	4.6	na	na	<1.5	<1.5	<1.5	<1.5	na	<1.5	<1.5	<1.5	na	2.9 B
Aluminum, Total Al	6870	na	na	120 B	51.1 B	244	53.8 B	na	56.7 B	35.7 B	54.6 B	na	187 B
Arsenic, Total As	10.5	10	10	<3.1	<3.1	<3.1	<3.1	na	<4.2	<3.1	<3.1	na	<3.1
Barium, Total Ba	39.6	2000	2000	<11.0	<11.0	<11.0	<11.0	na	<11.0	<11.0	<11.0	na	<11.0
Beryllium, Total Be	5	4	4	<0.30	0.30 B	<0.30	<0.30	na	<0.30	<0.30	<0.30	na	0.31 B
Calcium, Total Ca	14700	na	na	2400 B	2430 B	2670 B	3470 B	na	7630	7150	3540 B	na	6970
Cadmium, Total Cd	4.01	5	5	<0.50	<0.50	<0.50	0.72 B	na	<0.50	<0.50	<0.50	na	<0.50
Cobalt, Total Co	25	na	na	<3.1	<3.1	<3.1	<3.1	na	<3.1	<3.1	<3.1	na	<3.1
Chromium, Total Cr	14.7	100	100	6.7 B	1.4 B	2.0 B	<1.1	na	<1.1	<1.1	<1.1	na	3.6 B
Copper, Total Cu	8.09	1300	1300	3.7 B	2.6 B	2.8 B	<2.6	na	<2.6	<2.6	<2.6	na	3.0 B
Iron, Total Fe	9100	na	na	141	<35.5	293	<35.5	na	<35.5	<35.5	<35.5	na	219
Mercury, Total Hg	0.243	2	2	<0.10	<0.10	<0.10	<0.10	na	<0.10	<0.10	<0.10	na	<0.10
Potassium, Total K	2370	na	na	2130 B	2530 B	2190 B	2750 B	na	2530 B	1910 B	2030 B	na	1750 B
Magnesium, Total Mg	3480	na	na	663 B	894 B	1030 B	348 B	na	762 B	707 B	469 B	na	657 B
Manganese, Total Mn	291	na	na	6.6 B	<1.0	7.1 B	5.6 B	na	13.0 B	11.9 B	2.7 B	na	11.7 B
Sodium, Total Na	10800	20,000	na	2200 B	2800 B	3130 B	2010 B	na	2620 B	3060 B	2540 B	na	5830
Nickel, Total Ni	34.3	100	na	4.3 B	3.6 B	3.3 B	<2.9	na	<2.9	<2.9	<2.9	na	4.8 B
Lead, Total Pb	4.25	15	15	1.2 B	<1.2	3.4	<1.2	na	1.7 B	<1.2	<1.2	na	2.3 B
Antimony, Total Sb	3.03	6	6	<4.2	<4.2	<4.2	<4.2	na	<4.2	<4.2	<4.2	na	<4.2
Selenium, Total Se	3.02	50	50	<3.1	<3.0	<3.1	<3.1	na	<3.1	<3.1	<3.1	na	<3.1
Thallium, Total Tl	6.99	2	2	<7.9	<7.9	<7.9	<7.9	na	<7.9	<7.9	<7.9	na	<4.0
Vanadium, Total V	11	na	na	<3.0	<3.0	<3.0	<3.0	na	<3.0	<3.0	<3.0	na	<3.0
Zinc, Total Zn	21.1	na	na	<1.9	<1.9	5.3 B	<1.9	na	<1.9	2.6 B	<1.9	na	2.2 B
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	2.4	2.3	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	0.54 UJ	0.50 UJ	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<0.25	<0.25	<0.25	4.1 J+	4.0 J+	34 J+	34 J+	12 J+	12 J+	0.43 UJ
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	<0.25	<0.25	<0.25	18 J+	18 J+	260 J+	270 J+	45 J+	46 J+	1.3 J+
PERCHLORATE				0.054 J	0.52	0.044 J	0.12 J	0.086 J	3.1	2.8	0.17 J	0.17 J	0.48

LEGEND

Shaded areas - metal values are above Maximum Contaminant Levels -	25
Shaded areas - explosive values are above background levels. -	25
J = Estimated value	
UJ = Analyte tentatively not detected at the reported concentration due to spike recovery values above QC limits	
J+ = Value may be biased high based on high spike recoveries in the matrix spike samples	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	- - = Parameter not measured

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

TABLE 4-2

GROUNDWATER ANALYTICAL RESULTS - November 1-3, 2004

SOUTH POST IMPACT AREA WELLS (Sheet 2 of 3)

Devens, Massachusetts
(concentration in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	27M-93-05X	27M-93-06X	27M-93-08X	SPM-93-06X	SPM-93-08X	SPM-93-10X	SPM-93-12X	SPM-93-16X	SPM-97-23X	SPM-97-24X
DATE				11/3/04	11/3/04	11/3/04	11/2/04	11/2/04	11/2/04	11/1/04	11/2/04	11/2/04	11/2/04
				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW-FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)											
Silver, Total Ag	4.6	na	na	3.0 B	1.6 B	2.0 B	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	2.1 B
Aluminum, Total Al	6870	na	na	81.2 B	<34.1	<34.1	870	<34.1	90.7 B	79.6 B	62.7 B	145 B	71.6 B
Arsenic, Total As	10.5	10	10	<3.1	<3.1	<3.1	10.9	<3.1	5.2 B	<3.1	<3.1	<3.1	<3.1
Barium, Total Ba	39.6	2000	2000	<11.0	<11.0	<11.0	59.1 B	<11.0	<11.0	<11.0	<11.0	<11.0	<11.0
Beryllium, Total Be	5	4	4	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Calcium, Total Ca	14700	na	na	4670 B	3580 B	6960	39,400	2550 B	3140 B	6640	2580 B	4730 B	9050
Cadmium, Total Cd	4.01	5	5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.54 B	<0.50	<0.50
Cobalt, Total Co	25	na	na	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
Chromium, Total Cr	14.7	100	100	2.2 B	2.3 B	2.7 B	<1.1	<1.1	3.4 B	2.7 B	1.5 B	<1.1	1.9 B
Copper, Total Cu	8.09	1300	1300	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	3.0 B	<2.6	<2.6
Iron, Total Fe	9100	na	na	102	45.9 B	<35.5	<35.5	<35.5	78.1 B	<35.5	45.7 B	608	37.7 B
Mercury, Total Hg	0.243	2	2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	839 B	848 B	1680 B	7880	1700 B	1980 B	2480 B	2160 B	1930 B	2730 B
Magnesium, Total Mg	3480	na	na	1570 B	859 B	1560 B	<242	317 B	854 B	2200 B	664 B	983 B	3630 B
Manganese, Total Mn	291	na	na	5.1 B	2.9 B	7.4 B	1.5 B	<1.0	2.2 B	12.7 B	1.3 B	229	<1.0
Sodium, Total Na	10800	20,000	na	4070 B	2030 B	4650 B	7340	2710 B	3480 B	5580	3160 B	2950 B	3490 B
Nickel, Total Ni	34.3	100	na	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
Lead, Total Pb	4.25	15	15	<1.2	4.5	<1.2	<1.2	<1.2	<1.2	2.9 B	<1.2	<1.2	<1.2
Antimony, Total Sb	3.03	6	6	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2	<4.2
Selenium, Total Se	3.02	50	50	<3.1	4.1 B	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
Thallium, Total Tl	6.99	2	2	<4.0	<4.0	<4.0	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9
Vanadium, Total V	11	na	na	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Zinc, Total Zn	21.1	na	na	<1.9	<1.9	<1.9	4.4 B	<1.9	<1.9	2.4 B	<1.9	<1.9	<1.9
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<0.25	0.35 UJ	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	0.52 UJ	0.91 UJ	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
PERCHLORATE				0.18 J	0.12 J	0.11 J	<0.20	0.039 J	0.081 J	0.19 J	0.38	0.087 J	0.095 J

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas - metal values are above Maximum Contaminant Levels -	25
Shaded areas - explosive values are above background levels. -	25
J = Estimated value	
UJ = Analyte tentatively not detected at the reported concentration based on spike recovery values above QC limits	
B = The result is less than the reporting limit but greater than the instrument detection limit	

TABLE 4-2

GROUNDWATER ANALYTICAL RESULTS - November 1-3, 2004

SOUTH POST IMPACT AREA WELLS (Sheet 3 of 3)

Devens, Massachusetts
(concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	D - 1	41M-93-04X	41M-94-09A	41M-94-09B	41M-94-11X	41M-94-12X	41M-94-13X	41M-94-14X	41M-94-14XD
DATE				11/2/04	11/3/04	11/3/04	11/3/04	11/3/04	11/3/04	11/3/04	11/3/04	11/3/04
					LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES		MCLs (ug/l)										
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
HMX	400	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
RDX	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	na
PERCHLORATE	na			0.24	<0.20	0.15 J	0.49	<0.20	<0.20	0.051 J	0.088 J	na
VOLATILES												
1,1,2-Trichloroethane	na	5	5	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	na	70	70	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	na	5	5	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon disulfide	na	na	na	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	na	5	5	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	na	100	100	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	na	5	5	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	na	1000	1000	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	na	2	2	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND

Shaded areas - metal values are above Maximum Contaminant Levels -	25
Shaded areas - explosive values a -- = Parameter not measured	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	

TABLE 4-3
AOC 25 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 25M-92-06X

CHEMICAL SUMMARY REPORT (Sheet 1 of 2)
(Concentrations in ug/l)

	Well No.		25M-92-06X											
			DATE	06/23/93	11/17/92	03/02/93	08/23/93	10/30/97	10/21/98	10/21/99	10/23/00	10/15/01	10/21/02	10/30/03
PARAMETERS	BACKGROUND		FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
	LEVELS	MA	Federal											
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	nl	nl	<2	<2	<4.6	<4.6	<15	<3.0	<1.0	<0.8	<0.60	<1.8	<1.5
Aluminum, Total Al	6870	nl	nl	<25	8710	1640	16000	<100	350	321	23.4	51.3	181	34.1 B
Arsenic, Total As	10.5	10	10	<2	<2.54	<2.54	4.94	<8	<5.0	<1.0	<2.1	<1.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	<10	39.4	9.35	86.6	<8	<10.0	3.2	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<3.0	<0.1	<0.1	0.31	<0.20	<0.30
Calcium, Total Ca	14700	na	na	2990	3390	3290	3990	2440	2760	2460	2430	2260	2680	2260 B
Cadmium, Total Cd	4.01	5	5	<5	<4.01	<4.01	<5	<10	<3.0	<0.2	<0.65	<0.20	<0.30	<1.3
Cobalt, Total Co	25	na	na	<10	<25	<26	33.5	<30	<5.0	<1.0	<1.35	1.7	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	24.1	<6.02	41.9	<15	9.4	2.1	2.2	5.9	<4.8	<1.3
Copper, Total Cu	8.09	1300	1300	<10	<25	<28	33.5	<28	<5.0	0.98	2.3	4.7	<1.8	<2.0
Iron, Total Fe	9100	na	na	<25	33600	5230	56000	141	844	654	38.5	154	375	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	1190	2490	2020	2480	<1000	677	624	420	444	674	537 B
Magnesium, Total Mg	3480	na	na	711	1370	933	2800	690	778	726	680	699	722	627 B
Manganese, Total Mn	291	na	na	12.6	383	68.7	690	<5	13.6	10.3	1.8	2.2	5	<1.0
Sodium, Total Na	10600	20,000	na	<2000	1950	2400	<2000	1880	2100	1980	1490	1970	2050	1760 B
Nickel, Total Ni	34.3	100	na	<10	<34.3	<34.3	41.3	<40	5.6	2.6	1.8	2.2	<13.5	<2.5
Lead, Total Pb	4.25	15	15	<5	4.77	<1.26	11.6	<5	<3.0	0.6	<0.9	<0.60	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<3.03	<3.03	<5	<8	<5.0	<1.4	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0	2.5	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2.0	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	16.2	<11	36.0	<25	<5.0	<0.6	<1.0	<2.1	<2.8	<5.6
Zinc, Total Zn	21.1	na	na	<20	64.2	<21.1	121	<26	60.4	4.1	1.5	<0.90	<6.9	<2.0
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	<0.635	<0.635	<1	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	<1.21	<1.21	<1	<1.0	<2.60	<0.25	<0.25	0.34 J	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	<1.17	<1.17	<1J	<0.5	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
PETN	na	na	na	--	<20	<20	<10	--	--	--	--	--	--	--
FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	10.75	1.67	11.08	10.74	10.21	12.68	10.24
Oxidation Reduction Potential mv				--	--	--	--	209.6	161.6	183.9	251.2	333.2	197.3	368.9
pH				--	--	--	--	6.05	4.74	6.24	5.82	6.68	6.08	5.98
Specific Conductance				--	--	--	--	0.091	33.0	27.0	26.0	26.0	31.0	26
Turbidity NTU				--	--	--	--	4.92	27	31	3.00	9.00	9.30	2.79

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-3
AOC 25 - GROUNDWATER TRENDS

SOUTH POST IPACT AREA WELL 25M-97-11X

CHEMICAL SUMMARY REPORT (Sheet 2 of 2)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	10/30/97	10/21/98	10/21/98	10/21/99	10/23/00	10/15/01	10/21/02	10/30/03
		Well No. 25M-97-11X		LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)									
Silver, Total Ag	4.6	nl	nl	<15	<3.0	--	<1.0	<0.8	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	nl	nl	<100	<200	--	27.5	11.3	84.2	49	50.4 B
Arsenic, Total As	10.5	10	10	<8	<5.0	--	<1.0	<2.1	<1.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	<5	<10.0	--	<2.8	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	<5	<3.0	--	<0.1	<0.1	0.37	<0.20	0.39 B
Calcium, Total Ca	14700	na	na	2610	2670	--	2440	2460	2330	2400	2330 B
Cadmium, Total Cd	4.01	5	5	<10	<3.0	--	<0.2	<0.65	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<30	<5.0	--	4.5	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<15	<5.0	--	<0.5	1.8	4.0	<4.6	2.6 B
Copper, Total Cu	8.09	1300	1300	<25	<5.0	--	<0.9	2.0	1.9	<1.8	<2.0
Iron, Total Fe	9100	na	na	31	<100	--	30.4	22.0	124	41.7	<30.0
Mercury, Total Hg	0.243	2	2	<0.200	<0.2	--	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	<1000	749	--	804	656	555	683	649 B
Magnesium, Total Mg	3480	na	na	980	971	--	909	931	859	857	851 B
Manganese, Total Mn	291	na	na	<5	<5.0	--	1.3	1.3	2.0	<2.5	1.0 B
Sodium, Total Na	10800	20,000	na	2860	2760	--	2580	2430	2410	2330	2370 B
Nickel, Total Ni	34.3	100	na	<40	<5.0	--	1.1	1.1	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<6	<3.0	--	<0.5	<0.9	<0.60	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<8	<5.0	--	<1.4	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	<10	<5.0	--	1.3	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<15	<2.0	--	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<25	<5.0	--	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	<25	12.4	--	2.1	2.2	1.0	<6.9	<2.0
EXPLOSIVES											
1,3,5-Trinitrobenzene	na	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.125J	<2.60	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.125J	<2.60	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.125J	<2.60	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<1.0J	<2.60	<2.60	<0.25	<0.25	0.34 J	<0.25 UJ	<0.25
Tetryl	na	na	na	<0.5J	<2.60	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.125J	<1.20	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	<0.5J	<2.60	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
PETN	na	na	na	--	--	--	--	--	--	--	--

FIELD PARAMETERS											
Dissolved Oxygen mg/L				10.10	6.75	6.75	9.87	11.20	9.45	9.25	10.03
Oxidation Reduction Potential mv				191.3	216.8	216.8	199.8	227.4	363.0	247.6	222.4
pH				6.12	6.14	6.14	6.18	5.64	6.16	6.45	6.07
Specific Conductance				0.101	38.0	38.0	31.0	31.0	33.0	33.0	31
Turbidity NTU				1.34	0.61	0.61	4.45	1.5	3.10	6.8	4.01

Notes: Background levels for Explosives are taken from Functional Area I RI. Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-4
AOC 26 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 26M-92-02X

CHEMICAL SUMMARY REPORT (Sheet 1 of 4)
(Concentrations in ug/l)

	Well No.		DATE 26M-92-02X	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/21/98	10/20/99	10/26/00	10/17/01	10/21/02	10/30/03
PARAMETERS	BACKGROUND		FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
	LEVELS	MA	Federal											
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	na	na	--	--	--	--	<15	<3.0	<1.0	<0.80	2.0	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<25	4190J	1030J	748J	170	219	266	247	292	2570	399
Arsenic, Total As	10.5	10	10	5.07	<2.54	<2.54	4.94	<8	<5.0	5.7	6.3	5.6	12.4	5.6 B
Barium, Total Ba	39.6	2000	2000	<10	38.4	9.35	86.6	<5	<10.0	<2.8	<2.05	<4.0	10.7	<11.7
Beryllium, Total Be	5	4	4	--	--	--	--	<5	<3.0	<0.1	0.06	<0.20	<0.20	<0.30
Calcium, Total Ca	14700	na	na	2540	3190	2820	2520	2700	2690	2460	2620	2550	3070	2810 B
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<10	<3.0	<0.2	<0.15	0.24	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<25	<25	<10	<30	<5.0	<1.0	<0.80	2.0	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	6.78	<6.02	<10	25	<5.0	<0.5	3.2	2.8	4.6	3.3 B
Copper, Total Cu	8.09	1300	1300	<10	11.4	<8.09	<10	<25	<5.0	<0.9	1.6	3.8	6.0	2.1 B
Iron, Total Fe	9100	na	na	<25	6290J	1130J	1200J	300	239	317	315	416	2900	488
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	0.12	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	<1000	1610	1820	<1000	<1000	<500	469	524	434	978	565 B
Magnesium, Total Mg	3480	na	na	929	1910	1090	1080	1090	1050	1030	1110	1040	1490	1120 B
Manganese, Total Mn	291	na	na	<5	89.2J	20.9	17.8	5.5	<5.0	3.8	4.5	5.7	35.3	13 B
Sodium, Total Na	10800	20,000	na	3370	3280	3410	2920	3470	3490	3220	3390	3500	3520	3120 B
Nickel, Total Ni	34.3	100	na	<10	<34.3	<34.3	<10	<40	<5.0	<0.9	3.0	3.6	<13.5	3.8 B
Lead, Total Pb	4.25	15	15	<5	4.99	3.15	<5	<5	<3.0	<0.5	<0.90	<0.60	2.9	<1.4
Antimony, Total Sb	3.03	6	6	--	--	--	--	<8	<5.0	<1.4	<2.30	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0	1.4	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2.0	<1.4	<2.25	2.2	<3.0	2.2 B
Vanadium, Total V	11	na	na	<10	<10	<11	<11	<25	<5.0	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	76.7	59.2	95.3	99.3	27.6	14.3	4.3	4.8	4.5	14.8	8.0 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	<0.074	<0.074	<1	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	--	<1	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	--	1.86	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	<1	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	<1.21	<1.21	<1.21	<1.0	<2.60	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	<1.17	<1.17	<1	<0.5	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25
PETN	na	na	na	--	24.8	<20	<20	--	--	--	--	--	--	--
Nitroglycerine	na	na	na	--	68.3	<10	<10	--	--	--	--	--	--	--

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	7.30	4.71	6.91	6.99	6.99	7.73	6.46
Oxidation Reduction Potential mv				--	--	--	--	172.0	166.5	230.1	236.5	295.0	160.4	133.0
pH				--	--	--	--	5.83	6.10	6.02	5.67	6.08	5.88	6.02
Specific Conductance				--	--	--	--	0.110	44.0	35.0	36.0	38.0	43.0	36
Turbidity NTU								4.50	2.3	14	4.1	15	57.3	65

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-4
AOC 26 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 26M-92-03X

CHEMICAL SUMMARY REPORT (Sheet 2 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MCLs (ug/l) MA	MCLs (ug/l) Federal	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/21/98	10/21/98 -03XD	10/20/99	10/20/99 -03XD	10/26/00	10/16/01	10/16/01 -03XD	10/21/02	10/21/02 -03XD	10/30/03	10/30/03 -03XD
Well No. 26M-92-03X / FILTERED?				YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS																			
Silver, Total Ag	4.6	na	na	--	--	--	--	<15	<3.0	<3.0	<1.0	<1.0	<0.80	<0.60	--	<1.4	--	<1.5	na
Aluminum, Total A	6870	na	na	<25	1050	323J	6700J	<100	<200	<200	13.6	16.6	38.6	8.1	--	28.9	--	<30.7	na
Arsenic, Total As	10.5	10	10	<2	2.88	<2.54	5.60	<8	<5.0	<5.0	<1.0	<1.0	<2.1	<1.5	--	<3.2	--	<3.5	na
Barium, Total Ba	39.6	2000	2000	16.4	23.3	19.8	24.0	13.5	12.5	11.8	13.4	13.4	11.9	16.0	--	36.1	--	<11.7	na
Beryllium, Total Be	5	4	4	--	--	--	--	<5	<3.0	<3.0	<0.1	<0.1	0.08	0.39	--	<0.20	--	<0.30	na
Calcium, Total Ca	14700	na	na	5650	6030	5920	5870	4400	4020	3810	4660	4580	4320	4750	--	10500	--	3440 B	na
Cadmium, Total Cc	4.01	5	5	--	--	--	--	<10	<3.0	<3.0	<0.2	<0.2	<0.15	<0.20	--	<0.30	--	<0.70	na
Cobalt, Total Co	25	na	na	<10	<25	<25	<10	<30	<5.0	<5.0	<1.0	<1.0	<0.80	<1.4	--	<2.2	--	<3.1	na
Chromium, Total Cr	14.7	100	100	<10	<6.02	<6.02	<10	28	<5.0	<5.0	<0.5	<0.5	1.6	2.0	--	<4.6	--	<1.3	na
Copper, Total Cu	8.09	1300	1300	<10	<8.09	<8.09	<10	<25	<5.0	<5.0	1.2	1.1	2.0	5.2	--	<1.8	--	<2.0	na
Iron, Total Fe	9100	na	na	<25	1310	419J	2300J	210	<100	<100	<12.7	<12.7	29.9	16.5	--	26.2	--	<30.0	na
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.2	1.1J	0.13J	<0.1	<0.10	--	<0.10	--	<0.10	na
Potassium, Total K	2370	na	na	1010	2200	2610	1510	<1000	1060	1030	1180	1100	1210	1040	--	1770	--	1040 B	na
Magnesium, Total Mg	3480	na	na	589	697	651	936	610	<500	<500	427	421	458	388	--	696	--	335 B	na
Manganese, Total Mn	291	na	na	15.8	62.7	34.8	76.2	11.1	<5.0	<5.0	3.4	3.5	4.1	8.3	--	40.3	--	6.1 B	na
Sodium, Total Na	10800	20,000	na	2070	1900	2210	<2000	1740	1780	1750	1390	1560	1700	1720	--	2330	--	1490 B	na
Nickel, Total Ni	34.3	100	na	<10	<34.3	<34.3	<10	<40	<5.0	<5.0	<0.9	<0.9	<1.05	<2.1	--	<13.5	--	<2.8	na
Lead, Total Pb	4.25	15	15	<5	1.41	<1.26	<5	<5	<3.0	<3.0	<0.5	<0.5	<0.90	<0.60	--	1.1	--	<2.8	na
Antimony, Total Sb	3.03	6	6	--	--	--	--	<8	<5.0	<5.0	<1.4	<1.4	<2.3	<2.2	--	<3.5	--	<2.6	na
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0	<5.0	2	<1.2	<1.85	<1.2	--	<3.9	--	<3.0	na
Thallium, Total T	6.99	2	2	--	--	--	--	<15	<2.0	<2.0	<1.4	<1.4	<2.25	<1.8	--	<3.0	--	<1.8	na
Vanadium, Total V	11	na	na	<10	<11	<11	<11	<25	<5.0	<5.0	<0.8	<0.8	<1.0	<2.1	--	<2.8	--	<3.8	na
Zinc, Total Zn	21.1	na	na	<20	<21.1	<21.1	24.4	33.2	12.4	87.3	0.83	1	1.8	<0.90	--	<6.9	--	<2.0	na
EXPLOSIVES																			
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	<0.074	<0.074	<1	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.26	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	--	<1	<0.125J	<2.60	<2.60	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	--	<1	<0.125J	<2.60	<2.60	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	<1	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.60	<2.60	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	11.2	9.42	8.93	3.8J	2.60	<2.60	17	--	2.2	12 J	12 J	33 J	34 J	1.1	1.0
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.60	<2.60	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20	<0.25	--	<0.25	<0.26	<0.26	<0.26	<0.25	<0.25	<0.25
RDX	2	na	na	--	75	83.4	58	23J	8.90	<2.60	97	--	12	62	63	260	270	6.7	6.6
PETN	na	na	na	--	<20	<20	<10	--	--	--	--	--	--	--	--	--	--	--	--
Nitroglycerine	na	na	na	--	<10	<10	<10	--	--	--	--	--	--	--	--	--	--	--	--

FIELD PARAMETERS				06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/21/98	10/21/98 -03XD	10/20/99	10/20/99 -03XD	10/26/00	10/16/01	10/16/01 -03XD	10/21/02	10/21/02 -03XD	10/30/03	10/30/03 -03XD
Dissolved Oxygen mg/L				--	--	--	--	9.99	10.27	10.27	6.91	6.91	11.88	11.44	11.44	9.48	9.48	11.14	11.14
Oxidation Reduction Potential mv				--	--	--	--	223.0	208.0	208.0	230.1	230.1	283.7	359.7	359.7	267.0	267.0	154.2	154.2
pH				--	--	--	--	5.38	5.84	5.84	6.02	6.02	5.19	5.60	5.60	5.51	5.51	5.65	5.65
Specific Conductance				--	--	--	--	0.119	44.0	44.0	35.0	35.0	39.0	48.0	48.0	87.0	87.0	35	35
Turbidity NTU				--	--	--	--	2.00	0.45	0.45	0.70	0.70	0.90	0.32	0.32	1.69	1.69	0.7	0.7

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-4
AOC 26 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 26M-92-04X

CHEMICAL SUMMARY REPORT (Sheet 3 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	5/24/93	11/18/92	3/30/93	6/24/93	10/21/98	10/20/99	10/20/99	10/25/00	10/16/01	10/16/01	10/21/02	10/21/02	10/30/03	10/30/03
Well No.	26M-92-04X									-04XD			-04XD		-04XD		-04XD
			FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)															
METALS																	
Silver, Total Ag	4.6	na	na	--	--	--	--	<3.0	<1.0	--	<0.80	<0.60	<0.60	<1.4	<1.4	<1.5	<1.5
Aluminum, Total Al	6670	na	na	<25	24200	2560	6400	<200	21.8	--	8.5	<7.7	<7.7	<16.1	<16.1	35.2 B	31.8 B
Arsenic, Total As	10.5	10	10	<2	100	7.46	6.61	<5.0	1.5	--	<2.1	<1.5	<1.5	<3.2	<3.2	<3.5	<3.5
Barium, Total Ba	39.6	2000	2000	<10	86.5	21.9	11	10.0	9.7	--	10.3	7.6	7.7	<9.2	<9.2	<11.7	<11.7
Beryllium, Total Be	5	4	4	--	--	--	--	<3.0	<0.1	--	<0.10	0.48	0.46	<0.20	<0.20	<0.30	<0.30
Calcium, Total Ca	14700	na	na	7920	15200	18100	8780	10300	12100	--	11300	8340	8270	9070	8790	8020	8150
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<3.0	<0.2	--	<0.55	<0.20	<0.20	<0.30	<0.30	<0.70	<0.70
Cobalt, Total Co	25	na	na	<10	44.8	<25	<10	<5.0	1.7	--	1.35	<1.4	<1.4	<2.2	<2.2	<3.1	<3.1
Chromium, Total Cr	14.7	100	100	<10	26.6	8.14	<10	<5.0	<0.5	--	0.55	0.93	1.9	<4.6	<4.6	<1.3	<1.3
Copper, Total Cu	8.09	1300	1300	<10	32	<8.09	<10	<5.0	<0.9	--	0.97	2.5	1.9	8.0 J	2.4 J	<2.0	<2.0
Iron, Total Fe	9100	na	na	<25	31300	3060	2000	<100	<12.7	--	10.6	15.7	22.0	<22.6	<22.6	<30.0	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.2	0.11	--	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	<1000	5470	2260	<1000	790	985	--	870	765	764	873	860	889 B	940 B
Magnesium, Total Mg	3480	na	na	1080	4830	2410	1390	1250	1380	--	1190	871	864	912	884	873 B	868 B
Manganese, Total Mn	291	na	na	19.7	57.6	<34.3	<10	19.8	15.4	--	18.7	10.8	10.6	11.2	11.2	11.1 B	11.1 B
Sodium, Total Na	10800	20,000	na	3690	5810	6010	3390	4100	3880	--	3270	2920	3050	2980	2910	2630 B	2660 B
Nickel, Total Ni	34.3	100	na	<10	57.6	<34.3	<10	<5.0	10.7	--	1.05	<2.1	<2.1	<13.5	<13.5	<2.8	<2.8
Lead, Total Pb	4.25	15	15	<5	27	6.4	<5	<3.0	<0.5	--	<0.90	<0.60	<0.60	<1.1	<1.1	<2.8	<2.8
Antimony, Total Sb	3.03	6	6	--	--	--	--	<5.0	<1.4	--	<2.3	<2.2	<2.2	<3.5	<3.5	<2.6	<2.6
Selenium, Total Se	3.02	50	50	3.56	<3.02	<3.02	<2.0	<5.0	<1.2	--	1.65	<1.2	<1.2	<3.9	<3.9	<3.0	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<2.0	<1.4	--	<2.25	<1.8	<1.8	<3.0	<3.0	<1.6	<1.6
Vanadium, Total V	11	na	na	<10	24.9	<11	<10	<5.0	<0.8	--	<1.0	<2.1	<2.1	<2.8	<2.8	<3.8	<3.8
Zinc, Total Zn	21.1	na	na	<20	59.5	<21.1	27.6	12.9	4.6	--	1.2	<0.90	<0.90	<6.9	<6.9	2.7 B	<2.0
EXPLOSIVES																	
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
2,4-Dinitrotoluene	30	na	na	--	--	--	--	2.3	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
2,6-Dinitrotoluene	na	na	na	--	5.42	2.06	4.78	<1.20	<0.25	<0.25	3.6	3.0	2.8	3.1	3.4	<3.8	<3.8
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
2-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
3-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.20	<0.25	<0.25	0.71	0.50	0.42	0.46	0.45	<3.8	<3.8
4-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
HMX	400	na	na	--	22.4	23	15.7	32.9	38	39	41	24 J	24 J	25 J	26 J	25	23
Tetryl	na	na	na	--	--	--	--	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
Nitrobenzene	na	na	na	--	--	--	--	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<3.8	<3.8
RDX	2	na	na	--	270	390	198	227.4	240	250	260	200	200	180	200	210	190
PETN	na	na	na	--	<20	<20	<10	--	--	--	--	--	--	--	--	--	--
Nitroglycerine	na	na	na	--	<10	<10	<10	--	--	--	--	--	--	--	--	--	--

FIELD PARAMETERS				5/24/93	11/18/92	3/30/93	6/24/93	10/21/98	10/20/99	10/20/99 -04XD	10/25/00	10/16/01	10/16/01 -04XD	10/21/02	10/21/02 -04XD	10/30/03	10/30/03 -04XD
Dissolved Oxygen mg/L				--	--	--	--	11.00	7.04	7.04	11.20	8.58	8.58	7.13	7.13	9.16	9.16
Oxidation Reduction Potential mv				--	--	--	--	198.7	230.3	230.3	227.4	375.0	375.0	253.3	253.3	388.1	388.1
pH				--	--	--	--	5.89	5.63	5.63	6.64	5.60	5.60	5.76	5.76	5.54	5.54
Specific Conductance				--	--	--	--	107.0	101.0	101.0	31.0	86.0	86.0	86.0	86.0	69	69
Turbidity NTU				--	--	--	--	0.75	0.10	0.10	0.60	0.40	0.40	0.77	0.77	0.16	0.16

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-4
AOC 26 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 26M-97-08X

CHEMICAL SUMMARY REPORT (Sheet 4 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	10/28/97 08X LOW FLOW	10/21/98 08X LOW FLOW	10/20/99 08X LOW FLOW	10/20/99 08XD LOW FLOW	10/26/00 08X LOW FLOW	10/17/01 08X LOW FLOW	10/17/01 08XD LOW FLOW	10/21/02 08X LOW FLOW	10/21/02 08XD LOW FLOW	10/30/03 08X LOW FLOW	10/30/03 08XD LOW FLOW
Well No. 26M-97-08X		FILTERED?												
METALS														
Silver, Total Ag	4.6	na	na	<15	<3.0	<1.0	--	<0.80	<0.60	--	<1.4	--	<1.5	na
Aluminum, Total Al	6870	na	na	110J	<200	23.9	--	28.8	11.7	--	43.3	--	30.7	na
Arsenic, Total As	10.5	10	10	<8	<5.0	<1.0	--	<2.1	<1.5	--	<3.2	--	<3.5	na
Barium, Total Ba	39.6	2000	2000	9.1J	10.0	8.7	--	9.3	11.0	--	13.1	--	<11.7	na
Beryllium, Total Be	5	4	4	<5	<3.0	<0.1	--	0.06	<0.20	--	<0.20	--	0.34 B	na
Calcium, Total Ca	14700	na	na	4330	3760	3710	--	3320	4090	--	5130	--	3580 B	na
Cadmium, Total Cd	4.01	5	5	<10	<3.0	<0.2	--	<0.15	<0.20	--	<0.30	--	<0.70	na
Cobalt, Total Co	25	na	na	<30	8.5	2.6	--	<0.80	<1.4	--	<2.2	--	<3.1	na
Chromium, Total Cr	14.7	100	100	<15	5.2	0.74	--	1.2	1.1	--	<4.6	--	<1.3	na
Copper, Total Cu	8.09	1300	1300	<25	<5.0	<0.9	--	4.6	1.7	--	<1.8	--	<2.0	na
Iron, Total Fe	9100	na	na	260	<100	22.9	--	41.2	<15.7	--	42.4	--	<30.0	na
Mercury, Total Hg	0.243	2	2	<0.2	<0.2	<0.1	--	0.28	<0.10	--	<0.10	--	<0.10	na
Potassium, Total K	2370	na	na	<1000	793	774	--	926	772	--	878	--	671 B	na
Magnesium, Total Mg	3480	na	na	534	<500	455	--	470	504	--	578	--	478 B	na
Manganese, Total Mn	291	na	na	17.1	6.1	3.5	--	4.0	2.9	--	4.4	--	2.7 B	na
Sodium, Total Na	10800	20,000	na	2040	1950	1780	--	1980	2260	--	2230	--	1930 B	na
Nickel, Total Ni	34.3	100	na	<40	<5.0	1.5	--	<1.05	<2.1	--	<13.5	--	<2.8	na
Lead, Total Pb	4.25	15	15	<6	<3.0	<0.5	--	<0.90	<0.60	--	1.6	--	<2.8	na
Antimony, Total Sb	3.03	6	6	<8	<5.0	<1.4	--	<2.3	<2.2	--	<3.5	--	<2.6	na
Selenium, Total Se	3.02	50	50	<10	<5.0	1.7	--	<1.85	<1.2	--	<3.9	--	<3.0	na
Thallium, Total Tl	6.99	2	2	<15	<2.0	<1.4	--	<2.25	<1.8	--	<3.0	--	<1.8	na
Vanadium, Total V	11	na	na	<25	<5.0	<0.8	--	<1.0	<2.1	--	<2.8	--	<3.8	na
Zinc, Total Zn	21.1	na	na	32.2J	21.5	1.8	--	<1.75	<0.90	--	<6.9	--	<2.0	na
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
1,3-Dinitrobenzene	1	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
2,4,6-Trinitrotoluene	2	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
2,4-Dinitrotoluene	30	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
2,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
2-Nitrotoluene	na	na	na	<0.125J	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
3-Nitrotoluene	na	na	na	<0.125J	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
4-Nitrotoluene	na	na	na	<0.125J	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
HMX	400	na	na	4.9J	6.3	8.2	7.7	4.5	9 J	9.3 J	9.2 J	9.6 J	4.5	4.3
Tetryl	na	na	na	<0.5J	<2.60	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
Nitrobenzene	na	na	na	<0.125J	<1.20	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.75	<0.75
RDX	2	na	na	29J	28.5	48	44	30	57	59	63	66	37	33

FIELD PARAMETERS														
Dissolved Oxygen mg/L				10.21	2.30	9.15	9.15	7.30	8.46	8.46	10.02	10.02	9.35	9.35
Oxidation Reduction Potential mv				188.0	232.2	233.3	233.3	241.7	343.2	343.2	251.1	251.1	171.3	171.3
pH				5.55	5.84	5.67	5.67	5.77	5.65	5.65	5.43	5.43	5.67	5.67
Specific Conductance				0.112	40	35	35	33	41	41	51	51	36	36
Turbidity NTU				4.85	2.30	0.90	0.90	2.0	0.70	0.70	1.55	1.55	1.36	1.36

Notes: Background levels for Explosives are from Functional Area I Rf. Background levels for metals are from AOC 57 Rf.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-5
AOC 27 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL 27M-92-01X

CHEMICAL SUMMARY REPORT (Sheet 1 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	09/21/92	01/13/93	10/29/97	10/19/98	10/18/99	10/24/00	10/16/01	10/22/02	10/30/03
Well No. 27M-92-01X			FILTERED?	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS												
Silver, Total Ag	4.6	na	na	<4.6	<4.6	<15	<3	<0.8	<0.8	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<3.03	<3.03	1660	747	1300	1930	940	2650	258
Arsenic, Total As	10.5	10	10	26.3	25.9	<8	<10	<1.0	6.5	4.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	121	101	13.4	<10	10.1	14.3	10.8	16.6	<11.7
Beryllium, Total Be	5	4	4	<5	<5	<5	<3	0.1	<0.1	0.45	<0.20	0.36 B
Calcium, Total Ca	14700	na	na	11400	9740	5660	8600	8700	5840	5470	9230	15700
Cadmium, Total Cd	4.01	5	5	<4.01	<4.01	<10	<3	<0.2	<0.55	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<25	<25	<30	<5	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	48.4	35.5	78.8	<5	4.1	4.2	4.6	<4.6	1.6 B
Copper, Total Cu	8.09	1300	1300	29.4	25.9	<25	<5	3	4.0	4.0	4.1	6.5 B
Iron, Total Fe	9100	na	na	41600	32700	2530	815	1140	1830	969	2400	153
Mercury, Total Hg	0.243	2	2	<0.243	<0.240	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	8660	7950	1500	1850	2310	1760	1390	2580	2250 B
Magnesium, Total Mg	3480	na	na	9610	7740	1120	820	1110	952	604	1380	851 B
Manganese, Total Mn	291	na	na	820	585	83.7	11.1	23.3	29.1	21.6	37.0	7.6 B
Sodium, Total Na	10800	20,000	na	4560	4690	3880	4970	4880	4550	4650	5580	4040 B
Nickel, Total Ni	34.3	100	na	52.1	<34.3	88.5	<5	2.2	3.2	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	17.4	15.3	<5	<3	1.8	2.2	2.2	2.2	<2.8
Antimony, Total Sb	3.03	6	6	<3.03	<3.03	<8	<5	<2.5	<2.3	<2.2	<3.5	<2.8
Selenium, Total Se	3.02	50	50	--	--	<10	<5	1.5	<1.86	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.9
Vanadium, Total V	11	na	na	44.9	44.9	<25	<5	1.9	3.1	3.4	4.2	<3.8
Zinc, Total Zn	21.1	na	na	125	119	25.8	97.6	5.3	8.6	4.5	7.0	2.1 B
EXPLOSIVES												
1,3,5-Trinitrobenzene	nl	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.611	<0.611	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.064	<0.064	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	2.77	3.73	1.1	<2.6	1	0.98	0.78 J	0.82 J	<0.25
Tetryl	na	na	na	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	12.1	12.3	4.6	2.6	3	2.9	3.0	1.8	<0.25

FIELD PARAMETERS				09/21/92	01/13/93	10/29/97	10/19/98	10/18/99	10/24/00	10/16/01	10/22/02	10/30/03
Dissolved Oxygen mg/L				--	--	6.75	6.88	5.25	7.13	5.46	6.35	8.48
Oxidation Reduction Potential mv				--	--	170.9	167.7	204.8	235.2	315.1	232.3	408.1
pH				--	--	5.93	6.14	5.99	6.08	5.96	6.35	6.38
Specific Conductance				--	--	0.149	71	72	52	55	88	100
Turbidity NTU				--	--	35.6	16.2	23	41.0	35.2	64.7	7.19

Notes: Background levels for Explosives are taken from Functional Area I RI. Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-5
AOC 27 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL 27M-93-05X

CHEMICAL SUMMARY REPORT (Sheet 2 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	08/17/93	11/10/93	08/17/93	11/10/93	10/29/97	10/19/98	10/19/99	10/24/00	10/16/01	10/22/02	10/30/03
Well No.	27M-93-05X		DATE											
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS														
Silver, Total Ag	4.8	na	na	<2	<2	<2	<2	<16	<3	<0.8	<0.8	0.91	<1.4	<1.5
Aluminum, Total Al	6870	na	na	72.3	115J	2000	254J	2360	<200	1950	383	116	68.2	133 B
Arsenic, Total As	10.5	10	10	4.86	6.22	10.8	6.64	<8	<10	3.3	6.6	4.1	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	<10	<10	15	<10	27.4	<10	19.5	4.0	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.113J	<5	0.123J	<5	<5	<3	0.13	<0.1	0.45	<0.20	<0.30
Calcium, Total Ca	14700	na	na	11400	6730	11500	4640J	16700	4600	9260	7970	6280	5380	5190
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	0.21	<0.55	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5	5.2	<1.35	<1.4	4.5	<3.1
Chromium, Total Cr	14.7	100	100	<10	3.69J	7.38J	<10	30.4	<5	17.1	3.1	3.4	<4.6	3.5 B
Copper, Total Cu	8.09	1300	1300	<10	<10	5.92J	<10	<25	<5	24.9	2.5	3.7	<1.8	<2.0
Iron, Total Fe	9100	na	na	22.6J	14.5	3000J	395J	2690	<100	2270	365	137	95.8	62.6 B
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	1120	<1000	1580	549J	4500	706	3520	1580	1170	1240	1370 B
Magnesium, Total Mg	3480	na	na	1800	1790	2400	1200	2280	1190	2110	1970	1690	1590	1630 B
Manganese, Total Mn	291	na	na	1.46J	4.45J	102	32.1	107	<5	88.2	22.2	9.5	6.6	7.0 B
Sodium, Total Na	10600	20,000	na	6300	3320	5370	2120	9280	2250	3520	5500	4740	4600	4210 B
Nickel, Total Ni	34.3	100	na	<10	<10	8.94J	<10	<40	<5	10.7	1.8	<2.1	<13.5	<2.8
Lead, Total Pb	4.26	15	15	<5	<5	<5	3.19J	8	<3	6.5	<0.9	<0.60	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	<2.5	<2.3	<2.2	<3.5	<2.8
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.4	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	2.9	1.6	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	9.65J	5.05J	34.6	57.8J	76.1	<10	87.2	3.7	3.6	<6.9	2.7 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	nl	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	0.289J	1.03	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<1.0	0.281J	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1.0	<1.0	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	0.602	<1.0	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1.0	<1.0	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	<1.0	<1.0	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	1.02	0.788J	<0.5	<2.8	<0.25	0.50	0.43	0.48	0.43
FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	1.09	0.70	0.83	0.71	6.13	6.58	6.74
Oxidation Reduction Potential mv				--	--	--	--	-71.3	-164.3	-100.9	-107.1	232.0	14.0	233
pH				--	--	--	--	9.03	9.03	7.85	6.86	7.47	7.30	6.89
Specific Conductance				--	--	--	--	0.265	143.0	82.0	115.0	70.0	86.0	59
Turbidity NTU				--	--	--	--	58.7	33.1	61.6	12.5	7.8	5.59	9.8

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	-- = Parameter not measured
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-5
AOC 27 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 27M-93-06X

CHEMICAL SUMMARY REPORT (Sheet 3 of 4)
(Concentrations in ug/l)

	Well No. 27M-93-06X		DATE	08/16/93	11/10/93	08/18/93	11/18/93	10/29/97	10/19/98	10/18/99	10/24/00	10/16/01	10/22/02	10/30/03
PARAMETERS	BACKGROUND LEVELS	MA	FILTERED? Federal	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	na	na	<2	<2	1.49J	<2	<15	<3	1.1	<0.80	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	26.1	75.8J	356	366J	<100	<200	237	49.5	25.1	92.3	73.9 B
Arsenic, Total As	10.5	10	10	<2	<2	<2	1.03J	<8	<10	<1.0	<2.1	2.2	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	<10	<10	3.88J	3.99J	<5	<10	2.9	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.315J	<5	0.204J	<5	<5	<3	<0.1	<0.1	0.39	<0.20	<0.30
Calcium, Total Ca	14700	na	na	5190	4370	5370	4360J	4920	4600	4900	3810	3800	3990	3890 B
Cadmium, Total Cd	4.01	5	5	<5	2.79	<5	<5	<10	<3	<0.2	<0.65	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	<15	<5	3.4	2.0	2.9	<4.6	<1.3
Copper, Total Cu	8.09	1300	1300	<10	<10	1.62J	<10	<25	<5	2.8	1.3	1.3	<1.8	<2.0
Iron, Total Fe	9100	na	na	21.6J	24.4J	609J	514J	189	<100	302	50.8	52.7	66.6	<30.0
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	<1000	432J	1500	787J	1000	706	1620	886	748	1000	1180 B
Magnesium, Total Mg	3480	na	na	1170	1130	1260	1270	1310	1190	1010	1040	948	1020	980 B
Manganese, Total Mn	291	na	na	40.5	13.2J	64.6	35.4	6.1	<5	9.9	4.0	2.7	3.8	2.7 B
Sodium, Total Na	10800	20,000	na	3290	818J	3110	3340	2480	2250	1860	2110	2210	2240	2160 B
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	<40	<5	1.3	1.2	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<5	0.9J	<5	0.93J	<5	<3	6.1	2.5	2.1	1.6 J	1.5 B
Antimony, Total Sb	3.03	6	6	<5	<5	<6	1.78J	<8	<5	<2.5	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.4	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2	<1.4	<2.26	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	15.1J	232J	15.1J	232J	<25	<10	3.1	1.9	1.2	<6.9	2.5 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<1	1.09J	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.26	<0.26	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.26	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	0.699J	0.894J	<1.0	<2.6	0.63	0.54	0.34 J	0.43 J	0.28
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.26	<0.25	<0.25	<0.26
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.26	<0.25	<0.25	<0.26
RDX	2	na	na	--	--	1.56	1.77	2.2	2.2J	1.3	0.96	0.91	0.95	0.75

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	10.95	8.12	9.93	11.37	10.66	9.41	9.94
Oxidation Reduction Potential mv				--	--	--	--	94.3	139.2	194.5	234.9	305.9	252.8	144.0
pH				--	--	--	--	6.30	6.62	6.43	6.32	6.34	6.51	6.19
Specific Conductance				--	--	--	--	0.132	38.0	42.0	38.0	42.0	44.0	39
Turbidity NTU				--	--	--	--	4.85	2.5	8.9	3.8	2.21	5.61	3.20

Notes : Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value; -- = Parameter not measured	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. ; -- = Parameter not measured	

TABLE 4-5
AOC 27 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 27M-93-08X

CHEMICAL SUMMARY REPORT (Sheet 4 of 4)
(Concentrations in ug/l)

PARAMETERS	Well No. / BACKGROUND LEVELS	27M-93-08X MA	MCLs (ug/l) Federal	08/17/93	11/10/93	08/17/93	11/10/93	11/03/97	10/19/98	10/18/99	10/24/00	10/16/01	10/22/02	10/30/03
FILTERED?				YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS														
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<0.8	<0.80	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<25	86.3J	279	188J	<100	<200	18	80.9	12.2	40.3	54.5 B
Arsenic, Total As	10.5	10	10	<2	1.36J	<2	<2	<8	<10	<1.0	<2.1	<1.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	8.19J	4.30J	8.02J	5.94J	<5	<10	4.3	4.1	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.087J	<5	0.164J	<5	<5	<3	<0.1	<0.1	0.35	<0.20	<0.30
Calcium, Total Ca	14700	na	na	10200	4910	10800	5360J	7040	8370	8310	7270	7030	8520	7900
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	<0.2	<0.55	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	<15	<5	1.2	2.0	1.5	<4.6	1.9 B
Copper, Total Cu	8.09	1300	1300	<10	<10	2.58J	4.94J	<25	<5	0.96	4.5	<1.0	<1.8	<2.0
Iron, Total Fe	9100	na	na	<25	<25	384J	218J	42	141	12.1	45.9	18.8	42.3	<30.0
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	2330	1470	2570	2640	1800	1710	1870	1730	1600	1980	2030 B
Magnesium, Total Mg	3480	na	na	2580	812	2660	899	1690	1870	2050	1630	1640	2010	1670 B
Manganese, Total Mn	291	na	na	74.1	35.9J	85.8	41.9	<5	10.8	5.9	17.0	8.4	2.8	3.4 B
Sodium, Total Na	10800	20,000	na	10900	9580	11100	11800	6680	6460	5900	5720	5340	6040	5720
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	<40	<5	<0.9	<1.05	<2.1	<13.6	<2.8
Lead, Total Pb	4.25	15	15	<5	<5	2.95J	<5	<5	<3	<0.5	<0.9	<0.80	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	<2.6	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.4	<1.86	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.9
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	112	124	122	118J	<26	<10	1.3	1.5	<0.90	<6.9	<2.0
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	1.82	1.03	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.26	<0.25	<0.26
2,4-Dinitrotoluene	30	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.26	<0.25	<0.25	<0.26
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.28	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6	<0.25	<0.26	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	2.76	<1	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.126	<1.2	<0.25	<0.28	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--			<0.125	<2.6	<0.25	<0.25	<0.25	<0.26	<0.25
HMX	400	na	na	--	--	0.11J	<1	<1.0	<2.6	<0.25	<0.26	0.34 J	<0.26 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.26	<0.26	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.126	<1.2	<0.26	<0.28	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<1	<1	<0.5	<2.6	<0.25	<0.25	<0.26	<0.25	<0.26

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	6.56	8.88	7.98	9.02	7.97	8.68	8.53
Oxidation Reduction Potential mv				--	--	--	--	156.0	209.1	218.4	256.0	344.0	215.3	496.7
pH				--	--	--	--	5.82	6.06	5.98	6.36	5.68	5.86	5.60
Specific Conductance				--	--	--	--	0.190	85.0	87.0	78.0	82.0	92.0	77
Turbidity NTU				--	--	--	--	2.05	3.01	1.79	0.90	1.60	0.31	0.47

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	-- = Parameter not measured
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 41M-93-04X

CHEMICAL SUMMARY REPORT (Sheet 1 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/07/94	03/13/95	10/31/97	10/31/97	10/20/98	10/20/98	10/19/99	10/25/00	10/17/01	10/17/01	10/24/02	10/28/03
Well No.	41M-93-04X						-04XD		-04XD				-04XD		
						LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES															
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6	<0.25	<0.25	<0.25	--	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6	<0.25	<0.25	<0.25	--	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6	<0.25	<0.25	<0.25	--	<0.25	<0.25
HMX	400	na	na	--	--	<1.0	<1.0	<2.6	<2.6	<0.25	<0.25	<0.25 UJ	--	<0.25	<0.25 J
Tetryl	na	na	na	--	--	<0.5	<0.5	<2.6	<2.6	<0.25	<0.25	<0.25	--	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2	<0.25	<0.25	<0.25	--	<0.25	<0.25
RDX	2	na	na	--	--	<0.5	<0.5	<2.6	<2.6	<0.25	<0.25	<0.25	--	<0.25	<0.25
VOLATILES															
1,1,2-Trichloroethane	na	5	5	--	--	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	3J	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	1.3	<0.5	<5	<5	1J	1J	<1	<1.0	0.24J	0.28J	<1.0	<5.0
Toluene	na	1000	1000	0.63	<0.5	<5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	<5	<5	<1	<1	3.6J	<1.0	<1.0	<1.0	<1.0	<5.0

FIELD PARAMETERS				12/07/94	03/13/95	10/31/97	10/31/97	10/20/98	10/20/98	10/19/99	10/25/00	10/17/01	10/17/01	10/24/02	10/28/03
Dissolved Oxygen mg/L				--	--	2.63	2.63	--	--	0.28	0.12	2.07	2.07	0.66	4.26
Oxidation Reduction Potential mv				--	--	132.2	132.2	--	--	164.8	34.1	263.0	263.0	193.8	236.8
pH				--	--	5.46	5.46	--	--	5.43	5.81	5.47	5.47	5.49	5.25
Specific Conductance				--	--	0.099	0.099	--	--	34.0	56.0	30.0	30.0	37.0	31
Turbidity NTU				--	--	0.60	0.60	--	--	0.89	0.90	0.60	0.60	1.29	1.01

Note: Background levels for Explosives are taken from the Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed; NS = Not sampled; -- = Parameter not measured	

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELLS 41M-94-09A

CHEMICAL SUMMARY REPORT (Sheet 2 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/06/94	03/15/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Well No.	41M-94-09A											
		MCLs (ug/l)				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	NS	NS	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25 J
Tetryl	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	NS	NS	<0.25	<0.25	<0.25	<0.25	<0.25
VOLATILES												
1,1,2-Trichloroethane	na	5	5	--	--	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Toluene	na	1000	1000	<0.5	<0.5	NS	NS	<1	<1.0	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	NS	NS	<1J	<1.0	<1.0	<1.0	<5.0
FIELD PARAMETERS												
Dissolved Oxygen mg/L				--	--	--	--	11.15	9.84	11.26	11.01	11.23
Oxidation Reduction Potential mv				--	--	--	--	225.2	242.1	340.0	119.6	264.8
pH				--	--	--	--	5.87	5.93	5.97	5.93	5.78
Specific Conductance				--	--	--	--	35.000	37.0	40.0	44.0	42
Turbidity NTU				--	--	--	--	0.95	0.50	0.40	1.39	1.51

e: Background levels for Explosives taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background l NS = Not sampled	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed, -- = Parameter not measured	

TABLE 4-6
AOC41-GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 41M-94-09B

CHEMICAL SUMMARY REPORT (Sheet 3 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/05/94	03/15/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Well No. 41M-94-09B						LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	NS	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.125	NS	<0.26	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.125	NS	<0.27	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	NS	<0.28	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.125	NS	<0.29	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	<1.0	NS	<0.30	<0.25	<0.25 UJ	<0.25 UJ	<0.25 J
Tetryl	na	na	na	--	--	<0.5	NS	<0.31	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.125	NS	<0.32	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<0.5	NS	<0.33	<0.25	<0.25	<0.25	<0.25
VOLATILES												
1,1,2-Trichloroethane	na	5	5	--	--	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	NS	<1	<1.0	<1.0 UJ	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	<0.5	<0.5	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Toluene	na	1000	1000	<0.65	<0.65	<5	NS	<1	<1.0	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	<5	NS	<1J	<1.0	<1.0	<1.0	<5.0

FIELD PARAMETERS				12/05/94	03/15/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Dissolved Oxygen mg/L				--	--	10.78	--	11.29	10.63	10.20	10.77	10.66
Oxidation Reduction Potential mv				--	--	190.1	--	229.3	260.4	378.0	207.6	171.0
pH				--	--	5.81	--	6.11	6.07	6.04	6.27	6.06
Specific Conductance				--	--	0.101	--	31.0	31.0	34.0	36.0	38
Turbidity NTU				--	--	0.60	--	0.40	0.50	0.75	0.56	0.55

te: Background levels for Explosives taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level NS = Not sampled	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELLS 41M-94-11X

CHEMICAL SUMMARY REPORT (Sheet 4 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/06/94	03/14/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Well No. 41M-94-11X						LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.26	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25 J
Tetryl	na	na	na	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
VOLATILES												
1,1,2-Trichloroethane	na	5	5	--	--	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Toluene	na	1000	1000	0.86	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	<5	<1	<1J	<1.0	<1.0	<1.0	<5.0

FIELD PARAMETERS				12/06/94	03/14/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Dissolved Oxygen mg/L				--	--	3.14	2.06	3.21	3.11	1.56	4.32	4.99
Oxidation Reduction Potential mv				--	--	181.1	86.3	132.6	235.7	197.0	213.3	136.1
pH				--	--	6.60	6.68	6.63	6.64	6.91	6.96	6.92
Specific Conductance				--	--	0.143	52.0	44.0	47.0	54.0	49.0	50
Turbidity NTU				--	--	0.80	8.20	3.50	5.10	4.20	4.42	10.28

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-6
AOC41 -GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 41M-94-12X

CHEMICAL SUMMARY REPORT (Sheet 5 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/05/94	03/15/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Well No. 41M-94-12X				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25 J
Tetryl	na	na	na	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
VOLATILES												
1,1,2-Trichloroethane	na	5	5	--	--	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<1	<1	<1.0	0.31J	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	<0.5	<0.5	<5	<1	0.61	<1.0	<1.0	<1.0	<5.0
Toluene	na	1000	1000	<0.5	<0.5	<5	<1	<1	<1.0	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	<5	<1	<1J	<1.0	<1.0	<1.0	<5.0

FIELD PARAMETERS				12/05/94	03/15/95	10/31/97	10/20/98	10/19/99	10/25/00	10/17/01	10/24/02	10/28/03
Dissolved Oxygen mg/L				--	--	2.91	3.01	8.10	3.38	3.28	1.01	2.13
Oxidation Reduction Potential mv				--	--	149.1	179.8	178.9	184.7	320.0	130.1	277.2
pH				--	--	6.84	6.80	6.89	6.54	6.59	6.53	6.37
Specific Conductance				--	--	0.282	158.0	155.0	108.0	101.0	107.0	95
Turbidity NTU				--	--	1.62	3.56	3.80	1.90	1.44	1.98	2.27

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELL 41M-94-13X

CHEMICAL SUMMARY REPORT (Sheet 6 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/08/94	03/16/95	10/17/01	10/24/02	10/28/03
Well No. 41M-94-13X			DATE			LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)						
EXPLOSIVES								
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	<0.25 UJ	<0.25	<0.25 J
Tetryl	na	na	na	--	--	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<0.25	<0.25	<0.25
VOLATILES								
1,1,2-Trichloroethane	na	5	5			<1.0	<1.0	<5.0
cis-1,2-Dichloroethene	na	70	70			<1.0	<1.0	<5.0
Carbon tetrachloride	na	5	5	<0.58	<0.58	<1.0	<1.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<1.0	<1.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<1.0	<1.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.6	<0.5	<1.0	<1.0	<5.0
Trichloroethene	na	5	5	<0.5	0.9	<1.0	<1.0	<5.0
Toluene	na	1000	1000	--	--	<1.0	<1.0	<5.0
Vinyl chloride	na	2	2	--	--	<1.0	<1.0	<5.0

FIELD PARAMETERS								
Dissolved Oxygen mg/L				--	--	6.14	1.01	6.64
Oxidation Reduction Potential mv				--	--	303.0	130.1	239.0
pH				--	--	6.21	6.53	6.09
Specific Conductance				--	--	66.0	107.0	67
Turbidity NTU						3.0	2.0	2.04

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

Table 4-6
AOC 41 -Groundwater Trends

South Post Impact Area Well 41M-94-14X

Chemical Summary Report (sheet 7 of 7)
(Concentrations in ug/l)

PARAMETERS	Well No. / BACKGROUND LEVELS	41M-94-14X MA	Federal	12/07/94	03/13/95	10/21/97	10/20/98	10/19/99	10/19/99	10/25/00	10/17/01	10/24/02	10/24/02	10/28/03	10/28/03
													-14XD		-14XD
						LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)													
EXPLOSIVES															
1,3,5-Trinitrobenzene	na	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
1,3-Dinitrobenzene	1	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
2,4,6-Trinitrotoluene	2	na	na	<0.63		<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
2,4-Dinitrotoluene	30	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
2,6-Dinitrotoluene	na	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
2-Amino-4,6-Dinitrotoluene	na	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
2-Nitrotoluene	na	na	na	–	–	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
3-Nitrotoluene	na	na	na	–	–	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
4-Amino-2,6-Dinitrotoluene	na	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
4-Nitrotoluene	na	na	na	–	–	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
HMX	400	na	na	–	–	<1.0	<2.6	<0.25	<0.25	<0.25	<0.25 UJ	<0.25	–	<0.25 J	na
Tetryl	na	na	na	–	–	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
Nitrobenzene	na	na	na	–	–	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
RDX	2	na	na	–	–	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25	–	<0.25	na
VOLATILES															
1,1,2-Trichloroethane	na	5	5	–	–	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<1	<1	<1	<1.0	0.31J	<1.0	<1.0	<5.0	<5.0
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Trichloroethene	na	5	5	1.2	<0.5	<5	1J	1.2	1.4	<1.0	0.43J	0.64J	0.48J	<5.0	<5.0
Toluene	na	1000	1000	<0.5	<0.5	<5	<1	<1	<1	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Vinyl chloride	na	2	2	–	–	<5	<1	<1J	<1J	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
FIELD PARAMETERS															
Dissolved Oxygen mg/L				–	–	5.15	2.17	8.70	8.70	3.82	2.89	1.16	1.16	1.10	1.10
Oxidation Reduction Potential mv				–	–	184.7	278.2	282.8	282.8	220.3	352.0	228.4	228.4	166.6	166.6
pH				–	–	5.39	5.37	5.36	5.36	5.48	5.49	5.25	5.25	6.34	6.34
Specific Conductance				–	–	0.098	28.0	26.0	26.0	34.0	32.0	48.0	48.0	33	33
Turbidity NTU				–	–	0.33	0.25	0.40	0.40	1.00	0.57	0.04	0.04	0.43	0.43

Note: Background levels for explosives are taken from Functional Area I RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
R = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	– = Parameter not measured

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL SPM-93-06X

CHEMICAL SUMMARY REPORT (Sheet 1 of 7)
(Concentrations in ug/l)

DATE	Well No. SPM-93-06X			08/16/93	11/10/93	08/16/93	11/10/93	10/28/97	10/19/98	10/18/99	10/24/00	10/16/01	10/22/02	10/30/03
PARAMETERS	BACKGROUND		FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
	LEVELS	MA	Federal											
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<0.8	<0.80	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	213	1970	1500	2000	2810	2070	2490	1120	1460	1400	976
Arsenic, Total As	10.5	10	10	33.8	21.7	33.3	19.8	<8	<10	8.1	15.4	7.4	9.8	11.7
Barium, Total Ba	39.6	2000	2000	41.7	198	58	197	156	111	175	113	122	117	88.1 B
Beryllium, Total Be	5	4	4	<5	<5	0.146J	<5	<5	<3	<0.1	<0.1	0.33	<0.20	0.42 B
Calcium, Total Ca	14700	na	na	14400	90800	14200	92900	74600	60600	89600	69800	55800	65900	54100
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	<0.2	<0.55	0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	2.86J	6.84J	3.69J	<15	<5	3.6	0.85	2.2	<4.6	<1.3
Copper, Total Cu	8.09	1300	1300	<10	<10	3.48J	<10	<25	5.9	3	1.3	5.0	<1.8	<2.0
Iron, Total Fe	9100	na	na	<25	21.6	2600	139	82	<100	30.9	19.1	20.2	<22.6	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	0.11	<0.10
Potassium, Total K	2370	na	na	18600	13600	17700	12500	44700	25200	45400	12800	22600	20900	6560
Magnesium, Total Mg	3480	na	na	989	<500	1620	47.3J	60	<500	<99.5	140	<195	<218	<307
Manganese, Total Mn	291	na	na	17.8	1.08J	324	19.1	<5	<5	<0.2	3.7	0.70	<2.5	1.1 B
Sodium, Total Na	10800	20,000	na	12300	10400	11900	11500	21200	14600	25300	10000	14200	12200	7360
Nickel, Total Ni	34.3	100	na	<10	<10	8.89J	<10	<40	<5	<0.9	<1.05	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<5	<5	<5	<5	<5	<3	<0.5	<0.9	0.64	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	<2.5	<2.3	2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.4	<1.65	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.6
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	3.3	1.6	2.8	<2.6	<3.8
Zinc, Total Zn	21.1	na	na	<20	3.05	21.9	16.6	<25	10.1	3.1	2.2	<0.90	<6.9	<2.0
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<1	<1	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	--	--	<1.0J	<2.6	<0.25	<0.25	0.34 J	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<1	<1	<0.5J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	0.49	0.53	0.63	0.14	0.27	0.82	0.28
Oxidation Reduction Potential mv				--	--	--	--	53.0	-192.0	1.3	13.3	183.2	-66.6	55.6
pH				--	--	--	--	11.84	12.14	12.16	11.79	11.69	11.67	11.58
Specific Conductance				--	--	--	--	2.4	715.0	1323.0	69.2	852.0	1097.0	729
Turbidity NTU				--	--	--	--	1.70	0.85	2.4	0.50	1.75	1.26	0.71

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL SPM-93-08X

CHEMICAL SUMMARY REPORT (Sheet 2 of 7)
(Concentrations in ug/l)

PARAMETERS	Well No. BACKGROUND LEVELS	SPM-93-08X MA	FILTERED? Federal	08/18/93	11/10/93	08/18/93	11/10/93	10/28/97	10/22/98	10/19/99	10/23/00	10/15/01	10/22/02	10/28/03
			DATE	YES	YES	NO	NO	LOW FLOW	LOW-FLOW	LOW-FLOW	LOW-FLOW	LOW-FLOW	LOW-FLOW	LOW-FLOW
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<0.8	<0.80	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<25	42.3	109	180	<100	<200	<7.2	<6.2	<7.7	<16.1	<21.7
Arsenic, Total As	10.5	10	10	1.82J	1.26J	1.64J	<2	<8	<10	<1.0	<2.1	<1.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	4.19J	<10	4.07J	3.14J	<5	<10	<2.8	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.246J	<5	0.175	<5	<5	<3	<0.1	<0.1	0.22	<0.20	<0.30
Calcium, Total Ca	14700	na	na	3860	2640	3950	2830	2740	2750	2560	2490	2370	2430	2460 B
Cadmium, Total Cd	4.01	5	5	<5	1.56	<5	<5	<10	<3	<0.2	<0.55	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	5.6	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	3.78J	<10	3.18J	23.9	<5	1	2.0	1.9	<4.8	<1.3
Copper, Total Cu	8.09	1300	1300	1.47J	<10	1.09J	<10	<25	<5	0.89	1.3	3.0	22.1	<2.0
Iron, Total Fe	9100	na	na	<25	<25	220	165	155	<100	8.8	18.9	28.4	<22.6	<46.5
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	1440	<1000	2390	513	<1000	690	410	422	304	420	<838
Magnesium, Total Mg	3480	na	na	320J	283J	360J	358J	350	<500	346	340	281	298	336 B
Manganese, Total Mn	291	na	na	23.1	8.58	31.4	13.1	<5	<5	0.27	0.83	0.63	<2.5	<1.0
Sodium, Total Na	10800	20,000	na	3200	539	4600	2480	2290	2260	2070	2170	2080	2110	2310 B
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	<40	<5	<0.9	1.1	<2.1	<13.5	18.5 B
Lead, Total Pb	4.25	15	15	<5	<5	7.18	<5	<5	<3	<0.5	<0.9	1.5	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	2.44	<5	<5	<8	<5	<2.5	<2.3	<2.2	<3.5	<8.2
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.4	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	37.7	110	43.1	466	35.7	<10	3.2	1.3	0.99	<6.9	3.0 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--			<0.125	<1.2	<0.26	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<1	3.84	<0.125	<1.2	<0.26	<0.26	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.26	<0.25	<0.25	<0.25	<0.26
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.26	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.26	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.26	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	0.835J	<0.125	<2.6	<0.25	<0.26	<0.25	<0.25	<0.26
3-Nitrotoluene	na	na	na	--	--	<1	1.45	<0.125	<2.6	<0.25	<0.26	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.26	<0.25	<0.26	<0.25	<0.26
HMX	400	na	na	--	--	0.295	<1	<1.0	<2.6	<0.26	<0.25	0.34 J	<0.25 UJ	<0.25 J
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.26	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.26	<0.25	<0.25	<0.25

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	11.13	10.27	12.13	12.84	11.07	11.96	11.80
Oxidation Reduction Potential mv				--	--	--	--	158.6	182.6	230.6	240.0	333.0	175.0	327.2
pH				--	--	--	--	6.20	6.59	6.35	6.74	6.25	7.68	6.35
Specific Conductance				--	--	--	--	0.090	35.0	26.0	24.0	26.0	29.0	26
Turbidity NTU				--	--	--	--	2.00	0.10	0.50	0.20	0.85	<1.0	0.28

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL SPM-93-10X

CHEMICAL SUMMARY REPORT (Sheet 3 of 7)
(Concentrations in ug/l)

PARAMETERS	Well No. BACKGROUND LEVELS	SPM-93-10X MA	FILTERED? Federal	08/17/93	11/09/93	08/17/93	11/09/93	11/03/97	10/22/98	10/21/99	10/26/00	10/15/01	10/21/02	10/31/03
			DATE	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)												
Silver, Total Ag	4.6	na	na	<2	1.81J	<2	2.34	<16	<3	<1.0	<0.60	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	34.8	56.1	349	528	140	<200	190	28.4	178	104	89.6 B
Arsenic, Total As	10.5	10	10	<5	<5	<5	<5	<8	<10	6.4	5.6	5.8	3.7	7.8 B
Barium, Total Ba	39.6	2000	2000	2.88J	<10	7.93J	4.42J	<5	<10	<2.8	<2.05	4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.104J	<5	<5	<5	<5	<3	<0.1	0.13	<0.20	<0.20	<0.30
Calcium, Total Ca	14700	na	na	4360	3390	4740	3220	2980	3560	2980	2890	3160	3040	3020 B
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	<0.2	<0.16	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	2.48J	<10	<10	<30	11.4	<1.0	<0.80	1.4	<2.2	3.1
Chromium, Total Cr	14.7	100	100	<10	<10	7.58J	6.03J	<15	13.5	1.2	3.2	20.7	<4.6	3.3 B
Copper, Total Cu	8.09	1300	1300	<10	<10	3.09J	<10	<25	<5	<0.9	1.7	1.6	<1.8	<2.0
Iron, Total Fe	9100	na	na	51.5	124	678	811	236	203	243	59.4	311	141	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	1530	2190	1600	1930	<1000	1080	1070	1140	996	1010	973 B
Magnesium, Total Mg	3480	na	na	842	708	906	839	750	899	817	789	860	801	808 B
Manganese, Total Mn	291	na	na	11.7	13.3	21.6	28.1	5.5	6.6	4.4	1.8	6.1	2.8	1.7 B
Sodium, Total Na	10800	20,000	na	3640	4210	3760	4240	2840	3270	2960	2840	2710	2640	2680 B
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	<40	8.1	<0.9	<1.05	11.0	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<5	1.91J	<5	1.82J	<5	<3	<0.5	<0.90	0.61	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	<1.4	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	2.5	<1.85	<1.2	<3.8	<3.0
Thallium, Total Tl	6.99	2	2	<2	0.91	<2	<2	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.8	1.2	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	37.1	23.7	49	36.1	<26	21.7	2.6	2.6	2.8	<8.9	2.4 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	3.25	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.8	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	1.58	<1	<0.125	<2.5	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	--	--	<1.0	<2.6	<0.25	<0.25 UJ	<0.25 UJ	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	0.334	0.782	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	9.47	8.60	10.40	8.11	9.91	9.50	10.59
Oxidation Reduction Potential mv				--	--	--	--	137.6	208.7	209.7	218.8	302.6	219.4	374.1
pH				--	--	--	--	7.01	7.07	6.90	7.11	7.32	7.55	7.00
Specific Conductance				--	--	--	--	0.109	47.0	32.0	33.0	37.0	37.0	34
Turbidity NTU				--	--	--	--	4.25	3.71	4.65	0.60	6.90	2.32	2.80

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL SPM-93-12X

CHEMICAL SUMMARY REPORT (Sheet 4 of 7)
(Concentrations in ug/l)

PARAMETERS	Well No. SPM-93-12X BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	08/18/93	11/09/93	08/18/93	11/09/93	10/27/97	10/22/98	10/18/99	10/23/00	10/15/01	10/21/02	10/31/03
FILTERED?				YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS														
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<0.8	<0.80	<0.80	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<25	48.6	395	352	<100	<200	55.8	12.5	15.6	<16.1	39.1 B
Arsenic, Total As	10.5	10	10	<2	1.47J	<2	1.40J	<8	<10	1	<2.1	1.6	<3.2	<3.6
Barium, Total Ba	39.6	2000	2000	2.37J	4.33J	5.67J	5.51J	<5	<10	<2.8	2.2	4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	0.307	<5	0.234J	<5	<5	<3	<0.1	<0.1	0.50	<0.20	<0.30
Calcium, Total Ca	14700	na	na	8980	7870	9080	7360	6480	6420	6120	6100	6100	6690	6520
Cadmium, Total Cd	4.01	5	5	<5	2.28J	<5	<5	<10	<3	<0.2	<0.55	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	2.33J	<10	3.74J	41.3	<5	<1.3	<1.35	2.0	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	<10	<10	3.14J	63.3	9.3	4.5	4.7	6.8	<4.6	7.0 B
Copper, Total Cu	8.09	1300	1300	<10	<10	2.43J	<10	<25	<5	2.3	4.2	4.2	<1.8	<2.0
Iron, Total Fe	9100	na	na	30.9	44.9	639	521	621	<100	105	31.0	54.2	34.0	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	2300	2030	2410	1890	1200	1210	1150	1040	984	1200	1220 B
Magnesium, Total Mg	3480	na	na	2400	2320	2610	2260	2150	2080	2100	2050	1950	2160	2090 B
Manganese, Total Mn	291	na	na	320	267	333	263	32	10.6	13.1	4.1	5.8	7.0	3.3 B
Sodium, Total Na	10800	20,000	na	7530	5910	8490	5850	5230	5230	4740	4690	5020	5040	4960 B
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	81	5.6	1.2	1.5	2.3	<13.5	4.3 B
Lead, Total Pb	4.25	15	15	<5	1.23J	<5	0.720J	<5	<3	<0.5	<0.9	0.60	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	1.70J	<5	<5	<8	<5	<2.5	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	1.8	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<2	1.32	<2	1.05	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.6	<1.0	2.5	<2.6	<3.8
Zinc, Total Zn	21.1	na	na	1.26J	20.6	19.8J	35.2	38.1	33.0	2.1	2.5	1.8	<6.9	2.9 B
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	<1	<1	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.26	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6	<0.25	<0.25	<0.26	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	0.251J	<0.125J	<1.2	<0.26	<0.25	<0.26	<0.25	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.6	<0.26	<0.25	<0.25	<0.25	<0.26
HMX	400	na	na	--	--	--	--	<1.0J	<2.6	<0.25	<0.25	<0.25 UJ	<0.25	<0.26
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.6	<0.25	<0.25	<0.26	<0.25	<0.26
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2	<0.25	<0.25	<0.26	<0.25	<0.26
RDX	2	na	na	--	--	<1	0.251	<0.5J	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25

FIELD PARAMETERS														
Dissolved Oxygen mg/L				--	--	--	--	6.72	6.79	5.69	6.51	5.64	6.37	5.16
Oxidation Reduction Potential mV				--	--	--	--	253.0	181.0	183.1	221.8	294.0	236.4	453.2
pH				--	--	--	--	6.69	6.44	6.75	9.97	6.82	6.99	6.37
Specific Conductance				--	--	--	--	0.172	66.0	68.0	68.0	73.0	77.0	63
Turbidity NTU				--	--	--	--	3.60	0.87	1.38	0.40	0.80	0.96	2.47

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 67 RI.

LEGEND

Value is above Maximum Contaminant Level			25
Explosive value is above background level			25
J = Estimated value			
B = The result is less than the reporting limit but greater than the instrument detection limit			
na = not analyzed.		-- = Parameter not measured	

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELL SPM-93-16X

CHEMICAL SUMMARY REPORT (Sheet 5 of 7)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	8/16/93	11/09/93	8/16/93	11/09/93	10/27/97	10/22/98	10/21/99	10/26/00	10/15/01	10/21/02	10/31/03
Well No. SPM-93-16X			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS														
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<1.0	<0.80	<0.60	<1.4	<1.6
Aluminum, Total Al	6870	na	na	34	<25	349	121	<100	<200	13.6	14.0	<7.7	<16.1	<30.7
Arsenic, Total As	10.5	10	10	<2	<2	<2	0.720J	<8	<10	<1.0	2.6	1.6	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	9.24J	<10	13	<10	<5	<10	<2.6	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<3	<0.1	0.18	0.36	<0.20	<0.30
Calcium, Total Ca	14700	na	na	6970	2700	7080	2950	2800	2850	2669	2670	2590	2640	2550 B
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	<0.2	<0.15	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<10	2.72J	<10	<10	<30	<5	<1.0	<0.80	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	21	<5	<0.6	<0.55	0.75	<4.6	<1.3
Copper, Total Cu	6.09	1300	1300	<10	<10	1.68J	<10	<25	<5	<0.9	2.0	4.1	<1.8	<2.0
Iron, Total Fe	9100	na	na	<25	<25	521	159	190	<100	<12.7	20.0	<15.7	<22.8	<30.0
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	1140	991J	1160	647	<1000	527	558	472	439	469	<522
Magnesium, Total Mg	3480	na	na	764	654	890	707	714	743	652	762	688	647	646 B
Manganese, Total Mn	291	na	na	5.92	3.51J	16.4	6.16	5.6	<5	0.47	0.68	<0.60	<2.5	<1.0
Sodium, Total Na	10800	20,000	na	2930	3430	2690	3140	2560	2580	2380	2590	2400	2720	2180 B
Nickel, Total Ni	34.3	100	na	<10	<10	<10	<10	<40	<5	<0.9	<1.05	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<5	<5	<5	1.05J	<5	<3	<0.5	<0.90	0.60	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<5	<5	2.46J	<5	<8	<5	<1.4	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<1.2	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<2	0.85	<2	0.77	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.6
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	22.3	36.3	79.3	44.7	<25	<10	1.5	<1.75	<0.90	<8.8	<2.0
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	--	--	4.37	2.08	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	--	--	0.995J	<1	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	--	--	2.77J	2.66	<0.125	<2.6	<0.25	<0.26	<0.26	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2	<0.25	<0.25	<0.25	<0.26	<0.25
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	--	--	--	--	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	--	--	<1	<1	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25

FIELD PARAMETERS				8/16/93	11/09/93	8/16/93	11/09/93	10/27/97	10/22/98	10/21/99	10/26/00	10/15/01	10/21/02	10/31/03
Dissolved Oxygen mg/L				--	--	--	--	11.00	9.12	11.85	11.63	10.64	12.98	10.83
Oxidation Reduction Potential mv				--	--	--	--	207.5	233.8	207.3	244.1	375.0	231.1	174.1
pH				--	--	--	--	6.34	6.49	6.38	6.44	6.45	6.34	6.24
Specific Conductance				--	--	--	--	0.097	36.0	30.0	30.0	33.0	38.0	27
Turbidity NTU				--	--	--	--	1.70	0.15	1.38	0.10	0.50	0.46	0.27

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. -- = Parameter not measured	

Table 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELLS SPM-97-23X

CHEMICAL SUMMARY REPORT (Sheet 6 of 7)
(Concentrations in ug/l)

			DATE	10/29/97	10/19/98	10/18/99	10/26/00	10/18/01	10/22/02	10/30/03
Well No.	SPM-97-23X			23X	23X	23X	23X	23X	23X	23X
PARAMETERS	BACKGROUND LEVELS	MA	FILTERED? Federal	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)								
Silver, Total Ag	4.6	na	na	<15	<3	<0.8	<0.80	<0.60	<1.4	<1.5
Aluminum, Total Al	6870	na	na	<100	<200	21.9	16.0	<7.7	<16.1	212
Arsenic, Total As	10.5	10	10	<8	<10	<1.0	<2.1	<1.5	<3.2	<3.5
Barium, Total Ba	39.6	2000	2000	<5	<10	<2.8	<2.05	<4.0	<8.2	<11.7
Beryllium, Total Be	5	4	4	<5	<3	<0.1	0.08	0.31	<0.20	<0.30
Calcium, Total Ca	14700	na	na	5720	6170	5180	4800	4520	4920	8000
Cadmium, Total Cd	4.01	5	5	<10	<3	<0.2	<0.15	<0.20	<9.30	<0.70
Cobalt, Total Co	25	na	na	<30	<5	<1.3	<0.80	<1.4	<2.2	3.1 B
Chromium, Total Cr	14.7	100	100	<15	<5	0.92	<0.55	<0.70	<4.6	<1.3
Copper, Total Cu	8.09	1300	1300	<25	<5	1.4	1.0	3.1	2.5	8.8 B
Iron, Total Fe	9100	na	na	90J	<100	36.7	34.7	<15.7	51.6	696
Mercury, Total Hg	0.243	2	2	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	<1000	735	819	641	666	792	1060 B
Magnesium, Total Mg	3460	na	na	1270	1290	1110	1080	951	990	1070 B
Manganese, Total Mn	291	na	na	6.3	<5	4.2	2.4	<0.60	23.8	393
Sodium, Total Na	10800	20,000	na	3370	3530	2900	3220	2680	2940	3180 B
Nickel, Total Ni	34.3	100	na	<40	<5	<0.9	<1.05	<2.1	<13.5	<2.8
Lead, Total Pb	4.25	15	15	<5	<3	<0.5	<0.90	<0.60	<1.1	<2.6
Antimony, Total Sb	3.03	6	6	<8	<6	<2.6	<2.3	<2.2	<3.5	<2.6
Selenium, Total Se	3.02	50	50	<10	<5	<1.4	<1.85	<1.2	<3.9	<3.0
Thallium, Total Tl	6.99	2	2	<15	<2	<1.4	<2.25	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<25	<5	<0.8	<1.0	<2.1	<2.8	<3.8
Zinc, Total Zn	21.1	na	na	<25	24.6	14.3	4.9	1.4	<6.9	14.0 B
EXPLOSIVES										
1,3,5-Trinitrobenzene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.26	<0.26
2,4,6-Trinitrotoluene	2	na	na	<0.125	<1.2	<0.26	<0.25	<0.25	<0.26	<0.25
2,4-Dinitrotoluene	30	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.26	<0.25	<0.25	<0.26	<0.26
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.125	<2.8	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.125	<2.8	<0.25	<0.25	<0.25	<0.26	<0.26
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.26
Tetryl	na	na	na	<0.5	<2.8	<0.25	<0.25	<0.25	<0.26	<0.25
Nitrobenzene	na	na	na	<0.125	<1.2	<0.26	<0.25	<0.28	<0.26	<0.26
RDX	2	na	na	<0.5	<2.6	<0.25	<0.25	<0.25	<0.26	<0.25

FIELD PARAMETERS										
Dissolved Oxygen mg/L				10.78	15.36	10.37	7.78	10.07	10.31	8.40
Oxidation Reduction Potential mv				242.4	217.6	267.5	270.2	385.0	269.7	223.3
pH				5.89	6.46	6.15	6.29	5.84	6.35	5.87
Specific Conductance				0.160	61.0	46.0	45.0	47.0	49.0	60
Turbidity NTU				0.86	0.48	0.45	0.50	0.60	0.44	3.34

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed.	-- = Parameter not measured

Table 4-7
SPM WELLS - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA - WELLS SPM-97-24X

CHEMICAL SUMMARY REPORT (Sheet 7 of 7)
(Concentrations in ug/l)

			DATE	10/20/97	10/22/98	10/19/99	10/23/00	10/15/01	10/22/02	10/28/03
Well No.	SPM-97-24X			24X	24X	24X	24X	24X	24X	24X
PARAMETERS	BACKGROUND		FILTERED?	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
	LEVELS	MA	Federal							
METALS		MCLs (ug/l)								
Silver, Total Ag	4.6	na	na	<15	<3	<0.8	<0.60	<0.60	<1.4	<1.5
Aluminum, Total Al	6670	na	na	<100	<200	107	34.2	132	45.9	<21.7
Arsenic, Total As	10.5	10	10	<8	<10	3.7	6.3	5.5	<3.2	3.7
Barium, Total Ba	39.6	2000	2000	9.4	<10	2.9	<2.05	<4.0	<9.2	<11.7
Beryllium, Total Be	5	4	4	<5	<3	<0.1	<0.1	0.31	<0.20	<0.30
Calcium, Total Ca	14700	na	na	9450	8790	9270	8120	8500	8750	8010
Cadmium, Total Cd	4.01	5	5	<10	<3	<0.2	<0.65	<0.20	<0.30	<0.70
Cobalt, Total Co	25	na	na	<30	<5	<1.3	<1.35	<1.4	<2.2	<3.1
Chromium, Total Cr	14.7	100	100	<15	<5	3	2.0	3.3	<4.6	<1.3
Copper, Total Cu	8.09	1300	1300	<25	<5	1.4	<0.9	6.7	<1.8	<2.0
Iron, Total Fe	9100	na	na	180	280	101	34.5	102	29.3	<45.6
Mercury, Total Hg	0.243	2	2	<0.200	<0.2	<0.1	<0.1	<0.10	<0.10	<0.10
Potassium, Total K	2370	na	na	2200	1730	1640	1470	1200	1490	1050 B
Magnesium, Total Mg	3460	na	na	3840	3300	3760	3270	3380	3400	3310 B
Manganese, Total Mn	291	na	na	17.4	<5	8.6	1.7	2.8	<2.5	<1.0
Sodium, Total Na	10800	20,000	na	3750	3310	2900	2960	3070	3210	3110 B
Nickel, Total Ni	34.3	100	na	<40	<5	<0.9	1.1	<2.1	<13.6	<4.5
Lead, Total Pb	4.25	15	15	<5	<3	<0.6	<0.9	2.8	<1.1	<2.8
Antimony, Total Sb	3.03	6	6	<8	<8	<2.5	<2.3	<2.2	<3.5	<6.2
Selenium, Total Se	3.02	50	50	<10	<5	<1.4	<1.65	<1.2	<3.9	3.4
Thallium, Total Tl	6.99	2	2	<15	<2	<1.4	<2.28	<1.8	<3.0	<1.8
Vanadium, Total V	11	na	na	<25	<5	<0.8	<1.0	<2.1	<2.6	<3.8
Zinc, Total Zn	21.1	na	na	<25	17.5	3.9	2.2	1.2	<6.9	<2.0
EXPLOSIVES										
1,3,5-Trinitrobenzene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.125	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<1.0	<2.6	<0.25	<0.25	<0.25 UJ	<0.25 UJ	<0.25 J
Tetryl	na	na	na	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.125	<1.2	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	<0.5	<2.6	<0.25	<0.25	<0.25	<0.25	1.5

FIELD PARAMETERS										
Dissolved Oxygen mg/L				4.33	6.11	3.76	5.16	4.45	5.66	5.51
Oxidation Reduction Potential mv				167.2	126.2	134.2	164.9	232.0	274.7	132.9
pH				7.42	7.30	7.36	7.43	7.51	7.67	7.62
Specific Conductance				0.224	106.0	83.0	78.0	91.0	69.0	80
Turbidity NTU				4.70	0.78	2.40	3.00	3.00	2.27	1.10

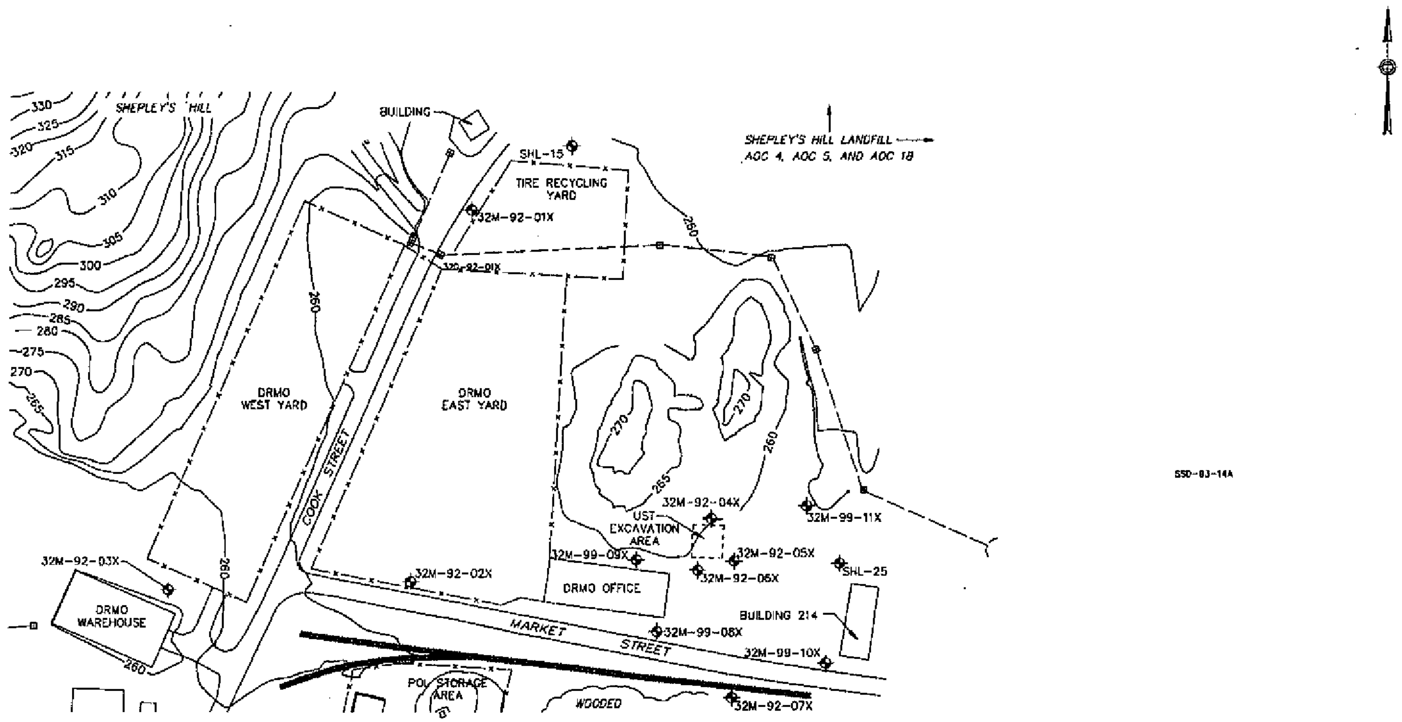
Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Value is above Maximum Contaminant Level	25
Explosive value is above background level	25
J = Estimated value	
B = The result is less than the reporting limit but greater than the instrument detection limit	
na = not analyzed. — = Parameter not measured	

APPENDIX F

AOCS 32 AND 43A



LEGEND

— 265 — TOPOGRAPHIC CONTOUR

IMPROVED ROAD

CHAINLINK FENCE

RAILROAD TRACK

STORM DRAIN WITH CATCH BASIN

0 150 300 FEET

1" = 150'-0"

SOURCE: REMEDIAL INVESTIGATIONS REPORT FUNCTIONAL AREA II, AOC32, ECOLOGY AND ENVIRONMENT, INC. 8/1994.

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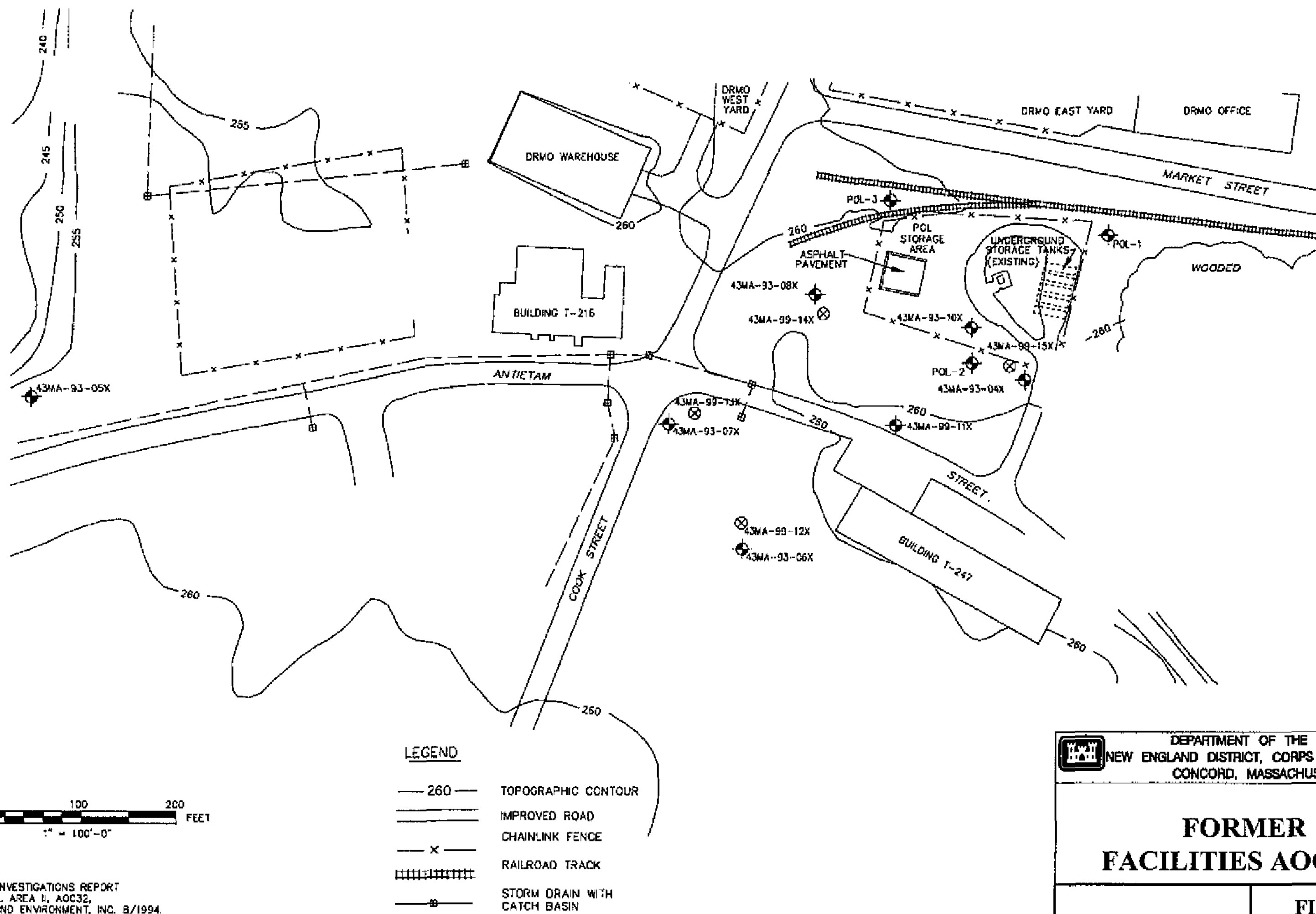
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

FORMER FACILITIES AOC 32

FIGURE 1



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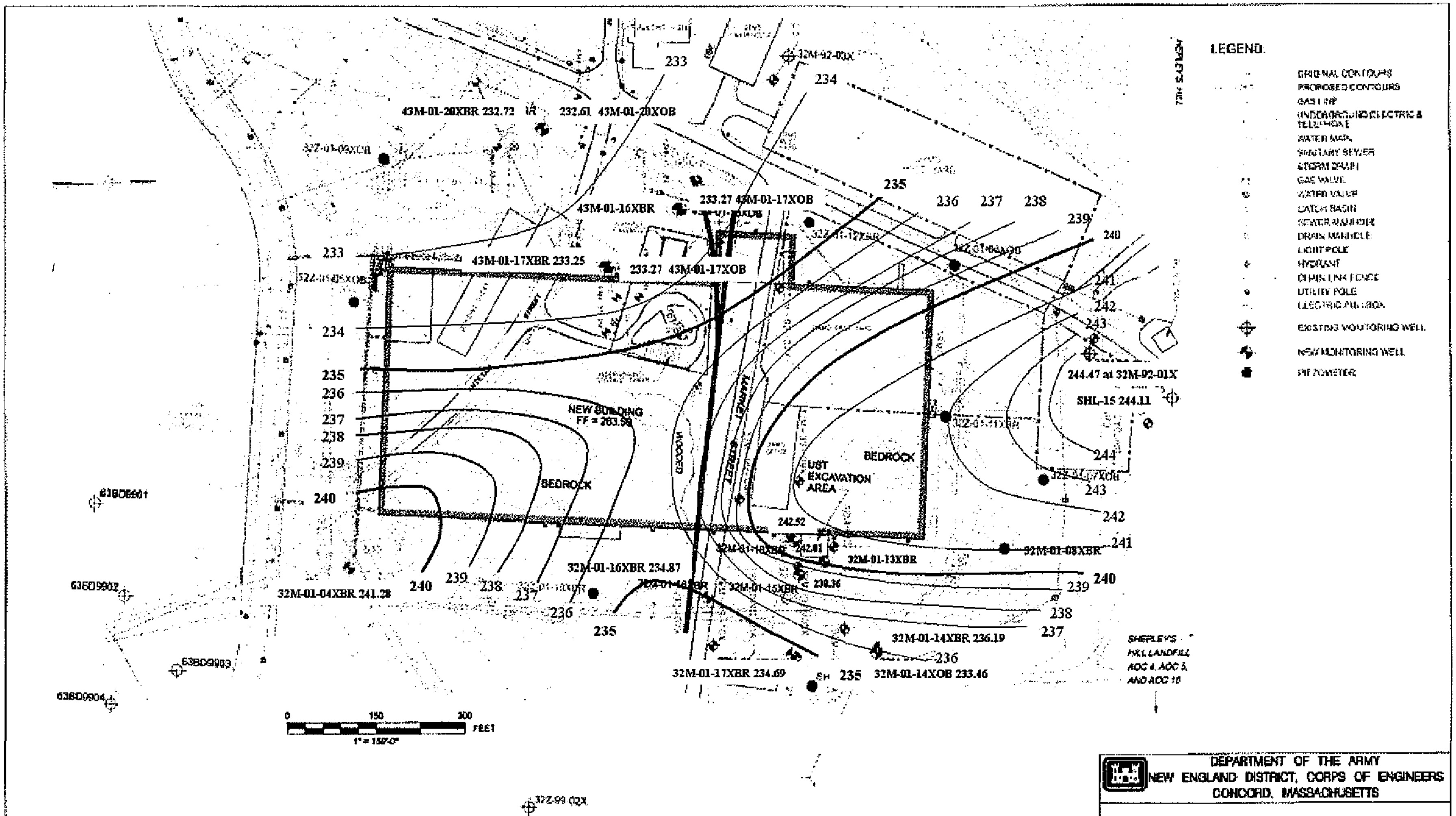
FORMER FACILITIES AOC 43A

FIGURE 2

...\fig2 1-1-43bMay04.dwg 06/16/2004 06:34:44 AM



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CONCORD, MASSACHUSETTS

MAY 2004

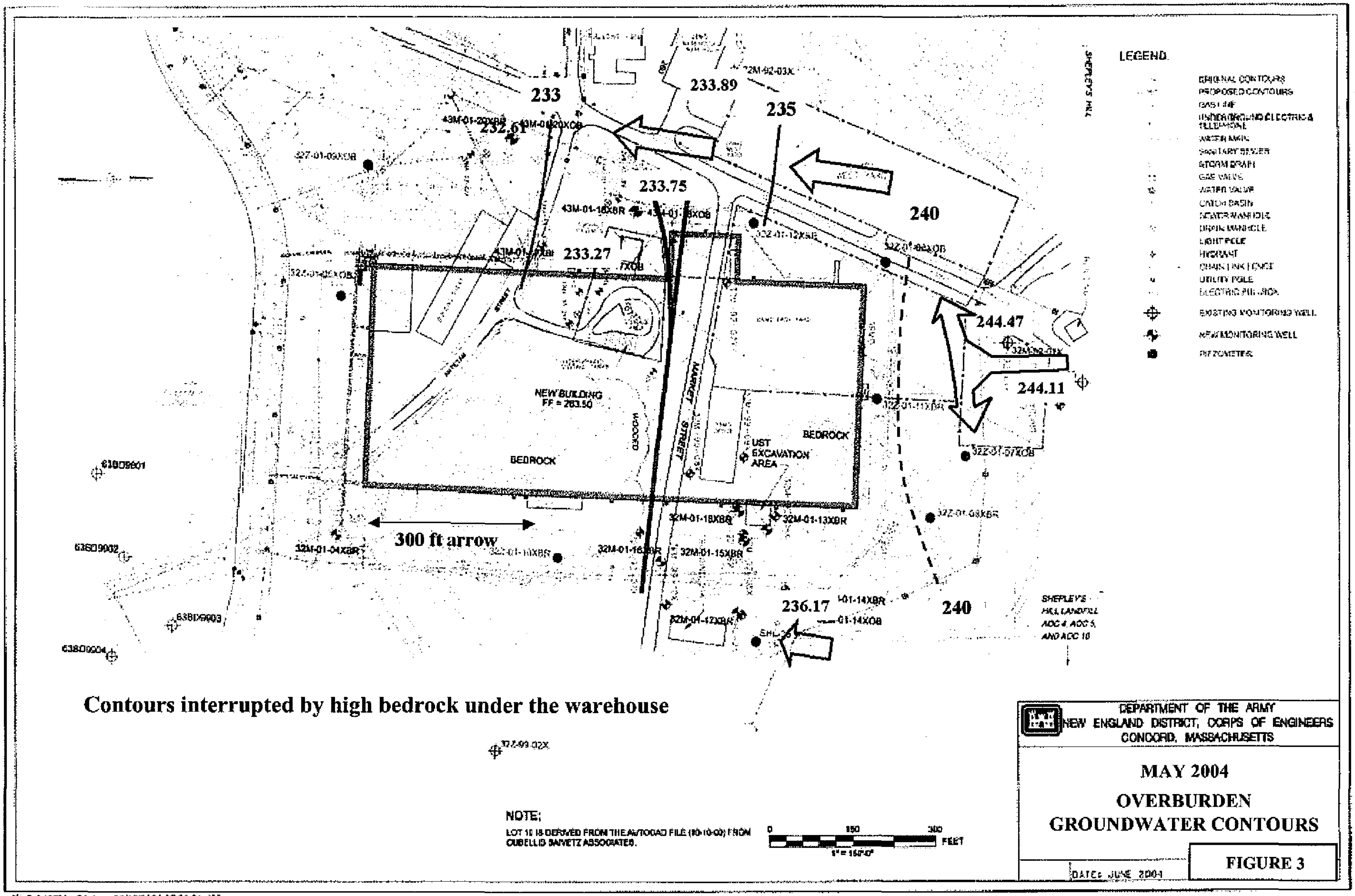
BEDROCK GROUNDWATER CONTOURS

FIGURE 2

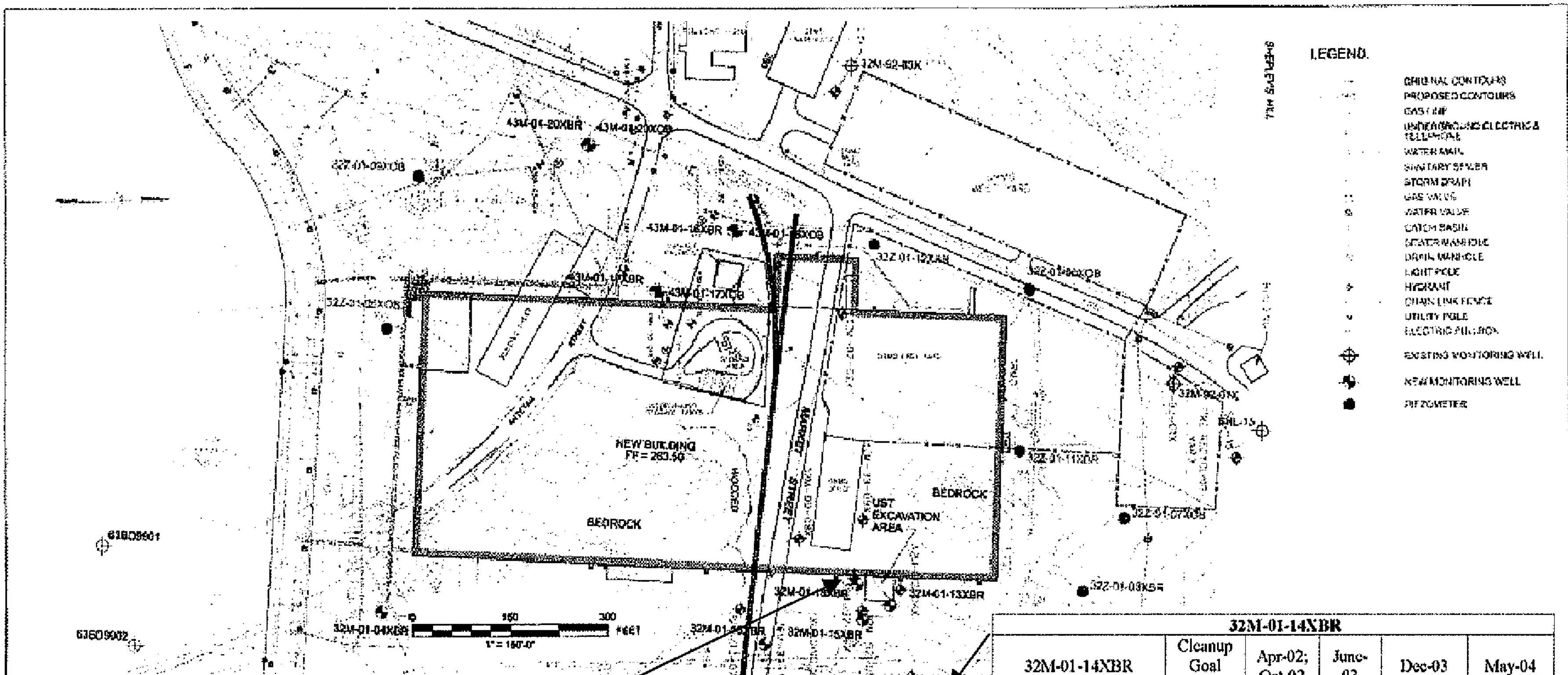
DATE: JUNE 2004

NOTE:
LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM CUBELLIS BANETZ ASSOCIATES.

...fig3 lot10May04.dwg 06/16/2004 07:28:01 AM



...\fig3 lot10May04.dwg 06/16/2004 07:24:01 AM



32M-01-18XBR	Cleanup Goal (ug/l)	Apr-02; Oct-02	June-03	Dec-03	May-04
DO (mg/L)		NC; 1.09	0.85	0.17	NA
ORP/Eh (mV)		120.37; 216.33	111.9	45.1	NA
TCE (ug/L)	3	19 J; 20 U	50 U	3.4 (QA split)	5.2 J (QA split)
1,3-DCB (ug/L)	600	660 J; 300 J	460	430	750
1,4-DCB (ug/L)	75	450 J; 200	310	280	470
1,2 DCB (ug/L)	600	5,900 J; 2,500	3,800	3,900	6,200
Chlorobenzene (ug/L)	100	100 U; 100 U	100 U	110	290 J-
C9-C10 Arom (ug/L)	200	9,100 J; 2,900	2,700 J	2,600 E	5,600 E
C9-C12 Aliph (ug/L)	4,000	500 UJ; 200 U	350 J	518 E	5,100 (QA split)
Mn total (ug/L)	3,500	7,710; 9,280	14,100	13,800 D	18,500
Mn dis (ug/L)	3,500	7,500; 8,960	14,200	13,900	18,700

32M-01-14XBR	Cleanup Goal (ug/l)	Apr-02; Oct-02	June-03	Dec-03	May-04
Arsenic - Total	50	8.4 J; 16.4	**172**	4.1 U	28.9
Lead - Total	15	7.5 U; 9.8	**43**	1.4 U	7.4

32M-01-14XOB	Cleanup Goal (ug/l)	Apr-02; Oct-02	June-03	Dec-03	May-04
Manganese, Tot (ug/L)	3,500	2,490; 2,680	**6,110**	**7,840**	2,420
Manganese, Dis. (ug/L)	3,500	2,260; 3,180	**6,670**	**5,410**	2,030

NOTE:
LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM CUBELLIS SAIVETZ ASSOCIATES.

0 150 300 FEET
1" = 150'-0"

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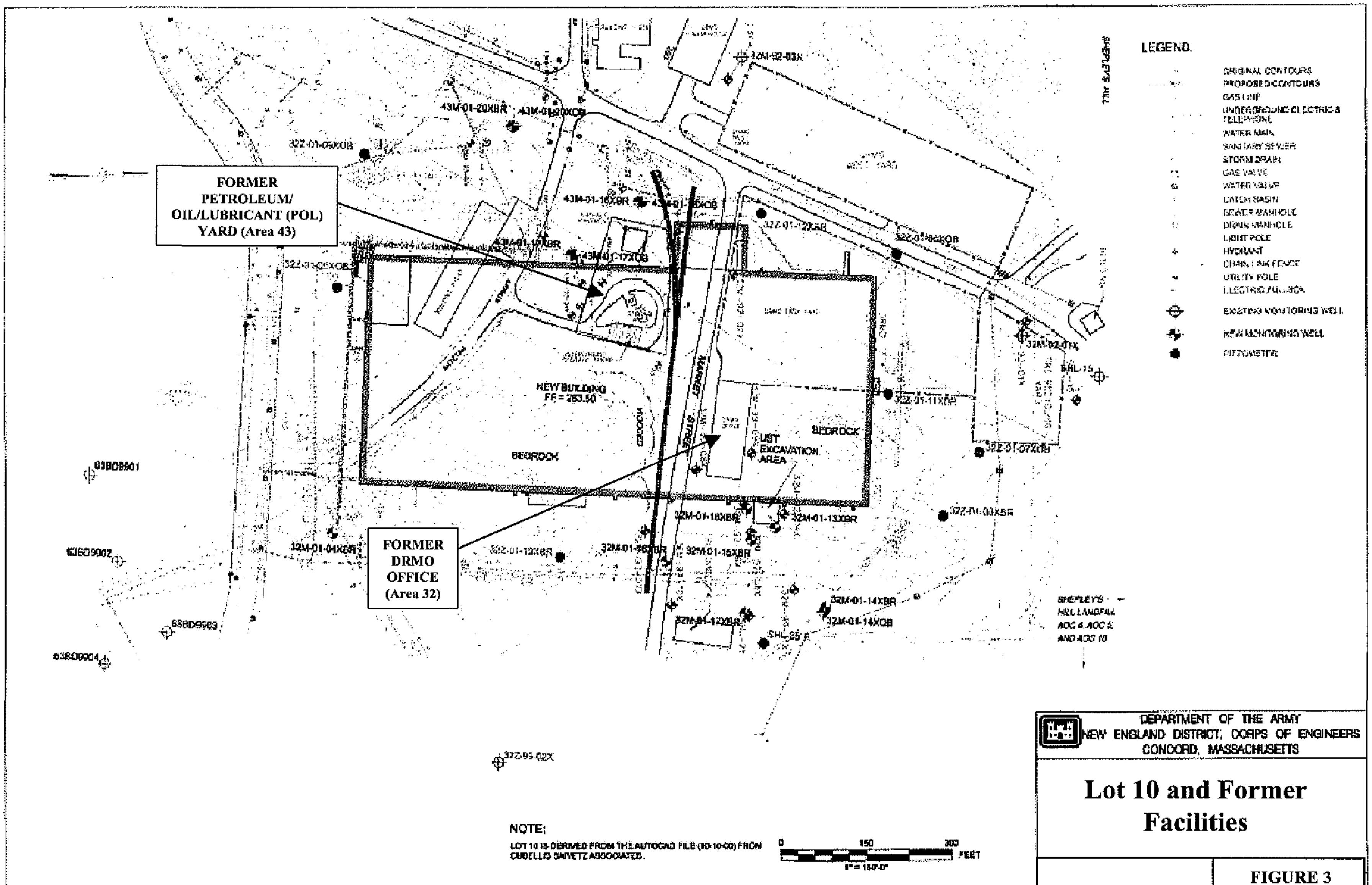
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

MAY 2004
CLEANUP GOAL EXCEEDANCES

DATE: JUNE 2004

FIGURE 4

...fig3 lot10May04.dwg 06/16/2004 07:24:01 AM



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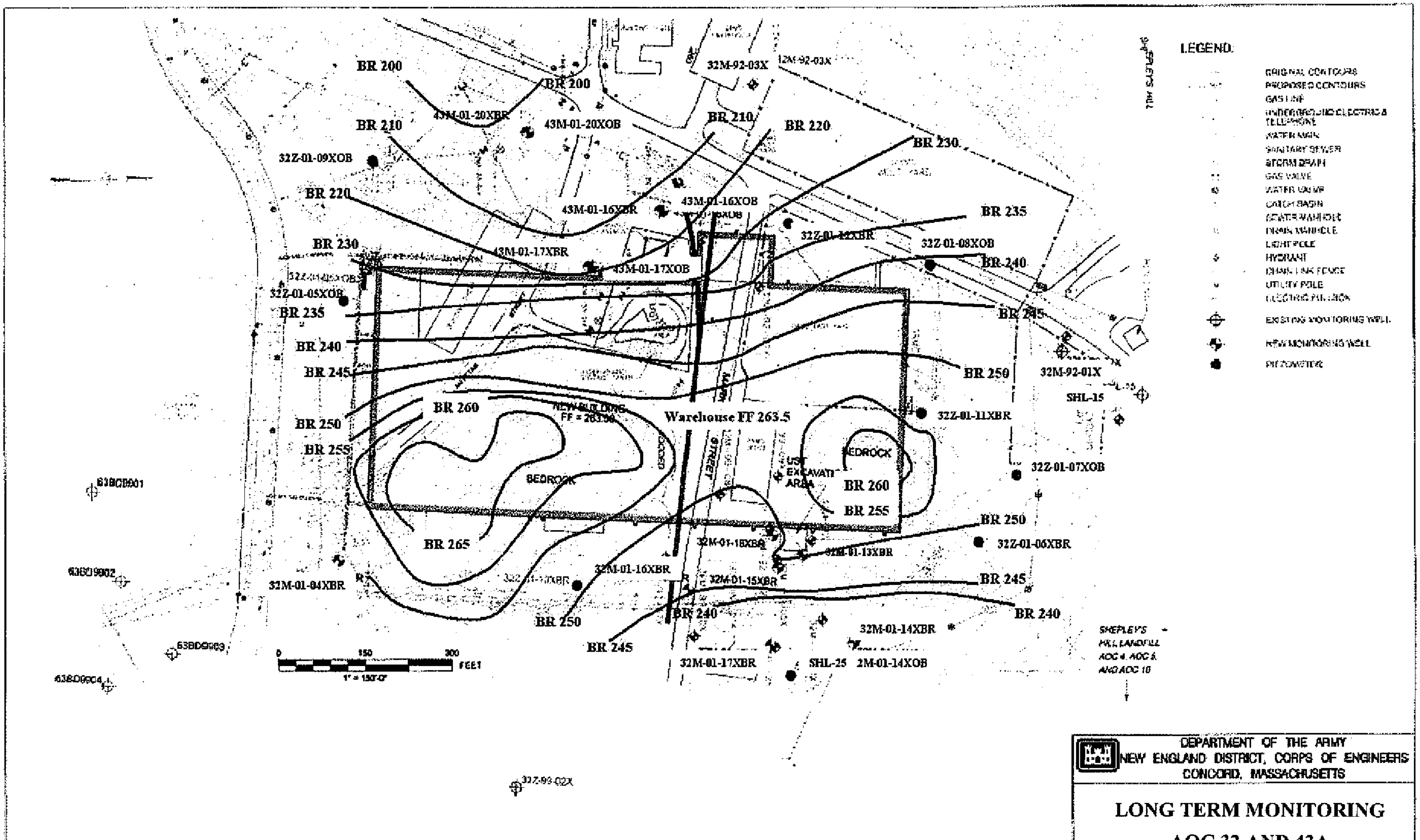
Lot 10 and Former Facilities

FIGURE 3

...\fig3 lot10May04.dwg 06/18/2004 07:28:01 AM



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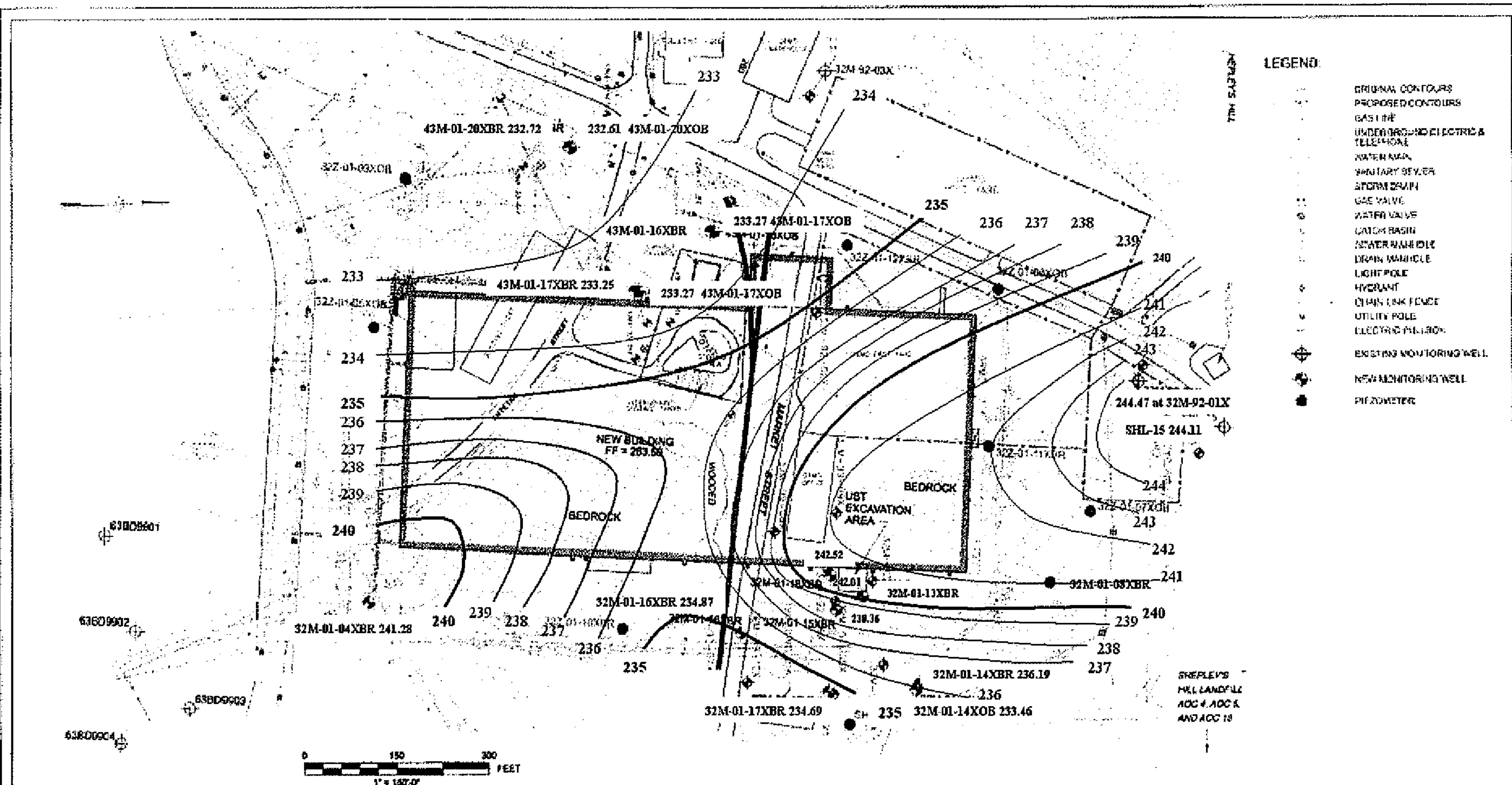
LONG TERM MONITORING
AOC 32 AND 43A
BEDROCK CONTOUR MAP

FIGURE 4

NOTE:
LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM CUBELLIS SANYETZ ASSOCIATES.

...fig3 lot10May04.dwg 06/18/2004 07:28:01 AM



NOTE:

LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM GUBELLIS SANVETZ ASSOCIATES.

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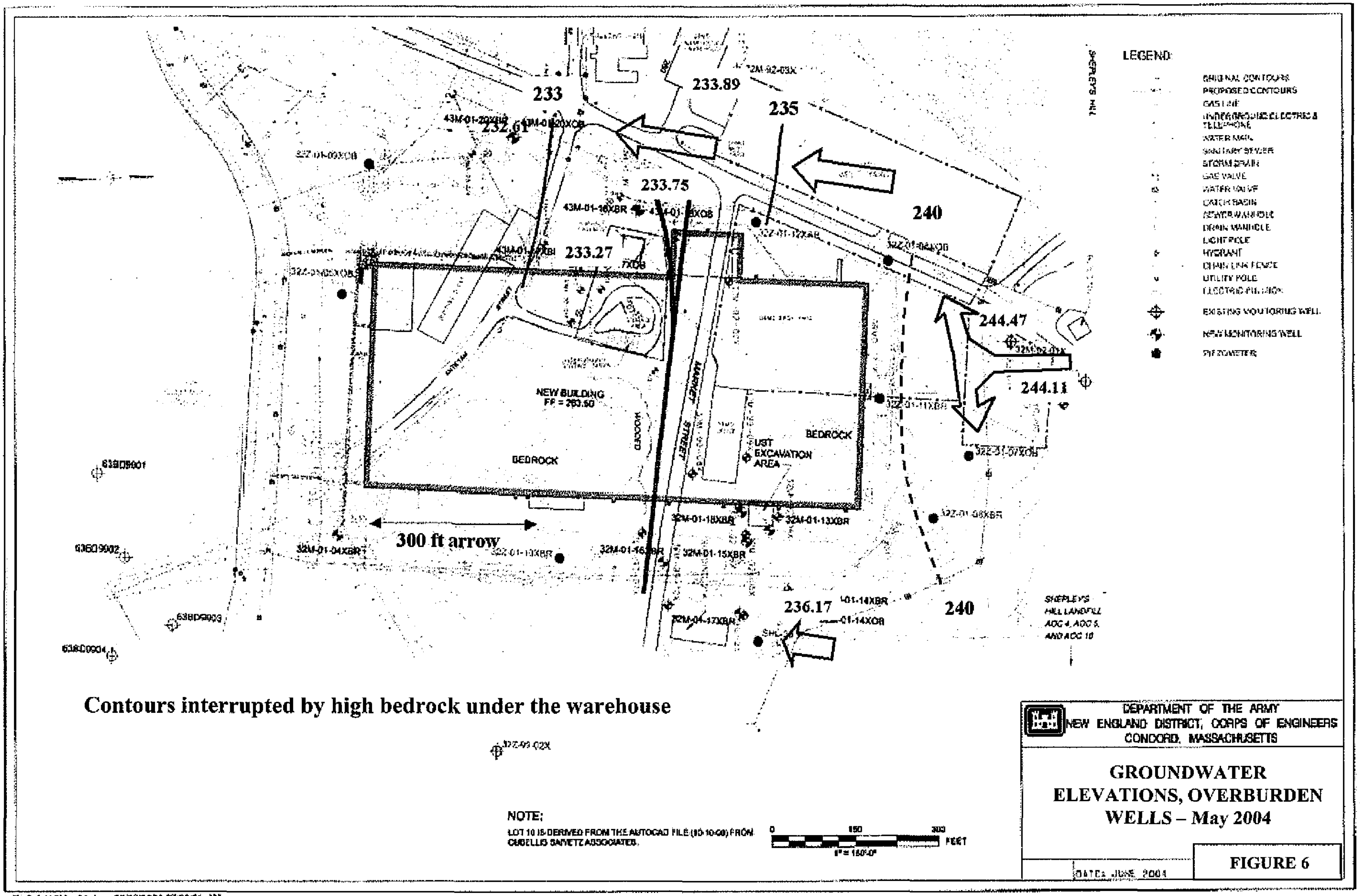
CONCORD, MASSACHUSETTS

GROUNDWATER ELEVATIONS, BEDROCK WELLS – May 2004

DATE: JUNE 2004

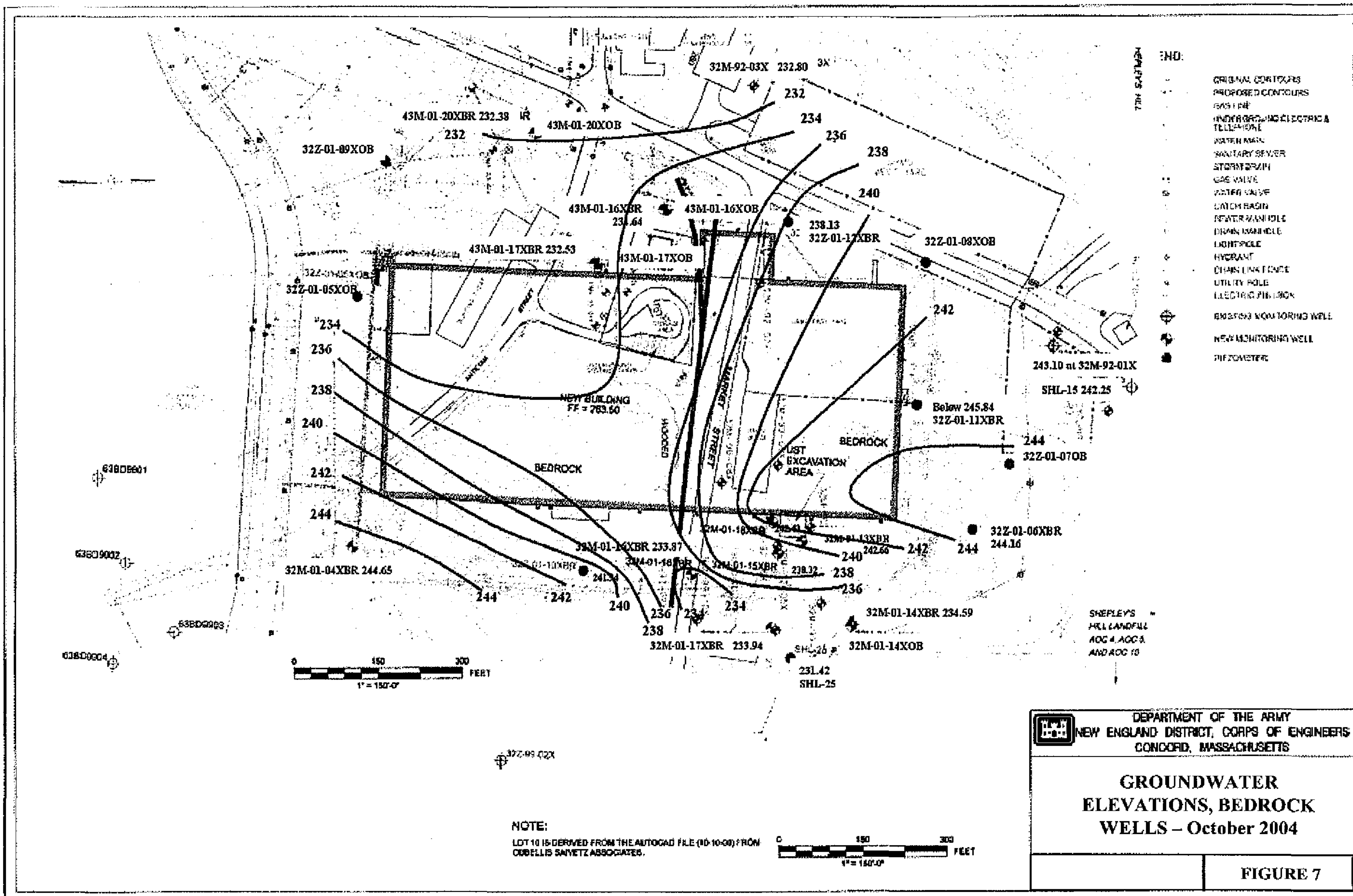
FIGURE 5

...lot10May04.dwg 06/10/2004 07:28:01 AM



GROUNDWATER ELEVATIONS, OVERBURDEN WELLS – May 2004

FIGURE 6



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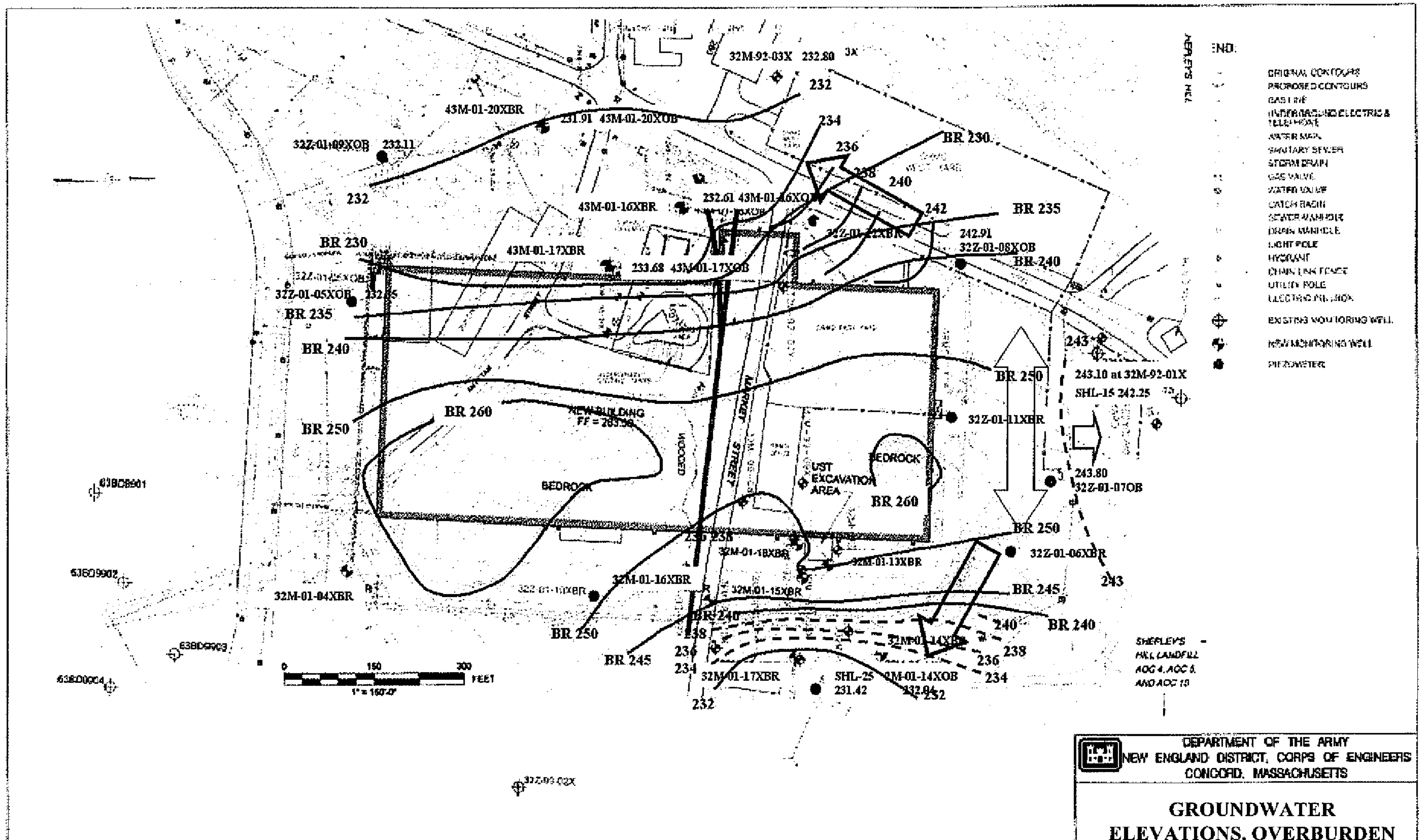
GROUNDWATER ELEVATIONS, BEDROCK WELLS – October 2004

FIGURE 7

...fig3 lot10Mav04.dwg 06/16/2004 07:28:01 AM



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NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
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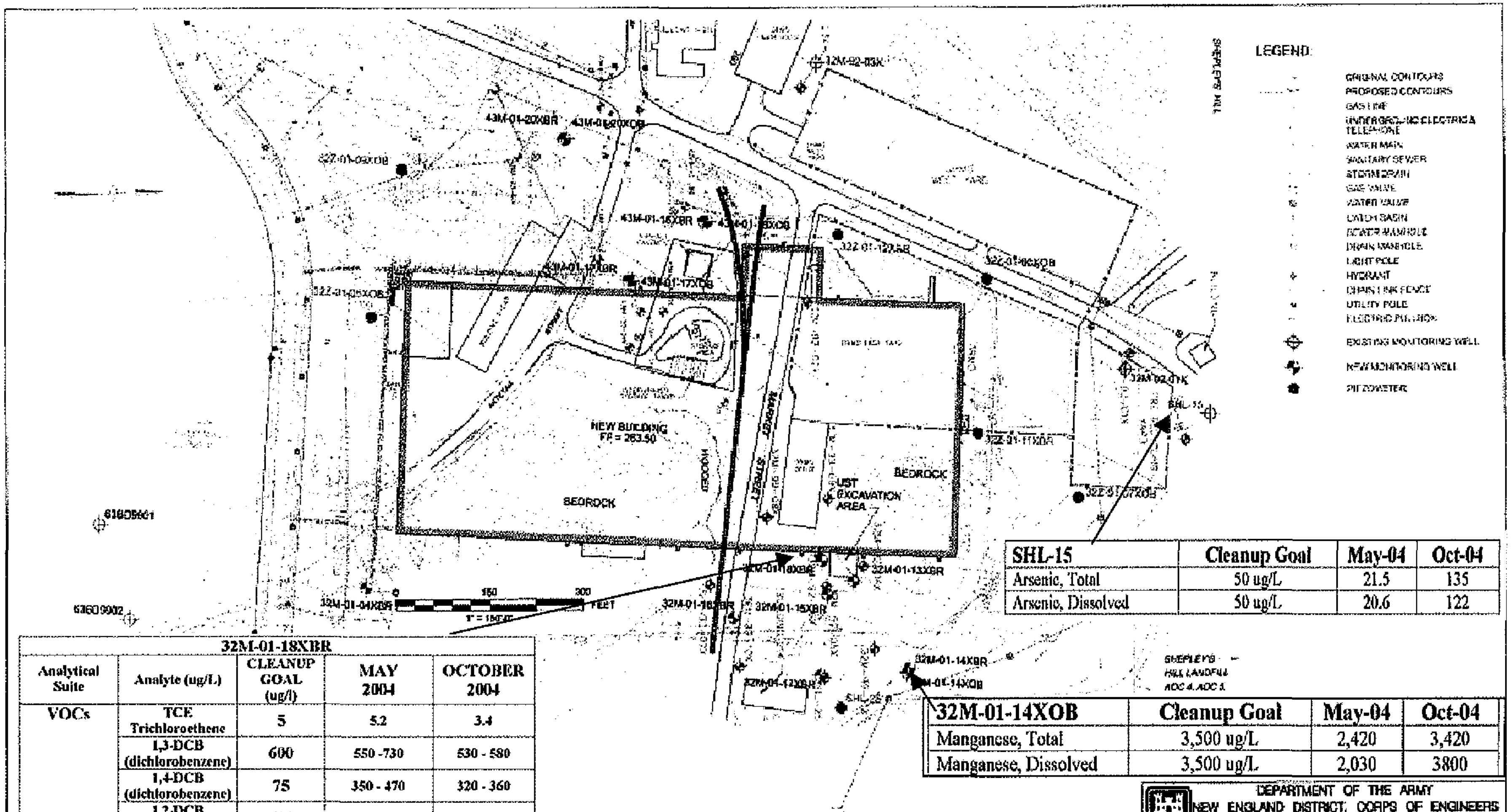
GROUNDWATER ELEVATIONS, OVERBURDEN WELLS, October 2004

FIGURE 8

NOTE:
LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM CUBELLIS SAIVETZ ASSOCIATES.

...\fig3 lot10\lay04.dwg 06/16/2004 07:24:01 AM



SHL-15	Cleanup Goal	May-04	Oct-04
Arsenic, Total	50 ug/L	21.5	135
Arsenic, Dissolved	50 ug/L	20.6	122

32M-01-18XBR				
Analytical Suite	**Analyte (ug/L)**	**CLEANUP GOAL (ug/l)**	**MAY 2004**	**OCTOBER 2004**
VOCs	**TCE Trichloroethene**	**5**	5.2	3.4
	1,3-DCB (dichlorobenzene)	**600**	550 -730	530 - 580
	1,4-DCB (dichlorobenzene)	**75**	350 - 470	320 - 360
	1,2-DCB dichlorobenzene	**600**	5,000 - 6,200	4,200 - 4,900
VPH	**C9 - C10 AROMATICS**	**200**	5,500 - 11,000	4,400 - 8,700
	C9 – C12 ALIPHATICS	**4,000**	358 - 5,100	4,410 - 4,480
Metals (total)	**Manganese, Total**	**3,500**	17,400 - 18,500	12,800 - 13,700
Metals (filtered)	**Manganese, Dis.**	**3,500**	17,600 - 18,100	12,500 - 13,000

32M-01-14XOB	Cleanup Goal	May-04	Oct-04
Manganese, Total	3,500 ug/L	2,420	3,420
Manganese, Dissolved	3,500 ug/L	2,030	3800

NOTE:
LOT 10 IS DERIVED FROM THE AUTOCAD FILE (10-10-00) FROM CUBELLIS SATYETZ ASSOCIATES.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

EXCEEDANCES OF CLEANUP GOALS, May/October 2004

FIGURE 9

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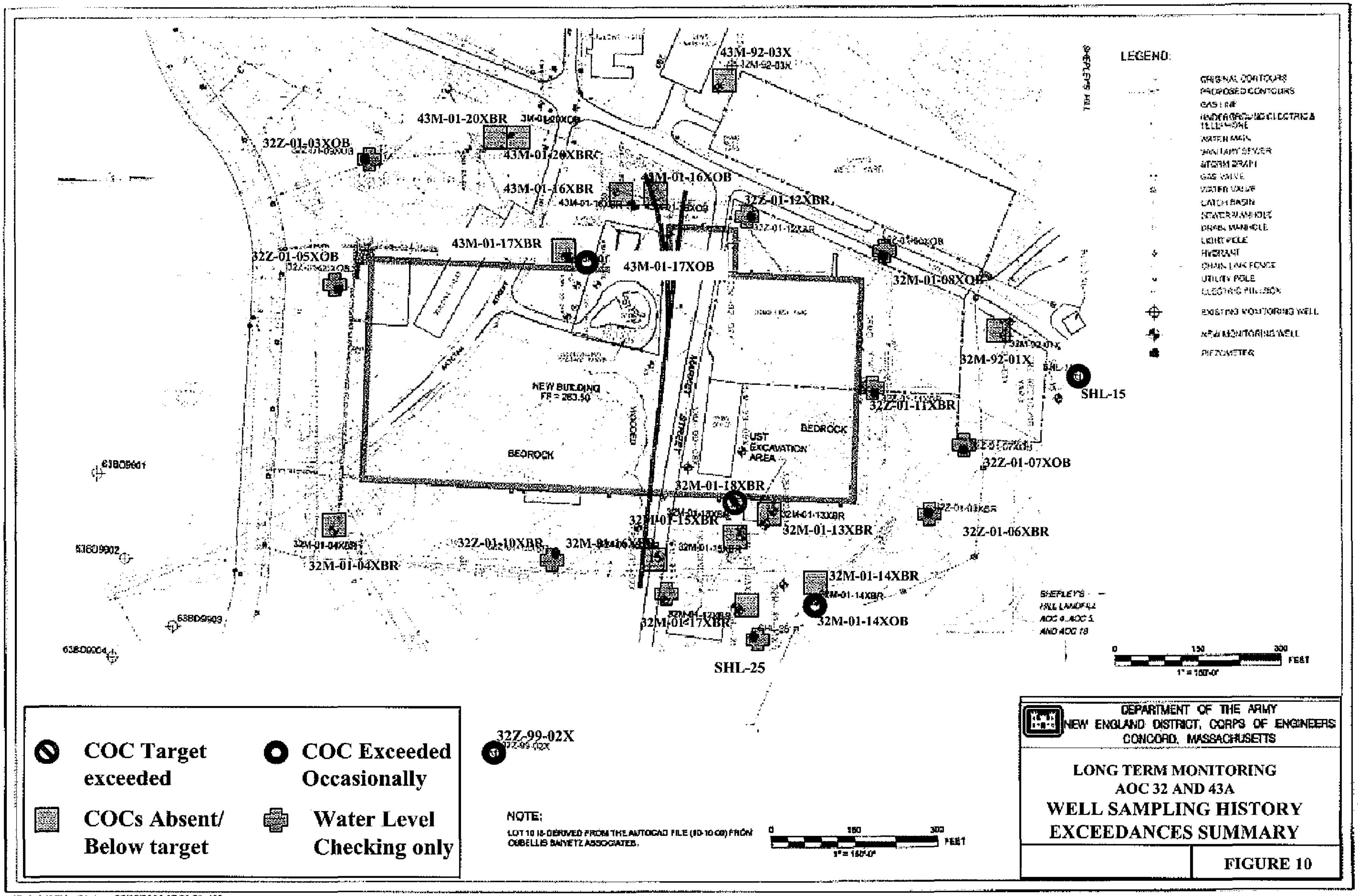

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TABLE 1-1
Cleanup Goals for Chemicals of Concern in Groundwater

Analytes	Cleanup Goal µg/l
Volatile Organic Compounds	
1,2-Dichloroethene (total)	55
1,1,1 Trichloroethane	5
Trichlorothene (TCE)	5
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	600
1,4-Dichlorobenzene	75
Volatile Petroleum Hydrocarbons	
Benzene	5
C5-C8 Aliphatics*	400
C9-C12 Aliphatics*	4,000
C9-C10 Aromatics*	200
Extractable Petroleum Hydrocarbons	
C9-C18 Aliphatics*	4,000
C19-C36 Aliphatics*	5,000
C11-C22 Aromatics*	200
Polychlorinated Biphenyls	
PCB-1260	0.5
Inorganics	
Arsenic	50
Lead	15
Manganese	3,500

Note: * 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.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID / Round Number / Sample Date / Sample ID / Parameter/Method	Cleanup Goal (µg/l)	32M-92-01X											
		1 (11/92)	2 (3/93)	2 F (3/93)	3 (6/93)	3 F (6/93)	1 (1/99) 32M-92-01X1	2 (4/99) 32M-92-01X2	3 (7/99) 32M-92-01X3	4 (10/99) 32M-92-01X4	1 (4/02) 32M-92-01X	2 (10/02) 32M-92-01X	3 (6/03) 32M-92-01X
VOCs (5030B/8021B/8260B) µg/l													
Vinyl chloride	2.0	N/A	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U	2U	2U	2U
1,2-dichloroethene (trans)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
1,2-dichloroethene (cis)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
1,1,1-trichloroethane	5.0	<0.500	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
Trichloroethene	5.0	<0.500	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	1U	1U	1U	1U
1,1,2-trichloroethane	5.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
1,3-dichlorobenzene	600.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
1,4-dichlorobenzene	75.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
1,2-dichlorobenzene	600.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1U	1U	1U
VPH (MADEP-VPH-98-1) µg/l													
Benzene	5.0	<0.500	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	5 U	5U	5U	5U
Ethylbenzene	500.0	<0.500	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	5 U	5U	5U	5U
m,p-xylene		<0.840	<0.840	N/A	N/A	N/A	20 U	20 U	20 U	20 U	20U	20U	20U
o-Xylene		<0.840	<0.840	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10U	10U	10U
Toluene		<0.500	<0.500	N/A	N/A	N/A	15 U	15 U	15 U	15 U	15U	15U	15U
C5-C8 Aliphatic (1,2)	400.0	N/A	N/A	N/A	N/A	N/A	40 U	40 U	40 U	40 U	40U	40U	40U
C9-C12 Aliphatic(1,3)	4,000.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10U	10U	10U
C9-C10 Aromatics(1)	200.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10U	10U	10U
EPH (MADEP-EPH-98-1) µg/l													
C9-C18 Aliphatics	4,000.0	N/A	N/A	N/A	N/A	N/A	67 UJ	62 UJ	60UJ	60U	60U	60UJ	60U
C19-C36 Aliphatics	5,000.0	N/A	N/A	N/A	N/A	N/A	67 UJ	62 UJ	60U	60U	60U	60UJ	60U
C11-C22 Aromatics ***	200.0	N/A	N/A	N/A	N/A	N/A	180 UJ	160 U	160 U	160 U	160U	160U	160U
PCBS (3510B/3520B/8082) µg/l													
PCB-1016	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1221	0.5	N/A	N/A	N/A	N/A	N/A	1 U	1.0 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1232	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1242	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1248	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1254	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1260	0.5	<0.190	<0.190	N/A	N/A	N/A	0.5 U	0.50 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
Inorganics (200:17/200.7/6010B) µg/l													
Arsenic - Total	50.0	3.94	23.6	N/A	6.12	3.42	1.85 U	2.07 U	12	39.3	2.15U	7.3	1.8U
Lead - Total	15.0	2.71	2.49	N/A	<5.0	<5.0	3.1 U	2.9 U	7.9U	19.7	1.8U	5.7U	1.56U
Manganese - Total	3,500.0	**6450**	**7930**	N/A	**7100**	**7000**	113	232 J	920	2430	52.9	448	74.8
Arsenic - Dissolved	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.15U	2U	1.8U
Lead - Dissolved	15.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.8B	1.8U	1.56U
Manganese - Dissolved	3,500.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.8U	0.7U
IRA Parameters (mg/l)													
Nitrate Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	0.9	0.69	0.76	0.87	0.62	0.82	0.83
Nitrite Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	<0.050	<0.050	<0.050	<0.050	0.05U	.05U	0.05U
Ammonia Nitrogen (E350.2)		N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	<0.10	<0.10	0.1U	0.1U	0.1U
Phosphate (365.2)		N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	0.16	0.19	0.1U	0.2	0.1U
Sulfate (375.4)		N/A	N/A	N/A	N/A	N/A	32	28	29	23	22	27	25
Sulfide (376.1)		N/A	N/A	N/A	N/A	N/A	<1.6	<2.0	5.6	3.7	10	8.8	1U
Alkalinity		N/A	N/A	N/A	N/A	N/A	51	43	40	48	30	40	40
TOC (415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	2.3	2	1.6	2.2	4	12	3
COD 415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	<15	<15	<15	<15	15U	15U	15U
Methane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	5.2 U	5.2 U	NC	NC	10U	ND	10U
Ethane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.6 U	9.6 U	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.0 U	9.0 U	NC	NC	NC	NC	NC
Field Collected Data													
Dissolved Oxygen (mg/L)		N/A	N/A	N/A	N/A	N/A	3.35	7.48	2.42	6.60	10.40	7.44	8.28
ORP/Eh (mv)		N/A	N/A	N/A	N/A	N/A	190.90	182.33	151.77	242.50	249.97	195.37	293.97
Specific Conductivity (µS/cm)		N/A	N/A	N/A	N/A	N/A	169.67	165.33	121.67	160.33	73.30	118.00	110.67
pH		N/A	N/A	N/A	N/A	N/A	6.19	6.10	5.16	5.56	6.33	6.21	5.95
Carbon Dioxide (mg/L)		N/A	N/A	N/A	N/A	N/A	15	20	30	25	NC	71.25	51.25
Iron (mg/L)		N/A	N/A	N/A	N/A	N/A	0	0	0	0	NC	0.00	0

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value is the compound quantitation limit.
UJ - The compound was not detected. The compound quantitation limit is an estimated value.
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Home Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID / Round Number / Sample Date / Sample ID / Parameter/Method	Cleanup Goal (µg/l)	32M-92-03X 1 (11/92)	2 (3/93)	2 F (3/93)	3 (6/93)	3 F (6/93)	1 (1/99) 32M-92-03X1	2 (4/99) 32M-92-03X2	3 (7/99) 32M-92-03X3	4 (10/99) 32M-92-03X4	1 (4/02) 32M-92-03X	2 (10/02) 32M-92-03X	3 (6/03) 32M-92-03X
VOCs (5030B/8021B/8260B) µg/l													
Vinyl chloride	2.0	N/A	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U	2UJ	2U	2U
1,2-dichloroethene (trans)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,2-dichloroethene (cis)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,1,1-trichloroethane	5.0	<0.500	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
Trichloroethene	5.0	<0.500	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,1,2-trichloroethane	5.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,3-dichlorobenzene	600.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,4-dichlorobenzene	75.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
1,2-dichlorobenzene	600.0	<1.70	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	1 U	1UJ	1U	1U
VPH (MADEP-VPH-98-1) µg/l													
Benzene	5.0	<0.500	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	5 U	5UJ	5U	5U
Ethylbenzene	500.0	<0.500	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	5 U	5UJ	5U	5U
m,p-xylene		<0.840	<0.840	N/A	N/A	N/A	20 U	20 U	20 U	20 U	20UJ	20U	20U
o-Xylene		<0.840	<0.840	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10UJ	10U	10U
Toluene		0.98	0.7	N/A	N/A	N/A	15 U	15 U	15 U	15 U	15UJ	15U	15U
C5-C8 Aliphatic (1,2)	400.0	N/A	N/A	N/A	N/A	N/A	40 U	40 U	40 U	40 U	40UJ	40U	40U
C9-C12 Aliphatic(1,3)	4,000.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10UJ	10U	10U
C9-C10 Aromatics(1)	200.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U	10UJ	10U	10U
EPH (MADEP-EPH-98-1) µg/l													
C9-C18 Aliphatics	4,000.0	N/A	N/A	N/A	N/A	N/A	60 U	61 UJ	60UJ	60U	60U	60U	60U
C19-C36 Aliphatics	5,000.0	N/A	N/A	N/A	N/A	N/A	60 U	61 U	60U	60U	60U	60U	60U
C11-C22 Aromatics ***	200.0	N/A	N/A	N/A	N/A	N/A	160 UJ	160 U	160 U	160 U	160UJ	160U	160U
PCBS (3510B/3520B/8082) µg/l													
PCB-1016	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1221	0.5	N/A	N/A	N/A	N/A	N/A	1 U	1 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1232	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1242	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1248	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1254	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
PCB-1260	0.5	<1.90	<1.90	N/A	N/A	N/A	0.5 U	0.5 U	0.50 U	0.50 U	0.5U	0.5U	0.5U
Inorganics (200.1T/200.7/6010B) µg/l													
Arsenic - Total	50.0	26.9	48.6	2.98	9.64	<2.0	1.85 U	2.07 U	2.07U	2.07 U	2.15U	2U	1.8U
Lead - Total	15.0	21.3	20.4	<1.26	5.37	>5.0	2.6 U	1.3 U	4.4U	1.4 J	2.0U	2.2U	1.56U
Manganese - Total	3,500.0	1310	2470	1880	1100	899	16.3	34.3 J	126	20.7	11.6	9.3	29.8
Arsenic - Dissolved	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.15U	2U	1.8U
Lead - Dissolved	15.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.6J	1.3U	1.56U
Manganese - Dissolved	3,500.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.4	7.9	22.1
IRA Parameters (mg/l)													
Nitrate Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	0.47	0.47	0.48	0.57	0.87	0.7	0.5
Nitrite Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	<0.050	<0.050	<0.050	<0.050	0.05U	0.05U	0.05U
Ammonia Nitrogen (E350.2)		N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	<0.10	<0.10	0.1	0.1U	0.1U
Phosphate (365.2)		N/A	N/A	N/A	N/A	N/A	<0.10	<0.10	<0.10	0.13	0.1U	0.1U	0.1U
Sulfate (375.4)		N/A	N/A	N/A	N/A	N/A	32	24	30	21	20	19	16
Sulfide (376.1)		N/A	N/A	N/A	N/A	N/A	1.8	<2.0	<4.0	2.5	4	6.5	1U
Alkalinity		N/A	N/A	N/A	N/A	N/A	<20	<20	<20	<20	20U	20U	20U
TOC (415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	<1.0	<1.0	<1.0	<1.0	2	15	1U
COD 415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	<15	<15	<15	<15	15U	15U	15U
Methane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	5.2 U	5.2 U	NC	NC	10U	NC	10U
Ethane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.6 U	9.6 U	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.0 U	9.0 U	NC	NC	NC	NC	NC
Field Collected Data													
Dissolved Oxygen (mg/L)		N/A	N/A	N/A	N/A	N/A	7.87	9.37	7.41	7.56	7.52	8.12	6.86
ORP/Eh (mv)		N/A	N/A	N/A	N/A	N/A	277.50	213.70	187.03	280.53	261.97	204.80	227.83
Specific Conductivity (µS/cm)		N/A	N/A	N/A	N/A	N/A	108.67	172.67	140.00	95.00	86.33	83.00	97
pH		N/A	N/A	N/A	N/A	N/A	5.34	5.48	5.05	5.00	5.77	5.71	5.31
Carbon Dioxide (mg/L)		N/A	N/A	N/A	N/A	N/A	10	10	15	50	NC	60.00	NC
Iron (mg/L)		N/A	N/A	N/A	N/A	N/A	0	0	0	0	NC	0.00	NC

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Horne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID	Cleanup Goal (µg/l)	32Z-99-02X			32M-01-04XBR			32M-01-14XOB			32M-01-14XBR		
Round Number		1	2	3	1	2	3	1	2	3	1	2	3
Sample Date		(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)
Sample ID		32Z-99-02X	32Z-99-02X	32Z-99-02X	32M-01-04XBR	32M-01-04XBR	32M-01-04XBR	32M-01-14XOB	32M-01-14XOB	32M-01-14XOB	32M-01-14XBR	32M-01-14XBR	32M-01-14XBR
Parameter/Method													
VOCs (5030B/8021B/8260B) µg/l													
Vinyl chloride	2.0	NC	2U	2U	2UJ	2U	2U	2UJ	2U	2U	2U	2U	2UJ
1,2-dichloroethene (trans)	55.0	NC	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1UJ
1,2-dichloroethene (cis)	55.0	NC	1U	1U	1UJ	1U	1U	1UJ	0.5J	1U	0.7J	1U	1UJ
1,1,1-trichloroethane	5.0	NC	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1UJ
Trichloroethene	5.0	NC	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1UJ
1,1,2-trichloroethane	5.0	NC	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1UJ
1,3-dichlorobenzene	680.0	NC	1U	1U	1UJ	1U	1U	3J	2U	0.7J	0.9J	0.6U	0.9J
1,4-dichlorobenzene	75.0	NC	1U	1U	1UJ	1U	1U	1J	0.8U	0.3J	0.9J	0.2U	1UJ
1,2-dichlorobenzene	680.0	NC	1U	1U	1UJ	1U	1U	8J	8	1	3	0.6U	1J
VPH (MADEP-VPH-98-1) µg/l													
Benzene	5.0	NC	5U	5U	5UJ	5U	5U	5UJ	5U	5U	5U	5U	5UJ
Ethylbenzene	580.0	NC	5U	5U	5UJ	5U	5U	5UJ	5U	5U	5U	5U	5UJ
m,p-xylene		NC	20U	20U	20UJ	20U	20U	20UJ	20U	20U	20U	20U	20UJ
o-Xylene		NC	10U	10U	10UJ	10U	10U	10UJ	10U	10U	10U	10U	10UJ
Toluene		NC	15U	15U	15UJ	15U	15U	15UJ	15U	15U	15U	15U	15UJ
C5-C8 Aliphatic (1,2)	400.0	NC	40U	40U	40UJ	40U	40UJ	40UJ	40U	40U	40U	40U	40UJ
C9-C12 Aliphatic(1,3)	4,000.0	NC	10U	10U	10UJ	10U	10UJ	10UJ	10U	10U	10U	10U	10UJ
C9-C10 Aromatics(1)	200.0	NC	10U	10U	10UJ	10U	10UJ	10UJ	10U	10U	10U	10U	14J
EPH (MADEP-EPH-98-1) µg/l													
C9-C18 Aliphatics	4,000.0	NC	60UJ	60U	60U	60U	60U	60U	60R	60U	60U	60U	61U
C19-C36 Aliphatics	5,000.0	NC	60UJ	60U	60U	60U	60U	60U	60R	60U	60U	60U	61U
C11-C22 Aromatics ***	200.0	NC	160UJ	160U	160UJ	160U	160U	160UJ	160R	160U	160UJ	160U	160U
PCBS (3510B/3570B/8082) µg/l													
PCB-1016	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1221	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1232	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1242	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1248	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1254	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
PCB-1260	0.5	NC	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.59U	0.5U	0.5UJ
Inorganics (200.1T/200.7/6010B) µg/l													
Arsenic - Total	50.0	NC	20.1	2.13U	2.15U	2U	1.8U	9.8	8.9	19	8.4J	16.4	372
Lead - Total	15.0	NC	35.3	3.2J	1.37U	1.26U	0.91U	5.4U	4.3U	2J	7.5U	9.8	43
Manganese - Total	3,500.0	NC	679.0	38.4	215.0	158.0	99.6	2490	2680	6110	187	356	1240
Arsenic - Dissolved	50.0	NC	2U	2.13U	2.15U	2U	1.8U	2.15U	2U	19.1	4.7J	2U	2.13U
Lead - Dissolved	15.0	NC	1.8U	1.56U	1.37U	1.26U	0.91U	1.37U	1.7U	1.56U	1.6J	1.3U	1.6J
Manganese - Dissolved	3,500.0	NC	5.3	13.8U	163.0	152.0	86.8	2260	3180	6670	149	138	148
IRA Parameters (mg/l)													
Nitrate Nitrogen (353.2)		NC	1.2	2	3.2	2.5	1.2	2.5	2.7	0.76	1.6	5.3	0.3
Nitrite Nitrogen (353.2)		NC	0.06	0.05U	0.05U	0.1U	0.05U	0.05U	0.06	0.05U	0.06	0.05U	0.05U
Ammonia Nitrogen (E350.2)		NC	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.31		0.1U	0.1U
Phosphate (365.2)		NC	12	0.1U	0.1U	0.1U	0.1U	0.2	0.2	0.1	0.1	0.39	1.4
Sulfate (375.4)		NC	53	53	41	54	55	33	32	28	37	21	32
Sulfide (376.1)		NC	1U	1U	1	4.4	1	2U	7.8	1U	7	4U	1U
Alkalinity		NC	40	20	120	200	170	190	220	200	280	280	320
TOC (415.1/SM5220)		NC	9.9	7.1	19	69	2	22	85	3	19	65	2
COD 415.1/SM5220)		NC	15U	15U	15U	15U	15U	15U	15U	15U	15U	15U	15U
Methane (RSK 175) µg/l		NC	NC	10U	10U	11	10U	370	23	740	18	NC	70
Ethane (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Field Collected Data													
Dissolved Oxygen (mg/L)		NC	NC	NC	4.67	3.52	3.4	NC	7.18	0.33	NC	1.61	0.69
ORP/Eh (mv)		NC	NC	NC	147.80	242.77	183	54.00	205.90	98.67	217.60	188.70	170
Specific Conductivity (µS/cm)		NC	NC	NC	NC	485.67	441	382.00	391.00	330.67	426.00	528.00	563
pH		NC	NC	NC	19.54	17.37	6.3	5.77	6.11	5.91	6.97	6.76	6.47
Carbon Dioxide (mg/L)		NC	NC	NC	NC	130	125	NC	175	94.05	NC	165	87.5
Iron (mg/L)		NC	NC	NC	0	0.0	0	NC	0.0	2.4	NC	0.0	0.2

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC – Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Harne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID / Round Number / Sample Date / Sample ID / Parameter/Method	Cleanup Goal (µg/l)	32M-01-13XBR 1 (4/02) 32M-01-13XBR	2 (10/02) 32M-01-13XBR	3 (6/03) 32M-01-13XBR	32M-01-15XBR 1 (4/02) 32M-01-15XBR	2 (10/02) 32M-01-15XBR	3 (6/03) 32M-01-15XBR	32M-01-16XBR 1 (4/02) 32M-01-16XBR	2 (10/02) 32M-01-16XBR	3 (6/03) 32M-01-16XBR	32M-01-17XBR 1 (4/02) 32M-01-17XBR	2 (10/02) 32M-01-17XBR	3 (6/03) 32M-01-17XBR
VOCs (5030B/8021B/8260B) µg/l													
Vinyl chloride	2.0	2UJ	2U	1U	2UJ	2U	2U	2UJ	2U	2U	2UJ	2U	2U
1,2-dichloroethene (trans)	55.0	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U
1,2-dichloroethene (cis)	55.0	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U	0.6J	1U	1U
1,1,1-trichloroethane	5.0	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U
Trichloroethene	5.0	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1UJ	0.8J	1U
1,1,2-trichloroethane	5.0	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U
1,3-dichlorobenzene	600.0	7J	0.7J	7	2J	4	0.7J	1UJ	1U	1U	0.9J	1U	1U
1,4-dichlorobenzene	75.0	3J	0.2U	3	1UJ	1U	1U	1UJ	1U	1U	1UJ	1U	1U
1,2-dichlorobenzene	600.0	36J	0.9J	24	4J	13	1U	1UJ	0.2U	1U	1UJ	0.7U	1U
VPH (MADEP-VPH-98-1) µg/l													
Benzene	5.0	5UJ	5U	5U	5UJ	5U	5U	5UJ	5U	5U	5UJ	5U	5U
Ethylbenzene	500.0	5UJ	5U	5U	5UJ	5U	5U	5UJ	5U	5U	5UJ	5U	5U
m,p-xylene		20UJ	20U	20U	20UJ	20U	20U	20UJ	20U	20U	20UJ	20U	20U
o-Xylene		10UJ	10U	10U	10UJ	10U	10U	10UJ	10U	10U	10UJ	10U	10U
Toluene		15UJ	15U	15U	15UJ	15U	15U	15UJ	15U	15U	15UJ	15U	15U
C5-C8 Aliphatic (1,2)	400.0	40UJ	40U	40U	40UJ	40U	40UJ	40UJ	40U	40U	40UJ	40U	40U
C9-C12 Aliphatic(1,3)	4,000.0	10UJ	10U	14J	10UJ	10U	10U	10UJ	10U	10U	10UJ	10U	10U
C9-C10 Aromatics(1)	200.0	36J	24J	24J	10UJ	15	10UJ	20J	10U	10U	10UJ	10U	10U
EPH (MADEP-EPH-98-1) µg/l													
C9-C18 Aliphatics	4,000.0	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U	64UJ
C19-C36 Aliphatics	5,000.0	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U	64UJ
C11-C22 Aromatics ***	200.0	160UJ	160U	160U	160U	160U	160U	160U	160U	160U	160U	160U	170UJ
PCBS (3510B/3520B/8082) µg/l													
PCB-1016	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1221	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1232	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1242	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1248	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1254	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
PCB-1260	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.52U	0.5U	0.5U	0.5U
Inorganics (200.7/7/200.7/6010B) µg/l													
Arsenic - Total	50.0	2.15U	2U	1.8U	2.15U	2U	1.8U	2.15U	2U	1.8U	2.15U	2U	1.8U
Lead - Total	15.0	1.37U	1.26U	1.8U	3.9U	4.8U	3.2	1.37U	2.2U	0.91U	2.8U	1.9U	0.91U
Manganese - Total	3,500.0	1230	202	97.9	1400	936	230	160	71.5	5.7	65	11.8	3
Arsenic - Dissolved	50.0	2.15U	2U	1.8U	2.15U	2U	1.8U	2.15U	2U	1.8U	2.15U	2U	1.8U
Lead - Dissolved	15.0	1.5J	1.7U	0.91U	1.6J	1.26U	0.91U	1.37U	1.26U	0.91U	1.37U	1.6U	0.91U
Manganese - Dissolved	3,500.0	1310	272	38.5	1260	502	43.6	144	77.7	6	41.7	13.8	2.7
IRA Parameters (mg/l)													
Nitrate Nitrogen (353.2)		3.1	2.5	2.9	2.6	1.9	1.4	3.1	3.7	2.9	2.5	3.2	2.6
Nitrite Nitrogen (353.2)		0.05U	0.05U	0.05U	0.06	0.22	0.05U	0.05U	0.005U	0.05	0.07	0.05U	0.05U
Ammonia Nitrogen (E350.2)		0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1	0.1U	0.1U	0.1U	0.1U	0.1U
Phosphate (365.2)		0.1U	0.1U	0.1U	0.3	0.38	0.3	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Sulfate (375.4)		30	27	23	28	40	18	35	45	56	37	29	23
Sulfide (376.1)		2U	13	1U	1U	4U	1U	2	4.2	1U	2U	4U	1U
Alkalinity		120	120	100	200	230	160	100	120	98	130	140	180
TOC (415.1/SM5220)		2	68	1	4	53	1	3	35	1	2	24	2
COD 415.1/SM5220)		15U	15U	15U	15U	15U	15U	15U	15U	15U	15U	15U	15U
Methane (RSK 175) µg/l		10U	NC	10U	10U	NC	10U	10U	10U	NC	10U	NC	10U
Ethane (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Field Collected Data													
Dissolved Oxygen (mg/L)		1.13	4.88	3.2	7.14	2.49	4.48	4.77	2.44	6.38	NC	1.31	5.26
ORP/Eh (mv)		124.83	151.87	217.67	111.07	76.53	165.17	148.97	160.37	307.43	66.90	156.01	240.63
Specific Conductivity (µS/cm)		616.33	434.67	254	668.00	723.00	427	286.00	424.00	291.67	399.67	335.33	310.67
pH		6.33	6.53	6.02	6.81	6.94	7.1	6.49	6.27	6.09	7.05	7.28	7.47
Carbon Dioxide (mg/L)		NC	172.5	83.5	NC	108.75	81.25	NC	72.5	105	NC	40	125
Iron (mg/L)		NC	0	0	NC	0	0	0	0.1	0.2	0	0	0

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Horne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID	Cleanup Goal (µg/l)	32M-01-18XBR			43M-01-16XBR			43M-01-16XOB			43M-01-17XBR		
Round Number		1	2	3	1	2	3	1	2	3	1	2	3
Sample Date		(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)
Sample ID		32M-01-18XBR	32M-01-18XBR	32M-01-18XBR	43M-01-16XBR	43M-01-16XBR	43M-01-16XBR	43M-01-16XOB	43M-01-16XOB	43M-01-16XOB	43M-01-17XBR	43M-01-17XBR	43M-01-17XBR
Parameter/Method													
VOCs (5030B/8021B/8260B) µg/l													
Vinyl chloride	2.0	2UJ	40U	100U	2UJ	2U	2U	2UJ	2U	2U	2U	2U	2U
1,2-dichloroethene (trans)	55.0	1UJ	20U	50U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
1,2-dichloroethene (cis)	55.0	28J	20U	50U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
1,1,1-trichloroethane	5.0	2J	20U	50U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
Trichloroethene	5.0	19J	20U	50U	1UJ	1	1U	1UJ	0.7J	1U	1U	1U	1U
1,1,2-trichloroethane	5.0	1UJ	20U	50U	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
1,3-dichlorobenzene	600.0	660J	300J	460	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
1,4-dichlorobenzene	75.0	450J	200	310	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
1,2-dichlorobenzene	600.0	5900J	2500	3800	1UJ	1U	1U	1UJ	1U	1U	1U	1U	1U
VPH (MADEP-VPH-98-1) µg/l													
Benzene	5.0	250UJ	100U	5U	5UJ	5U	5U	5UJ	5U	5U	5U	5U	5U
Ethylbenzene	500.0	250UJ	100U	5U	5UJ	5U	5U	5UJ	5U	5U	5U	5U	5U
m,p-xylene		1000UJ	400U	20U	20UJ	20U	20U	20UJ	20U	20U	20U	20U	20U
o-Xylene		500UJ	200U	10U	10UJ	10U	10U	10UJ	10U	10U	10U	10U	10U
Toluene		750UJ	300U	15U	15UJ	15U	15U	15UJ	15U	15U	15U	15U	15U
C5-C8 Aliphatic (1,2)	400.0	2000UJ	800U	170J	40UJ	40U	40U	40UJ	40U	40U	40U	40U	40U
C9-C12 Aliphatic(1,3)	4,000.0	500UJ	200U	350J	10UJ	10U	10U	10UJ	10U	10U	10U	10U	10U
C9-C10 Aromatics(1)	200.0	9100J	2900	1700J	10UJ	10U	10U	10UJ	10U	10U	10U	10U	10U
EPH (MADEP-EPH-98-1) µg/l													
C9-C18 Aliphatics	4,000.0	920	240	620	60U	60U	60U	60U	60U	60U	60U	60U	60U
C19-C36 Aliphatics	5,000.0	60U	62U	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U
C11-C22 Aromatics ***	200.0	160U	160U	160U	160UJ	160U	160U	160U	160UJ	160U	160UJ	160UJ	160U
PCBS (3510B/3520B/8082) µg/l													
PCB-1016	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1221	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1232	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1242	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1248	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1254	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1260	0.5	0.5U	0.62U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Inorganics (200.1T/200.7/6010B) µg/l													
Arsenic - Total	50.0	2.15U	2U	3.5J	2.15U	2U	1.8U	12.4	2U	11.2	2.15U	2U	1.8U
Lead - Total	15.0	3U	2.1U	1.8U	2.1U	1.26U	8.3	10.7J	1.26U	9.3	2.8U	1.6U	0.91U
Manganese - Total	3,500.0	7730	9260	14100	182	77.2	35.4	320	12.8	258	244	48.2	21.1
Arsenic - Dissolved	50.0	2.15U	2U	3.0J	2.15U	2U	1.8U	2.15U	2U	1.8U	2.15U	2U	1.8U
Lead - Dissolved	15.0	2.8J	1.8U	1.9U	1.8J	1.8U	0.91U	3.3J	2.2U	1.2U	1.37U	1.7U	0.91U
Manganese - Dissolved	3,500.0	7500	8960	14200	174	69.2	19.2	119	9.8	19.7	216	28.7	25.3
IRA Parameters (mg/l)													
Nitrate Nitrogen (353.2)		3.4	0.79	1.2	1.1	0.67	0.54	1.4	1.3	1	0.93	1.4	1.3
Nitrite Nitrogen (353.2)		0.3	0.06	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U
Ammonia Nitrogen (E350.2)		0.1U	0.1U	0.1U	0.1	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Phosphate (365.2)		0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.4	0.1U	0.1	0.1	0.1	0.1U
Sulfate (375.4)		30	27	18	38	40	2	26	38	32	50	40	62
Sulfide (376.1)		2U	4U	1U	4	14	1U	4	9.3	2	6	9	1
Alkalinity		140	210	240	110	140	20U	30	30	20	120	140	150
TOC (415.1/SM5220)		5.2	74	4.2	5	30	3	2	19	1	1U	28	2
COD 415.1/SM5220)		15U	15U	15U	15U	15U	15U	15U	15U	15	15U	15U	15U
Methane (RSK 175) µg/l		40	33	140	10U	NC	10U	10U	NC	10U	10U	NC	10U
Ethane (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Field Collected Data													
Dissolved Oxygen (mg/L)		NC	1.09	0.85	3.13	15.26	8.36	8.02	7.31	8.41	3.00	1.59	1.59
ORP/Eh (mv)		120.37	216.33	111.9	41.50	116.13	189	166.87	188.27	226.8	66.90	275.90	275.9
Specific Conductivity (µS/cm)		344.33	453.00	494	379.33	169.67	21	144.80	142.67	123	399.67	415.00	415.33
pH		6.39	6.13	6.35	7.27	7.01	6.15	6.32	5.74	5.61	7.05	7.52	7.52
Carbon Dioxide (mg/L)		NC	122.5	96	NC	87.5	NC	NC	93.75	NC	NC	58	58
Iron (mg/L)		NC	0	0.8	0	0	0	0	0	0	NC	0	0

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Horne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID	Cleanup Goal (µg/l)	43M-01-17XOB			43M-01-20XBR			43M-01-20XOB		
Round Number		1	2	3	1	2	3	1	2	3
Sample Date		(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)	(4/02)	(10/02)	(6/03)
Sample ID		43M-01-17XOB	43M-01-17XOB	43M-01-17XOB	43M-01-20XBR	43M-01-20XBR	43M-01-20XBR	43M-01-20XOB	43M-01-20XOB	43M-01-20XOB
Parameter/Method										
VOCs (5030B/8021B/8260B) µg/l										
Vinyl chloride	2.0	2U	2U	2U	2UJ	2U	2U	2UJ	2U	2R
1,2-dichloroethene (trans)	55.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
1,2-dichloroethene (cis)	55.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
1,1,1-trichloroethane	5.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
Trichloroethene	5.0	1U	1U	1U	0.6J	1U	1U	1UJ	1U	1R
1,1,2-trichloroethane	5.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
1,3-dichlorobenzene	600.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
1,4-dichlorobenzene	75.0	1U	1U	1U	1UJ	0.2U	1U	1UJ	1U	1R
1,2-dichlorobenzene	600.0	1U	1U	1U	1UJ	1U	1U	1UJ	1U	1R
VPH (MADEP-VPH-98-1) µg/l										
Benzene	5.0	5U	5U	5U	5UJ	5U	5U	5UJ	5U	5UJ
Ethylbenzene	500.0	5U	5U	5U	5UJ	5U	5U	5UJ	5U	5UJ
m,p-xylene		20U	20U	20U	20UJ	20U	20U	20UJ	20U	10UJ
o-Xylene		10U	10U	10U	10UJ	10U	10U	10UJ	10U	10UJ
Toluene		15U	15U	15U	15UJ	15U	15U	15UJ	15U	15UJ
C5-C8 Aliphatic (1,2)	400.0	40U	40U	40U	40UJ	40U	40UJ	40UJ	40U	40UJ
C9-C12 Aliphatic(1,3)	4,000.0	150	10U	10U	10UJ	10U	10UJ	10UJ	10U	10UJ
C9-C10 Aromatics(1)	200.0	10U	43	10U	10UJ	10U	10U	10UJ	10U	11J
EPH (MADEP-EPH-98-1) µg/l										
C9-C18 Aliphatics	4,000.0	110	60U	60U	60U	60U	60U	60U	60U	60U
C19-C36 Aliphatics	5,000.0	60U	60U	60U	60U	60U	60U	60U	60U	60U
C11-C22 Aromatics ***	200.0	290	160U	160U	160U	160U	160U	160R	160U	160U
PCBS (3510B/3520B/8082) µg/l										
PCB-1016	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1221	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1232	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1242	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1248	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1254	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
PCB-1260	0.5	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
Inorganics (200.7/7200.7/6010B) µg/l										
Arsenic - Total	50.0	271	103	2.8J	5.2J	3.1J	2.7J	2.15U	2U	1.8U
Lead - Total	15.0	1.5U	1.26U	0.91U	1.37U	3.1U	0.91U	2.2J	2.4U	1U
Manganese - Total	3,500.0	650	923	197	3750	3690	1370	4.3U	1.9U	1.4U
Arsenic - Dissolved	50.0	269	105	1.8U	4.8B	2U	1.9J	2.15U	2U	1.8U
Lead - Dissolved	15.0	1.8J	1.8U	0.91U	1.37U	1.4U	1.1U	1.37U	2.6U	0.91U
Manganese - Dissolved	3,500.0	635	906	183	3720	3450	1320	3B	1.7	1.3U
IRA Parameters (mg/l)										
Nitrate Nitrogen (353.2)		0.2	0.1	0.93	0.1	0.05U	0.05U	2	2.3	1.9
Nitrite Nitrogen (353.2)		0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U
Ammonia Nitrogen (E350.2)		0.2	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Phosphate (365.2)		0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Sulfate (375.4)		20	10	30	33	28	14	35	40	28
Sulfide (376.1)		8	9	1	3.3U	1U	4.1	1U	4	2
Alkalinity		70	100	20U	90	80	75	30	20U	20
TOC (415.1/SM5220)		11	69	1U	18	22	1U	4	18	1U
COD 415.1/SM5220)		15U	20	15U	15U	15U	15U	15U	15U	15U
Methane (RSK 175) µg/l		36	2800	10U	14	NC	10U	10U	NC	10U
Ethane (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		NC	NC	NC	NC	NC	NC	NC	NC	NC
Field Collected Data										
Dissolved Oxygen (mg/L)		0.15	0.36	2.29	NC	8.17	0.4	NC	8.53	10.31
ORP/Eh (mv)		(34.43)	33.43	223.3	(51.03)	(35.37)	(153.73)	211.03	178.30	203.6
Specific Conductivity (µS/cm)		179.33	214	88	1582.67	1569.33	1881.33	176.00	167.33	268.33
pH		6.36	6.22	5.48	7.10	7.94	7.2	5.77	5.51	5.47
Carbon Dioxide (mg/L)		NC	196.25	68	NC	35	48.75	NC	93.75	NC
Iron (mg/L)		0	2.1	1.2	NC	0.6	0.6	NC	0	NC

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Horne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-1: AOC 32 and 43A Validated Groundwater Sampling

Well ID / Round Number / Sample Date / Sample ID / Parameter/Method	Cleanup Goal (µg/l)	SHL-15													
		1 (11/92)	2 (3/93)	2 F (3/93)	3 (6/93)	3 F (6/93)	1 (1/99) SHL-15-1	2 (4/99) SHL-15-2	3 (7/99) SHL-15-3	3F (7/99) SHL-15-3	4 (10/99) SHL-15-4	4F (10/99) SHL-15-4F	1 (4/02) SHL-15	2 (10/02) SHL-15	3 (6/03) SHL-15
VOCs (5030B/8021B/8260B) µg/l															
Vinyl chloride	2.0	N/A	N/A	N/A	N/A	N/A	2 U	2 U	2 U	N/A	2 U	NC	2U	2U	2U
1,2-dichloroethene (trans)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,2-dichloroethene (cis)	55.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,1,1-trichloroethane	5.0	N/A	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
Trichloroethene	5.0	N/A	<0.500	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,1,2-trichloroethane	5.0	N/A	N/A	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,3-dichlorobenzene	600.0	N/A	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,4-dichlorobenzene	75.0	N/A	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
1,2-dichlorobenzene	600.0	N/A	<1.70	N/A	N/A	N/A	1 U	1 U	1 U	N/A	1 U	NC	1U	1U	1U
VPH (MADEP-VPH-98-1) µg/l															
Benzene	5.0	N/A	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	N/A	5 U	NC	5U	5U	5U
Ethylbenzene	500.0	N/A	<0.500	N/A	N/A	N/A	5 U	5 U	5 U	N/A	5 U	NC	5U	5U	5U
m,p-xylene		N/A	<0.840	N/A	N/A	N/A	20 U	20 U	20 U	N/A	20 U	NC	20U	20U	20U
o-Xylene		N/A	<0.840	N/A	N/A	N/A	10 U	10 U	10 U	N/A	10 U	NC	10U	10U	10U
Toluene		N/A	<0.500	N/A	N/A	N/A	15 U	15 U	15 U	N/A	15 U	NC	15U	15U	15U
C5-C8 Aliphatic (1,2)	400.0	N/A	N/A	N/A	N/A	N/A	40 U	40 U	40 U	N/A	40 U	NC	40U	40U	40U
C9-C12 Aliphatic(1,3)	4,000.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	N/A	10 U	NC	10U	10U	10UJ
C9-C10 Aromatics(1)	200.0	N/A	N/A	N/A	N/A	N/A	10 U	10 U	10 U	N/A	10 U	NC	10U	10U	10U
EPH (MADEP-EPH-98-1) µg/l															
C9-C18 Aliphatics	4,000.0	N/A	N/A	N/A	N/A	N/A	60 UJ	61 UJ	60UJ	N/A	60U	NC	60UJ	60U	60U
C19-C36 Aliphatics	5,000.0	N/A	N/A	N/A	N/A	N/A	60 UJ	61 U	60UJ	N/A	60U	NC	60UJ	60U	60U
C11-C22 Aromatics ***	200.0	N/A	N/A	N/A	N/A	N/A	160 UJ	160 U	160 U	N/A	160 U	NC	160UJ	160UJ	160U
PCBS (3510B/3520B/8082) µg/l															
PCB-1016	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1221	0.5	N/A	N/A	N/A	N/A	N/A	1 U	1.0 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1232	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1242	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1248	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1254	0.5	N/A	N/A	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
PCB-1260	0.5	N/A	<0.190	N/A	N/A	N/A	0.5 U	0.50 U	0.50 UJ	N/A	0.50 U	NC	0.5UJ	0.5U	0.5U
Inorganics (200:11T/200.7/6010B) µg/l															
Arsenic - Total	50.0	N/A	91	N/A	16.6	2.21	16.2	104	63.9	60.8	327	287	116	44.2	35
Lead - Total	15.0	N/A	10.7	N/A	6.56	<5.0	3.2 U	1.5 U	2.6U	1.9U	3.7 U	1.5 U	5.5U	1.8U	1.56U
Manganese - Total	3,500.0	N/A	1010	N/A	7400	7700	1060	2560 J	808	790	6200	6010	4100	1060	237
Arsenic - Dissolved	50.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	111	27.2	29
Lead - Dissolved	15.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.2B	1.26U	1.56U
Manganese - Dissolved	3,500.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4440	1030	247
IRA Parameters (mg/l)															
Nitrate Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	0.63	0.053	0.26	N/A	0.88	NC	1.1	0.1U	0.22
Nitrite Nitrogen (353.2)		N/A	N/A	N/A	N/A	N/A	<0.050	<0.050	<0.050	N/A	<0.050	NC	0.1	0.05U	0.05U
Ammonia Nitrogen (E350.2)		N/A	N/A	N/A	N/A	N/A	<0.10	0.57	0.2	N/A	0.49	NC	0.1U	0.1U	0.2
Phosphate (365.2)		N/A	N/A	N/A	N/A	N/A	0.27	0.14	0.24	N/A	0.66	NC	0.4	0.2	0.1U
Sulfate (375.4)		N/A	N/A	N/A	N/A	N/A	24	12	20	N/A	11	NC	39	25	21
Sulfide (376.1)		N/A	N/A	N/A	N/A	N/A	<1.6	<2.0	7.0	N/A	<4.0	NC	5	11	1U
Alkalinity		N/A	N/A	N/A	N/A	N/A	50	82	60	N/A	170	NC	120	83	50
TOC (415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	3.2	10	3.2	N/A	8.3	NC	51	71	2
COD 415.1/SM5220)		N/A	N/A	N/A	N/A	N/A	<15	33	<15	N/A	40	NC	82	15U	15U
Methane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	62	5.2 U	NC	N/A	NC	NC	700	1500	38
Ethane (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.6 U	9.6 U	NC	N/A	NC	NC	NC	NC	NC
Ethene (RSK 175) µg/l		N/A	N/A	N/A	N/A	N/A	9.0 U	9.0 U	NC	N/A	NC	NC	NC	NC	NC
Field Collected Data															
Dissolved Oxygen (mg/L)		N/A	N/A	N/A	N/A	N/A	0.60	12.95	0.48	N/A	0.59	N/A	0.50	0.27	1.61
ORP/Eh (mv)		N/A	N/A	N/A	N/A	N/A	266.20	(72.23)	(78.00)	N/A	(97.60)	N/A	(15.57)	(23.33)	(44.20)
Specific Conductivity (µS/cm)		N/A	N/A	N/A	N/A	N/A	159.00	222.67	188.00	N/A	349.33	N/A	186.00	217.00	99.67
pH		N/A	N/A	N/A	N/A	N/A	5.64	5.68	5.68	N/A	6.73	N/A	5.71	5.90	5.55
Carbon Dioxide (mg/L)		N/A	N/A	N/A	N/A	N/A	25	90	40	N/A	45	N/A	NC	268.75	NC
Iron (mg/L)		N/A	N/A	N/A	N/A	N/A	1.6	6.2	4.4	N/A	3.2	N/A	NC	2.1	NC

Notes:

B - Attributable to field or laboratory contamination.
R - Rejected value
J - Estimated Value.
U - The compound was not detected. The associated numerical value i
UJ - The compound was not detected. The compound quantitation lim
NC = Not Collected due to limited water volumes in wells.
N/A - Not Analyzed.

1. For groundwater sampling rounds conducted in 1992 and 1993, only select data for relevant parameters is shown and was taken from the ROD prepared by Horne Engineering Services, Inc., February 1998.
2. *** - C11-C22 Aromatics exclude the concentration of target PAH analytes.
3. IRA Data was not validated.
4. Clean-up goals from previous rounds (listed in the ROD) were used.
5. Bolded values exceed the clean-up goals.

Table D-2
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 1 of 2)

PARAMETER (METHOD)	MCP GW-1 µg/L	Site-Specific Cleanup Goals µg/L	Reporting Limit µg/L	SHL-15 µg/L	32M-92-01X µg/L	32Z-… (32M-97-03X) µg/L	32M-92-03X µg/L	32M-01-08XBR µg/L	32M-01-13XBR µg/L	32M-01-14XOB µg/L	32M-01-[illegible]XBR µg/L	32M-01-15XBR µg/L	32M-01-16XBR µg/L	32M-01-17XBR µg/L	32M-01-18XBR µg/L	32M-01-18XBR-DUP µg/L	43M-01-13XOB µg/L	43M-01-14XBR µg/L	43M-01-17XBR µg/L	43M-01-17XOB µg/L	43M-01-20XOB µg/L	43M-01-22XBR µg/L	[illegible] µg/L
VOC (SW846 8260B)																							
Vinyl chloride (chloroethene)	2	2	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
trans-1,2-Dichloroethene	100	53	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
cis-1,2-Dichloroethene	70	55	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.27 J	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,1-Trichloroethane	200	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Trichloroethene	5	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.41 J	110 U	96 U	0.86 J+	1.4	0.43 J	0.43 J	1.0 U	NS	1.0 U
1,1,2-Trichloroethane	5	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3-Dichlorobenzene	600	600	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	8.6	0.65 J	0.63 J	52	1.0 U	2.4	430	400	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,4-Dichlorobenzene	5	75	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.9	0.28 J	0.35 J	32	1.0 U	1.0 U	280	260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichlorobenzene	600	600	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	39	0.92 J, D	0.78 J, B	280	0.34 J, B	0.62 J, B	3,900	3,600	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.56 J
Dichlorodifluoromethane (Freon 12)	10,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.42 J	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloromethane	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromomethane	2	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloroethane	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Trichlorofluoromethane (Freon 11)	10,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Acrolein	100	--	5.0	5.0 U	5.0 U	0.52 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	550 U	480 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Freon TF		--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloroethene	1	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Acetone	300	--	5.0	3.8 J	5.0 U	5.0 U	5.0 U	5.0 U	4.6 J	12	9.1	55 U	5.0 U	5.0 U	550 U	480 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	1.0 U
Methyl iodide	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Carbon disulfide	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.25 J
Allyl chloride	5,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methylene chloride	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	8.6
Acrylonitrile	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichloroethene (total)		--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.27 J	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methyl-t-butyl ether	700	--	1.0	1.0 U	1.0 U	1.0 U	0.42 J	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	0.34 J	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloroethane	70	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Vinyl acetate	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloroprene	100	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Butanone	400	--	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	550 U	480 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Propionitrile	500	--	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	44 U	4.0 U	4.0 U	440 U	380 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	NS	4.0 U
Methacrylonitrile	5000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromochloromethane	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Tetrahydrofuran	5,000	--	14	1.0 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	150 U	14 U	14 U	1500 U	1300 U	14 U	14 U	14 U	14 U	14 U	NS	14 U
Chloroform	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Carbon tetrachloride	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Isobutyl alcohol (butanol)	10,000	--	50.0	1.0 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	550 U	50 U	50 U	5,500 U	4800 U	50 U	50 U	50 U	50 U	50 U	NS	50 U
Benzene	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichloroethane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichloropropane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methyl Methacrylate	5,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Dibromomethane	5,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,4-Dioxane	1,000	--	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	550 U	50 U	50 U	5500 U	4800 U	50 U	50 U	50 U	50 U	150	NS	50 U
Bromodichloromethane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Chloroethyl Vinyl Ether		--	1.0	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	11 UR	1.0 UR	1.0 UR	110 UR	96 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	NS	1.0 UR
cis-1,3-Dichloropropene	5**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
4-methyl-2-pentanone		--	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	550 U	480 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Toluene	1,000	--	1.0	0.38 J, B	0.44 J, B	0.59 J, B	0.30 J, B	0.61 J, B	1.0 U	0.33 J, B	0.44 J, B	11 U	1.0 U	0.30 J, B	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.31 J
trans-1,3-Dichloropropene	5**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Ethyl methacrylate	5,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Tetrachloroethene	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.27 J	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Hexanone	1,000	--	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	550 U	480 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Dibromochloromethane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chlorobenzene	100	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11	1.0 U	0.96 J	85	1.0 U	1.0 U	110 J	110	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,1,2-Tetrachloroethane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Ethylbenzene	700	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	0.76 J	1.0 U	NS	1.0 U
m-Xylene & p-Xylene	6,000**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Xylene (total)		--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
o-Xylene	6,000**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Styrene	100	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromoform	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Isopropylbenzene	10,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
cis-1,4-Dichloro-2-butene	1000**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,2,2-Tetrachloroethane	2	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,3-Trichloropropane	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
trans-1,4-Dichloro-2-butene	1000**	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	100	--	2.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,4-Trichlorobenzene	70	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Hexachlorobutadiene	0.6	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	0.31 J, B	NS	1.0 U
Naphthalene	20	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	0.97 J, B	NS	1.0 U
2,2-Dichloropropane	5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloropropene	0.5	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3-Dichloropropane	5000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromobenzene	1,000	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
n-Propylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Chlorotoluene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
4-Chlorotoluene		--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3,5-Trimethylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
tert-Butylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,4-Trimethylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
sec-Butylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
p-Isopropyltoluene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	0.49 J	1.0 U	NS	1.0 U
n-Butylbenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,3-Trichlorobenzene	-	--	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	0.28 J, B	NS	1.0 U

Bold numbers indicate exceedance of site-specific cleanup goal
Shaded area indicates compounds analyzed for in addition to the site specific contaminants of concern
Bold numbers in shaded areas indicate exceedance of MCP GW-1 standard
** Regulatory standard is for total 1,3-dichloropropene, total xylenes and total 1,4-Dichlorobutene

U = Compound not detected at a concentration above the reporting limit
J = Estimated value less than Reporting Limit or based on data evaluation of laboratory results
J+ = Estimated value less than Reporting Limit with slight positive bias due to matrix spike recoveries above upper QC limit
R = Result rejected due to zero percent recovery in matrix spike and matrix spike duplicate samples. No recovery of compound may be due to acid preservation of sample.
B = Compound is detected in the sample and the associated method blank or rinsate blank

Table D-2
Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 2 of 2)

PARAMETER (METHOD)	MCP RCGW-1	Site-Specific Cleanup Goals	Reporting Limit	Wet	SHL-11	32M-92-01X	32Z-01-03X (32M-92-03X)	32M-92-03X	32M-01-14XBR	32M-01-13XBR	32M-01-14XOB	32M-01-14XBR	32M-01-15DBR	32M-01-16XBR	32M-01-17XBR	32M-01-18XBR	32M-01-18XBR DUP	43M-01-16XOB	43M-01-16XBR	43M-01-17XBR	43M-01-17XOB	43M-01-20XOB	43M-01-20XBR	32-03-RB
	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VPH (MA DEP)																								
C5-C8 Aliphatic Hydrocarbons	–	400	100		40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	113	118	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	NS	40 U
C9-C12 Aliphatic Hydrocarbons	–	4,000	25		10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	12.1	10.0 U	10.0 U	13.3	10.0 U	10.0 U	511 E	514 E	10.0 U	10.0 U	10.0 U	12.8	10.0 U	NS	10 U
C9-C10 Aromatic Hydrocarbons	–	200	10		10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	100 U	10 U	10 U	2,600 E	2,400 E	10 U	10 U	10 U	100 U	10 U	NS	20 U
Methyl tert-butyl ether	700	–	15		15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	NS	15 U
Benzene	5	5	5.0		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	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Toluene	1,000	–	15		15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	NS	15 U
Ethylbenzene	700	500	5.0		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	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
m,p-Xylene **	5,000	–	20		20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	NS	20 U
o-Xylene **	5,000	–	10		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Naphthalene	20	–	10		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
EPH (MA DEP)																								
EXTRACTABLE PETROLEUM HYDROCARBON RANGES																								
C9 - C18 Aliphatics	–	4,000	81-87		82 U	84 U	87 U	86 UJ	81 UJ	82 UJ	84 UJ	87 U	85 U	81 U	84 U	1000 U	1000 U	83 U	83 U	83 U	82 U	81 U	NS	110 B
C19 - C36 Aliphatics	–	5,000	81-90		82 U	86 U	89 U	87 UJ	81 UJ	85 UJ	88 UJ	90 U	86 U	83 U	88 U	85 U	83 U	84 U	85 U	84 U	83 U	82 U	NS	82 U
C11-C22 Aromatics	–	200	170 to 190		170 U	180 U	190 U	180 U	170 U	180 U	170 U	190 U	180 U	170 U	180 U	180 U	180 U	180 U	180 U	180 U	180 U	170 U	NS	180 U
TARGET PAH ANALYTES																								
Naphthalene	20	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
2-Methylnaphthalene	10	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Acenaphthylene	300	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Acenaphthene	20	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Fluorene	300	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Phenanthrene	50	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Anthracene	600	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Fluoranthene	100	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Pyrene	60	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Benzo(a)anthracene	1	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Chrysene	2	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Benzo(b)fluoranthene	1	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Benzo(k)fluoranthene	–	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Benzo(a)pyrene	0.2	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Indeno(1,2,3-cd)pyrene	0.5	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Dibenzo(a,h)anthracene	0.5	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
Benzo(g,h,i)perylene	0.5	–	10 to 11		10 U	11 U	11 U	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	NS	10 U
TOTAL DISSOLVED GASES (EPA RSK 175)																								
Methane	1,000	–	2.0		180	2.0 U	2.0 U	2.0 U	3.0	2.0 U	6.9	2.0 U	2.0 U	2.0 U	2.0 U	24	31	2.0 U	2.0 U	22	1,200	2.0 U	NS	2.0 U
Ethane	1,000	–	4.0		4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	160 U	4.0 U	NS	4.0 U
Ethene	100	–	3.0		3.0 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	3.0 U	3.0 U	3.0 U	3.0 U	3.0 UJ	3.0 U	3.0 U	120 U	3.0 U	NS	3.0 U
PCB (EPA 8082)																								
Aroclor 1016	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1221	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1232	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1242	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1248	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1254	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
Aroclor 1260	0.3	0.5	0.50 to 0.57		0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS	0.54 U
ICP METALS - TOTAL METALS (SW846 3010/6010B)																								
Arsenic	50	50	10		146	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20.5	4.1 U	6.6 B	4.7 B	4.1 B	8.8 B	11	4.1 U	4.1 U	4.1 U	32.8	4.1 U	NS	4.1 U
Lead	15	15	3.0		1.7 B	1.4 U	2.4 B	1.4 B	1.4 U	1.4 U	1.4 U	1.4 U	2.0 B	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	4.1	1.4 U	1.4 B	1.4 U	NS	1.4 U
Manganese	–	3,500	15		3,340	18.6 B	14.2 B	28.3	55.7	188	7,840	79.7	794	8.2 B	3.4 B	11,000 D	12,800 D	7.3 B	39.6	25.8	1,140	2.1 B	NS	5.8 B
Arsenic	50	50	10		144	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	6.7 B	4.1 U	6.1 B	6.1 B	4.1 U	4.1 U	4.1 U	38.5	4.1 U	NS	6.1 B
Lead	15	15	3.0		1.4 U	1.6 B	1.8 B	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 B	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	NS	1.8 B
Manganese	–	3,500	15		3,450	8.1 B	6.2 B	25.0	89.0	228	5,410	60.7	167	8.9 B	8.6 B	12,900	13,100	3.0 B	24.1	21.0	1,180	1.7 B	NS	2.9 B
			mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TOC (SW846 9060)	–	–	1.0		6.7 UJ	1.2 UJ	1.0 U	1.0 U	1.1 UJ	1.0 U	1.1 UJ	1.2 UJ	1.9 UJ	1.0 U	1.0 U	3.8 UJ	1.0 U	1.0 U	1.0 U	1.0 U	2.6 UJ	1.0 U	NS	232
AMMONIA (EPA 350.1)																								
Ammonia as N	–	–	0.024		0.017	0.024 U	0.026	0.024 U	0.024 U	0.024 U	0.440	0.069	0.024 U	0.024 U	0.029	0.033*	0.051*	0.640	0.180	0.039	0.230	0.063	NS	0.024 U
ALKALINITY (EPA 310.1)																								
TOTAL as CaCO3	–	–	1.0		110	40.8 J+	29.8 J+	13.5 U	131	165	165	151	246	120	165	227	230	29.5 J+	48.8 J+	129	83.8	25.1 J+	NS	2.7
ANIONS (EPA 300)																								
Nitrate/Nitrite (353.2) as N	–	–	0.010		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.0	0.62	1.3	0.71	2.4	NS	NA
Phosphate (365.2)	–	–	0.010		0.027	0.010 U	0.016	0.010 U	0.010 U	0.019	0.045	0.036	0.088	0.010 U	0.010 U	0.064*	0.025*	0.019	0.069	0.027	0.033	0.010 U	NS	0.010 U
Sulfate (375.4)	–	–	5.0		14.7	23.1	35.8	19.9	34.8	23.3	28.7	18.9	31.8	42.7	35.9	24.5	32.6	34.8	12.1	38.0	11.3	38.7	NS	5.0 U
Sulfide (376.2)	–	–	0.020		0.73	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.058	0.020 U	0.020 U	0.043*	0.15*	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NS	0.020 U
COD (EPA 410.4)	–	–	20		40.6 UJ	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	22.2 UJ*	28.9 UJ*	20 U	20 U	20 U	20 U	20 U	NS	32.2
FIELD PARAMETERS																								
Temperature (deg C) initial			-		12.85	13.29	10.98	13.38	12.39	11.41	11.20	9.57	NS	14.32	11.59	13.40	13.40	14.87	10.18	12.07	14.23	14.28	NS	NS
Temperature °C			-		14.99	14.93	11.14	14.59	15.12	8.88	18.68	9.13	NS	15.75	13.39	16.30	16.30	15.80	14.47	13.83	18.85	16.29	NS	NS
ORP/Eh mV			-		-37.1	223.1	348.4	292.1	248.5	237.8	55.2	250.8	NS	194.6	103.7	45.1	45.1	248.5	196.2	258.5	180.7	267.2	NS	NS
pH			-		6.00	5.83	5.88	5.02	6.29	6.53	6.17	6.72	NS	6.16	7.29	6.43	6.43	5.79	7.05	7.49	5.99	5.75	NS	NS
Specific Conductance uS/cm			-		249	164	181	96	633	571	482	579	NS	643	644	771	771	201	188	411	177	221	NS	NS
Dissolved Oxygen mg/L			-		1.10	1.65	9.23	8.16	3.95	2.63	1.17	7.70	NS	2.95	0.44	0.15	0.15	5.95	1.56	1.63	0.43	4.56	NS	NS

Bold numbers indicate exceedance of site-specific cleanup goal
Shaded area indicates compounds analyzed for in addition to the site specific contaminants of concern
** Regulatory Standard is for total xylenes.

NS = Not Sampled
NA = Not Analyzed
U = Compound not detected at a concentration above the reporting limit.
J = Estimated value less than PQL or based on data evaluation of laboratory results
UJ = Analyte tentatively not detected at reported concentration
E = Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.
D = Metal duplicate results outside QC RPD limits
B = The result reported is less than the reporting limit but greater than the instrument detection limit
* = Duplicate results outside QC RPD limits

Table 2
Groundwater Analytical Results - May 25-27, 2004 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 1 of 2)

PARAMETER	MCP RCGW-1 (µg/L)	Site-Specific Cleanup Goals (µg/L)	Reporting Limit (µg/L)	Well Number: SHL-15 (µg/L)	32M-92-01X (µg/L)	32Z-99-02X (32M-92-02X) (µg/L)	32M-92-03X (µg/L)	32M-01-04XBR (µg/L)	32M-01-13XBR (µg/L)	32M-01-14XOB (µg/L)	32M-01-14XBR (µg/L)	32M-01-15XBR (µg/L)	32M-01-16XBR (µg/L)	32M-01-17XBR (µg/L)	32M-01-18XBR (µg/L)	32M-01-18XBR-DUP (µg/L)	32M-01-18XBR-QA (µg/L)	43M-01-13XOB (µg/L)	43M-01-14XBR (µg/L)	43M-01-17XBR (µg/L)	43M-01-17XOB (µg/L)	43M-01-20XOB (µg/L)	43M-01-20XBR (µg/L)	32-43A-EQB (µg/L)
Volatile Organic Compounds (SW846-8260B)																								
Vinyl chloride (chloroethene)	2	2	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
trans-1,2-Dichloroethene	100	65	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
cis-1,2-Dichloroethene	70	55	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	0.25 J	0.98 J	0.59	1.0 U	170 UJ	180 UJ	22 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,1-Trichloroethane	200	5	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.51 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Trichloroethene	5	5	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.64 J	0.28 J	0.28 J	170 UJ	180 UJ	5.2 J-	1.0 U	22	0.34 J	1.0 U	1.0 U	1.0 UJ	5 U
1,3-Dichlorobenzene	600	600	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	0.68 J	0.24 J	0.42 J	14	0.24 J	1.1	730 J-	710 J-	550 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	0.69 J
1,4-Dichlorobenzene	5	75	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	0.50 J	3.1	1.0 U	1.0 U	470 J-	480 J-	350 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	0.53 J
1,2-Dichlorobenzene	600	600	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.6 UJ	0.32 UJ	0.87 UJ	36 J+	0.31 UJ	0.41 UJ	6200 J-	6200 J-	5000 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	3.8
Dichlorodifluoromethane (Freon 12)	10,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	0.71 J	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.6 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloromethane	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	5.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromomethane	2	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloroethane	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	5.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Trichlorofluoromethane (Freon 11)	10,000	-	1.0	1.0 U	1.0 U	0.64 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.32 J	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	0.25 J	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Acrolein	100	-	5.0	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	850 UJ	920 UJ	NA	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U
Freon TF		-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethene	1	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Acetone	300	-	5.0	4.7 J	5.0 U	5.0 UJ	5.0 U	5.0 U	3.0 J	15	21	15	5.0 U	5.0 U	850 UJ	920 UJ	34 J-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U
Methyl iodide	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Carbon disulfide	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	0.27 J
Allyl chloride	5,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Methylene chloride	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	5.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	4.5
Acrylonitrile	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichloroethene (total)		-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	0.25 J	1.0	0.64 J	1.0 U	170 UJ	180 UJ	22 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Methyl-t-butyl ether	700	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethane	70	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Vinyl acetate	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloroprene	100	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
2-Butanone	400	-	5.0	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	850 UJ	920 UJ	10 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U
Propionitrile	500	-	4.0	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	680 UJ	730 UJ	NA	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U
Methacrylonitrile	5000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromochloromethane	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Tetrahydrofuran	5,000	-	14	14 U	14 U	14 UJ	14 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	2400 UJ	2500 UJ	10 UJ	14 U	14 U	14 U	14 U	14 U	14 UJ	2.2 J
Chloroform	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Carbon tetrachloride	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Isobutyl alcohol (butanol)	10,000	-	50.0	50 U	50 U	5.0 UJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	8500 UJ	9200 UJ	50 UJ	50 U	50 U	50 U	50 U	50 U	50 UJ	50 U
Benzene	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.90 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichloroethane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichloropropane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Methyl Methacrylate	5,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Dibromomethane	5,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,4-Dioxane	1,000	-	50	50 U	50 U	5.0 UJ	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	8500 U	9200 UJ	50 UJ	50 U	50 U	50 U	50 U	50 U	50 UJ	50 U
Bromodichloromethane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
2-Chloroethyl Vinyl Ether		-	1.0	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	170 U R	180 U R	NA	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R	1.0 U R
cis-1,3-Dichloropropene	(5)	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
4-methyl-2-pentanone		-		5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	850 U	920 UJ	10 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U
Toluene	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.63 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
trans-1,3-Dichloropropene *	1	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Ethyl methacrylate	5,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,2-Trichloroethane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Tetrachloroethene	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.69 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.25 J-	1.0 U
2-Hexanone	1,000	-	5.0	5.0 U	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	850 U	920 UJ	10 UJ	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 U
Dibromochloromethane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chlorobenzene	100	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	0.29 J	0.49 J	2.7	2.2	1.0 U	1.0 U	280 J-	280 J-	250 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,1,2-Tetrachloroethane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Ethylbenzene	700	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.88 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
m-Xylene & p-Xylene **	6,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.59 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Xylene (total) **		-		1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.60 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
o-Xylene **	6,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	0.81 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Styrene	100	-	1.0	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	170 UJ	180 UJ	2.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Bromoform	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Isopropylbenzene	10,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	3.0 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
cis-1,4-Dichloro-2-butene *	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,2,2-Tetrachloroethane	2	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2,3-Trichloropropane	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
trans-1,4-Dichloro-2-butene *	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	100	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	5.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2,4-Trichlorobenzene	70	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	3.0 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Hexachlorobutadiene	0.6	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	0.31 JB
Naphthalene	20	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	3.8 J-	1.0 U	1.0 U	1.0 U	0.39 J	1.0 U	1.0 UJ	0.50 JB
2,2-Dichloropropane	5	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1-Dichloropropene	0.6	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,3-Dichloropropane	5000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromobenzene	1,000	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.6 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
n-Propylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.8 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
2-Chlorotoluene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
4-Chlorotoluene		-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,3,5-Trimethylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
tert-Butylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2,4-Trimethylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.3 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
sec-Butylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.1 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
p-Isopropyltoluene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	1.7 J-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
n-Butylbenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2,3-Trichlorobenzene	-	-	1.0	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	170 UJ	180 UJ	2.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	0.26 JB

NOTES:
Bold numbers indicate exceedance of site-specific cleanup goal
Bold numbers in shaded areas indicate exceedance of MCP GW-1 standard
* Regulatory standard is for total 1,3-dichloropropene and total xylenes
** Regulatory standard is for total xylenes.
U = Compound not detected at concentration above the reporting limit.
UJ = Compound tentatively not detected at reported concentration due to blank contamination or reporting limit is estimated due to potential loss of VOCs
J = Estimated value based on data evaluation of laboratory results.
J- = Value may be biased low based on sampling method
J+ = Value may be biased high based on blank contamination
R = Results were rejected based on zero percent recovery in the MS/MSD.
B = Compound concentration exceeds the upper limit of the calibration range of the instrument for specific analysis.
NA = Not analyzed

Table 2
Groundwater Analytical Results - May 25-27, 2004 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 2 of 2)

	MCP	Site-Specific	Reporting	Well Number																			
PARAMETER	RCGW-1 (µg/L)	Cleanup Goals (µg/L)	Limit (µg/L)	SHL-15 (µg/L)	32M-92-01X (µg/L)	32Z-93-02X (32M-93-02X) (µg/L)	32M-92-03X (µg/L)	32M-01-04XBR (µg/L)	32M-01-13XBR (µg/L)	32M-01-14XOB (µg/L)	32M-01-14XBR (µg/L)	32M-01-15XBR (µg/L)	32M-01-16XBR (µg/L)	32M-01-17XBR (µg/L)	32M-01-18XBR (µg/L)	32M-01-18XBR-DUP (µg/L)	32M-01-18XBR-QA dup (µg/L)	43M-01-16XOB (µg/L)	43M-01-16XBR (µg/L)	43M-01-17XBR (µg/L)	43M-01-17XOB (µg/L)	43M-01-20XOB (µg/L)	43M-01-20XBR (µg/L)
VOLATILE PETROLEUM HYDROCARBONS (MA DEP) Ranges																							
C5-C8 Aliphatic Hydrocarbons	-	400	40.0	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	100 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U
C9-C12 Aliphatic Hydrocarbons	-	4,000	10.0	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	356 E J	388 E J	6,100	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
C9-C10 Aromatic Hydrocarbons	-	200	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	51	10 UJ	10 U	5500 E J	6600 E J	11,000	10 U	10 U	10 U	10 U	10 U	10 U
VPH (MA DEP) Target VPH Analytes																							
Methyl tert-butyl ether	700	-	15	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	2.0 U	15 U	15 U	15 U	15 U	15 U	15 U
Benzene	5	5	5.0	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	5.0 U	0.86 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1,000	-	15	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	0.64 J	15 U	15 U	15 U	15 U	15 U	15 U
Ethylbenzene	700	500	5.0	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	5.0 U	310	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
m,p-Xylene **	6,000	-	20	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	1.1 J	20 U	20 U	20 U	20 U	20 U	20 U
o-Xylene **	6,000	-	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1.2 J	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	20	-	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	4.7	10 U	10 U	10 U	10 U	10 U	10 U
Extractable Petroleum Hydrocarbon Ranges																							
C9 - C18 Aliphatics	-	4,000	60 to 68	60 U	61 U	67 U	61 U	63 U	67 U	66 U	66 U	67 U	62 U	62 U	2,300	2,200	3,400	63 U	63 U	61 U	64 U	68 U	61 U
C19 - C36 Aliphatics	-	5,000	80 to 91	80 U	82 U	89 U	81 U	85 U	89 U	88 U	88 U	89 U	82 U	83 U	90 U	88 U	100 U	83 U	84 U	81 U	85 U	91 U	81 U
C11-C22 Aromatics	-	200	170 to 190	170 U	170 U	190 U	170 U	18 U	190 U	190 U	190 U	190 U	180 U	180 U	190 U	180 U	100 U	180 U	180 U	170 U	180 U	190 U	170 U
Target PAH Analytes																							
Naphthalene	20	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 UJ	10 U	11 U	10 U	11 U	11 U	10 U
2-Methylnaphthalene	10	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 UJ	10 U	11 U	10 U	11 U	11 U	10 U
Acenaphthylene	300	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Acenaphthene	20	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Fluorene	300	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Phenanthrene	50	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Anthracene	600	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Fluoranthene	100	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Pyrene	80	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(a)anthracene	1	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Chrysene	2	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(b)fluoranthene	1	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(k)fluoranthene	-	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(a)pyrene	0.2	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Indeno(1,2,3-cd)pyrene	0.5	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Dibenzo(a,h)anthracene	0.5	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
Benzo(g,h,i)perylene	0.5	-	10 to 11	10 U	10 U	11 U	10 U	11 U	11 U	11 U	11 U	11 U	10 U	10 U	11 U	11 U	2.0 U	10 U	11 U	10 U	11 U	11 U	10 U
TOTAL DISSOLVED GASES (method RSK175)																							
Methane	1,000	-	2.0	55	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	170	27	2.0 U	2.0 U	2.0 U	26 D	38 D	59	2.0 U	2.0 U	2.0 U	4.2	2.0 U	2.0 U
Ethane	1,000	-	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	1 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Ethene	100	-	3.0	3.0 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	3.0 U	3.0 U	3.0 U	3.0 U	1 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
PCBs by EPA8082																							
Aroclor 1016	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1221	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1232	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1242	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1248	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1254	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
Aroclor 1260	0.3	0.5	0.48 to 0.57	0.48 U	0.50 U	0.51 U	0.48 U	0.57 U	0.53 U	0.57 U	0.52 U	0.52 U	0.52 U	0.51 U	0.55 U	0.56 U	0.22 U	0.50 U	0.50 U	0.50 U	0.49 U	0.52 U	0.48 U
ICP METALS 3010/6010B (Total metals)																							
Arsenic	50	50	3	21.5	2.6 U	2.6 U	2.6 U	3.7 U	2.6 U	5.9 B	26.9	3.7 U	3.7 U	3.7 U	10.4	9.6 B	11	2.6 U	2.6 U	2.6 U	19.1	2.6 U	2.6 U
Lead	15	15	1.7	1.7 U	2.5 B	1.8 B	1.7 U	1.8 U	1.7 U	1.7 U	7.4	4.4	1.8 U	2.0 U	4.6 D	3.2 D	5.0 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Manganese	-	3,500	15	371	11.6 B	9.7 B	24.4	35.3	198.0	2420.0	314.0	398.0	9.5 B	44.9	**17400**	**18500.0**	**18,000**	4.6 B	10.0 B	15.8	571	1210	1.9 U
ICP METALS 3010/6010B (Field-filtered metals)																							
Arsenic	50	50	2.6	20.6	2.6 U	2.6 U	2.6 U	3.7 U	2.6 U	2.6 U	2.6 U	3.7 U	3.7 U	3.7 U	10.1	8.3 B	8.1	2.6 U	2.6 U	2.6 U	20.6	2.6 U	2.6 U
Lead	15	15	1.7	1.7 U	1.7 U	1.9 UJ	1.6 UJ	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.8 U	1.7 U	1.7 U	5.0 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Manganese	-	3,500	15	379.0	9.2 B	8.8 B	22.8	31.7	123	2030.0	94.6	238.0	6.4 B	47.6	**18100.0**	**17600.0**	**18,000**	3.2 B	3.1 B	12.5 B	556	1140	1.9 U
UNIT CHANGE			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TOC by SW846:9060																							
Total Organic Carbon	-	-	1.0	3.7 UJ	2.4 UJ	1.8 UJ	1.0 U	1.5 UJ	1.5 UJ	4.4 UJ	2.1 UJ	3.1 UJ	2.1 UJ	1.6 UJ	4.6 UJ	4.7 UJ	4.0	2.1 UJ	1.3 UJ	1.1 UJ	3.3 UJ	1.0 U	1.6 UJ
AMMONIA (350.1)																							
Ammonia as N	-	-	0.024	0.48	0.024 U	0.050	0.040	0.024 U	0.14	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.064	0.067	1.0 U	0.087	0.028	0.16	0.13	0.066	0.064
ALKALINITY, TOTAL																							
as CaCO3	-	-	1.0	47.7 J+	50.9 J+	30.4 J+	6.4 UJ	127	118	171	356	223	118	178	229	230	220	22.3 UJ	80.5 J+	108	28.6 J+	61.8 J+	26.4 J+
ANIONS (300)																							
Nitrate/nitrite (as N) by 353.2	-	-	0.010	0.26	0.53	1.5	0.37	1.3	2.8	0.29	0.23	1.7	3.0	3.7	0.43	0.44	0.37	1.1	0.64	1.1	0.44	0.047	1.4
Nitrite (as N) by 354.1			0.0050	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.012	0.0050 U	0.023	0.011	0.011	0.20 U	0.0050 U	0.0050 U	0.012	0.0050 U	0.0050 U	0.0050 U
Phosphorus (as P) by 365.2	-	-	0.01	0.042	0.014	0.014	0.010 U	0.010 U	0.019	0.053	0.33	0.14	0.010 U	0.010 U	0.058 D	0.12 D	0.38	0.010 U	0.038	0.021	0.015	0.021	0.010 U
Sulfate by 375.4	-	-	5.0	13.2	19.3	35.3	21.8	36.9	19.9	27.2	12.6	24.4	38.9	53.6	15.1	15.3	13	41.4	19.1	24.2	25.5	9.1	32.6
Sulfide by 376.2	-	-	0.020	0.061	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.022	0.020 U	0.081	0.020 U	0.020 U	0.020 U	0.025	5.0 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Nitrate (as N) by calc	-	-	0.010	0.26	0.53	1.5	0.37	1.3	2.8	0.29	0.23	1.7	3.0	3.8	0.42	0.43	NA	1.1	0.64	1.0	0.44	0.047	1.4
COD (410.4)																							
Chemical Oxygen Demand	-	-	20.0	20.0 U	20.0 U	29.9	23.5	20.0 U	20.0 U	20.0 U	20.0 U	25.6	20.0 U	20.0 U	34.1	34.1	40 J	23.6	23.5	20.0 U	74.4	20.0 U	23.5
FIELD PARAMETERS																							
Temperature(deg C) initial	-	-	-	10.83	10.29	11.02	10.45	14.00	N/A	N/A	10.56	N/A	12.92	12.07	N/A	N/A	N/A	15.14	N/A	12.45	12.34	13.69	12.97
Temperature (deg C) final	-	-	-	13.40	11.10	10.62	10.64	17.34	13.45	N/A	15.23	16.64	16.99	12.97	N/A	N/A	N/A	17.60	18.50	15.78	14.62	15.17	12.80
ORP/Eh (mV)	-	-	-	33.5	194.8	273.6	232.5	392.4	214.6	–	123.2	192.2	171.0	229.8	–	–	–	231.9	214.1	87.0	110.5	215.2	-44.7
pH (std units)	-	-	-	5.94	6.35	6.80	6.56	6.03	6.24	N/A	6.77	6.67	6.16	6.81	N/A	N/A	N/A	5.62	6.79	7.31	5.70	5.74	7.15
Specific Conductance	-	-	-	140	137	160	95	426	351	N/A	624	725	431	534	N/A	N/A	N/A	180	223	382	132	193	2805
Dissolved Oxygen	-	-	-	1.08	9.62	9.08	9.46	6.16	5.42	N/A	3.99	6.34	3.99	1.50	N/A	N/A	N/A	6.89	9.19	2.19	1.15	7.94	4.10

NOTES:
Bold numbers indicate exceedance of site-specific cleanup goal
Bold numbers in shaded areas indicate exceedance of MCP GW-1 standard
* Regulatory standard is for total 1,3-dichloropropene and total xylenes
** Regulatory standard is for total xylenes.
U = Compound not detected at concentration above the reporting limit.
UJ = Compound tentatively not detected at reported concentration due to blank contamination or reporting limit is estimated due to potential loss of VOCs
J = Estimated value based on data evaluation of laboratory results.
J- = Value may be biased low based on sampling method
J+ = Value may be biased high based on blank contamination
B = (in metals & inorganics) The result is less than the reporting limit but greater than the instrument detection limit.
B = (organics) The analyte is in the sample and the associated method blank.
R = Results were rejected based on zero percent recovery in the MS/MSD.
E = Compound concentration exceeds the upper limit of the calibration range of the instrument for specific analysis.
NA = Not analyzed

Table 6-3
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 1 of 5)

PARAMETERS	Well No. MCP RCGW-1	Reporting Limit	SHL-15	32M-92-01X	322-99-02X (32M-92-02X)	32M-92-03X	32M-01-04XBR	32M-01-13XBR	32M-01-14XOB	32M-01-14XBR	32M-01-15XBR	32M-01-16XBR	32M-01-17XBR	32M-01-18XBR	32M-01-18XBR-DUP	32M-01-18XBR-QA	43M-01-16XOB	43M-01-16XBR	43M-01-17XBR	43M-01-17XOB	43M-01-20XOB	43M-01-20XBR	32/43A-RB
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (SW846-8260B)																							
Dichlorodifluoromethane (Freon 12)	10,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.42 J	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	5.4	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloromethane	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Vinyl chloride (chloroethene)	2	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromomethane	2	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloroethane	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Trichlorofluoromethane (Freon 11)	10,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Acrolein	100	5.0	5.0 U	5.0 U	0.52 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	560 U	480 U	–	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Freon TF		1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloroethene	1	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Acetone	300	5.0	3.8 J	5.0 U	5.0 U	5.0 U	5.0 U	4.6 J	12	9.1	55 U	5.0 U	5.0 U	560 U	480 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	1.0 U
Methyl iodide	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Carbon disulfide	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.28 J
Allyl chloride	5,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methylene chloride	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.63 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	8.6
Acrylonitrile	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
trans-1,2-Dichloroethene	100	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichloroethene (total)		1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.27 J	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methyl-t-butyl ether	700	1.0	1.0 U	1.0 U	1.0 U	0.42 J	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	0.24 J	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloroethane	70	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Vinyl acetate	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chloroprene	100	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
cis-1,2-Dichloroethene	70	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.27 J	110 U	96 U	12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Butanone	400	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	560 U	480 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	5.0 U
Propionitrile	500	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	44 U	4.0 U	4.0 U	450 U	380 U	–	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	NS	4.0 U
Methacrylonitrile	5000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromochloromethane	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Tetrahydrofuran	5,000	14	1.0 U	14 U	14 U	14 U	14 U	14 U	14 U	14 U	150 U	14 U	14 U	1600 U	1300 U	10 U	14 U	14 U	14 U	14 U	14 U	NS	14 U
Chloroform	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,1-Trichloroethane	200	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Carbon tetrachloride	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Isobutyl alcohol (butanol)	10,000	50.0	1.0 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	550 U	50 U	50 U	5,600 U	4800 U	–	50 U	50 U	50 U	50 U	50 U	NS	50 U
Benzene	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.55 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichloroethane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Trichloroethene	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	0.41 J	110 U	96 U	3.4	0.65 J	1.4	0.43 J	0.43 J	1.0 U	NS	1.0 U
1,2-Dichloropropane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Methyl Methacrylate	5,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Dibromomethane	5,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,4-Dioxane	1,000	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	550 U	50 U	50 U	5600 U	4800 U	–	50 U	50 U	50 U	50 U	150	NS	50 U
Bromodichloromethane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Chloroethyl Vinyl Ether		1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
cis-1,3-Dichloropropene	(5)	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
4-methyl-2-pentanone			5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	560 U	480 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	1.0 U
Toluene	1,000	1.0	0.36 J	0.44 J	0.60 J	0.30 J	0.51 J	1.0 U	0.33 J	0.44 J	11 U	1.0 U	0.33 J	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.31 J
trans-1,3-Dichloropropene	0.5 *	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Ethyl methacrylate	5,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,2-Trichloroethane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Tetrachloroethene	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	0.27 J	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Hexanone	1,000	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	55 U	5.0 U	5.0 U	560 U	480 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS	1.0 U
Dibromochloromethane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Chlorobenzene	100	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11	1.0 U	0.06 J	15	1.0 U	1.0 U	**110 J**	**110**	**120**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,1,2-Tetrachloroethane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Ethylbenzene	700	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.51 J	1.0 U	1.0 U	1.0 U	0.75 J	1.0 U	NS	1.0 U
m-Xylene & p-Xylene	6,000 *	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Xylene (total)			1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.53 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
o-Xylene	6,000 *	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.53 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Styrene	100	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromoform	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Isopropylbenzene	10,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.6 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
cis-1,4-Dichloro-2-butene	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1,2,2-Tetrachloroethane	2	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,3-Trichloropropane	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
trans-1,4-Dichloro-2-butene	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3-Dichlorobenzene	600	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	8.5	0.65 J	0.63 J	59	1.0 U	2.4	430	400	390	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,4-Dichlorobenzene	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.9	0.25 J	0.35 J	32	1.0 U	1.0 U	**260**	**260**	**230**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2-Dichlorobenzene	600	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	39	0.92 J	0.76 J	360	0.34 J	0.52 J	**3,900**	**3,600**	**3,600**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	0.88 J
1,2-Dibromo-3-chloropropane (DBCP)	100	2.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,4-Trichlorobenzene	70	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Hexachlorobutadiene	0.6	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.31 JB	NS	1.0 U
Naphthalene	20	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.2 J	1.0 U	1.0 U	1.0 U	1.0 U	0.37 JB	NS	1.0 U
2,2-Dichloropropane	5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,1-Dichloropropene	0.5	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3-Dichloropropane	5000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	–	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
Bromobenzene	1,000	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	1.6 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
n-Propylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.62 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
2-Chlorotoluene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
4-Chlorotoluene		1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,3,5-Trimethylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
tert-Butylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,4-Trimethylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.77 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
sec-Butylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.66 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
p-Isopropyltoluene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	0.97 J	1.0 U	1.0 U	1.0 U	0.40 J	1.0 U	NS	1.0 U
n-Butylbenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NS	1.0 U
1,2,3-Trichlorobenzene	-	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	11 U	1.0 U	1.0 U	110 U	96 U	2.6	1.0 U	1.0 U	1.0 U	1.0 U	0.28 JB	NS	1.0 U

Shaded area with bold numbers indicates MCP RCGW-1 exceedance.

J = Estimated value less than PQL, or based on data evaluation of laboratory results

* Regulatory standard is for total 1,3-dichloropropene and total xylenes

Sample-specific qualifiers:

Table 6-3
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 2 of 5)

PARAMETERS	Well No. / MCP RCGW-1	Reporting Limit	SHL-16	32M-92-01X	32Z-99-02X (32M-92-02X)	32M-92-03X	32M-01-04XBR	32M-01-13XBR	32M-01-14XOB	32M-01-14XBR	32M-01-15XBR	32M-01-16XBR	32M-01-17XBR	32M-01-18XBR	32M-01-18XBR-DUP	32M-01-18XBR-QA	43M-01-16XOB	43M-01-16XBR	43M-01-17XBR	43M-01-17XOB	43M-01-20XOB	43M-01-20XBR
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
VOLATILES PETROLEUM HYDROCARBONS																						
C5-C8 Aliphatic Hydrocarbons	-	100	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	113	116	100 U	40.0 U	40.0 U	40.0 U	40.0 U	40.0 U	NS
C9-C12 Aliphatic Hydrocarbons	-	25	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	12.1	10.0 U	10.0 U	13.3	10.0 U	10.0 U	511 E	516 E	25 U	10.0 U	10.0 U	10.0 U	12.6	10.0 U	NS
C9-C10 Aromatic Hydrocarbons	-	10	10 U	10 U	10 U	10 U	10 U	36	10 U	10 U	39	10 U	10 U	2600 E	2600 E	69	10 U	10 U	10 U	32	10 U	NS
Methyl tert-butyl ether	700	15	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	2.0 U	15 U	15 U	15 U	15 U	15 U	NS
Benzene	5	5.0	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	5.0 U	0.69 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS
Toluene	1,000	15	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	0.56 J	15 U	15 U	15 U	15 U	15 U	NS
Ethylbenzene	700	5.0	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	5.0 U	0.88 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	NS
m,p-Xylene *	6,000	20	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	0.54 J	20 U	20 U	20 U	20 U	20 U	NS
o-Xylene *	6,000	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.51 J	10 U	10 U	10 U	10 U	10 U	NS
Naphthalene	20	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	10 U	NS
TOTAL DISSOLVED GASES (method RSK175)																						
Methane	1,000	2.0	150	2.0 U	2.0 U	2.0 U	3.0	2.0 U	0.9	2.0 U	2.0 U	2.0 U	2.0 U	24	31	20 U	2.0 U	2.0 U	2.2	**1200**	2.0 U	NS
Ethane	1,000	4.0	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	4.0 U	4.0 U	4.0 U	160 U	4.0 U	NS
Ethene	100	3.0	3.0 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	3.0 U	3.0 U	3.0 U	3.0 U	20 U	3.0 U	3.0 U	3.0 U	120 U	3.0 U	NS

Shaded area with bold numbers indicates MCP RCGW-1 exceedance. - 25

J = Estimated value less than PQL or based on data evaluation of laboratory results

* Regulatory Standard is for total xylenes.

Table 6-3
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 3 of 5)

	Well No.	Reporting Limit	SHL-15	32M-92-01X	32Z-99-02X (32M-92-02X)	32M-92-03X	32M-01-04XBR	32M-01-13XBR	32M-01-14XOB	32M-01-14XBR	32M-01-15XBR	32M-01-16XBR	32M-01-17XBR	32M-01-18XBR	32M-01-18XBR-DUP	32M-01-18XBR-QA	43M-01-16XOB	43M-01-16XBR	43M-01-17XBR	43M-01-17XOB	43M-01-20XOB	43M-01-20XBR
PARAMETERS	MCP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L				
	RCGW-1																					
	ug/L																					
PCBs by EPA8082																						
Aroclor 1016	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1221	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1232	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1242	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1248	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1254	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS
Aroclor 1260	0.3	0.50 to 0.57	0.52 U	0.54 U	0.57 U	0.51 U	0.53 U	0.50 U	0.56 U	0.55 U	0.52 U	0.52 U	0.53 U	0.52 U	0.53 U	0.21 U	0.53 U	0.54 U	0.53 U	0.50 U	0.51 U	NS

Shaded area with bold numbers indicates MCP RCGW-1 exceedance. - **25**

J = Estimated value less than PQL or based on data evaluation of laboratory results

Table 6-3
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 4 of 5)

PARAMETERS	Well No. MCP RCGW-1 ug/L	Reporting Limit ug/L	SHL-16 ug/L	32M-92-01X ug/L	322-99-02X (32M-92-02X) ug/L	32M-92-03X ug/L	32M-01-04XBR ug/L	32M-01-13XBR ug/L	32M-01-14XOB ug/L	32M-01-14XBR ug/L
Extractable Petroleum Hydrocarbons										
EPH Ranges										
C9 - C18 Aliphatics	-	60 to 65	95 B	60 U	100 B	61 B	76 B	110 B	76 B	78 B
C19 - C36 Aliphatics	-	80 to 86	80 U	80 U	110	82 U	80 U	82 U	82 U	84 U
C11-C22 Aromatics	-	170 to 180	170 U	170 U	180 U	170 U	170 U	180 U	170 U	180 U
Target PAH Analytes										
Naphthalene	20	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	300	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Fluorene	300	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	50	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Anthracene	500	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	100	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Pyrene	80	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	1	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Chrysene	2	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	1	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	-	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	0.2	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.5	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	0.5	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	0.5	10 to 11	10 U	10 U	11 U	10 U	10 U	10 U	10 U	10 U

PARAMETERS	32M-01-15XBR ug/L	32M-01-16XBR ug/L	32M-01-17XBR ug/L	32M-01-18XBR ug/L	32M-01-18XBR-DUP ug/L	32M-01-13XBR-CA ug/L	43M-01-16XOB ug/L	43M-01-16XBR ug/L	43M-01-17XBR ug/L	43M-01-17XOB ug/L	43M-01-20XOB ug/L	43M-01-20XBR ug/L
Extractable Petroleum Hydrocarbons												
EPH Ranges												
C9 - C18 Aliphatics	180 B	84 B	75 B	940 B	910 B	31 U	64 B	62 U	73 B	62 U	61 U	NS
C19 - C36 Aliphatics	82 U	82 U	84 U	82 U	82 U	41 U	82 U	82 U	82 U	83 U	82 U	NS
C11-C22 Aromatics	170 U	170 U	180 U	180 U	170 U	87 U	170 U	180 U	180 U	180 U	170 U	NS
Target PAH Analytes												
Naphthalene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Acenaphthene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Fluorene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Phenanthrene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Anthracene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Fluoranthene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Pyrene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Chrysene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	10 U	5.1 U	10 U	10 U	10 U	10 U	10 U	NS

Shaded area with bold numbers indicates MCP RCGW-1 exceedance. - 25

J = Estimated value less than PQL or based on data evaluation of laboratory results

December Sampling Event: Consistent blank contamination (C9-C18 aliphatics) led to a re-extraction outside holding time limits; results reported in this table are from the initial runs.

Table 6-3
Groundwater Analytical Results - December 3-5, 2003 Sampling Event
Devens Areas 32/43A (DRMO/POL Yard)
(SHEET 5 of 5)

	Well No.	Reporting Limit	SHL-15	32M-92-01X	322-99-02X (32M 92-02X)	32M-92-03X	32M-01-04XBR	32M-01-13XBR	32M-01-14XOB	32M-01-14XBR	32M-01-15XBR	32M-01-16XBR	32M-01-17XBR	32M-01-18XBR	32M-01-18XBR-DUP	32M-01-18XBR-QA	43M-01-16XOB	43M-01-16XBR	43M-01-17XBR	43M-01-17XOB	43M-01-20XOB	43M-01-20XBR	32/43A-RB
PARAMETERS	MCP RCGW-1 *	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	ug/L																						
ICP METALS 3010/6010B (Total metals)																							
Arsenic	50	50	149	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20.5	4.1 U	6.6 B	4.7 B	4.1 B	8.8 B	11	4.1 J	4.1 U	4.1 U	4.1 U	32.9	4.1 U	NS	4.1 U
Lead	15	5.0	1.7 B	1.4 U	2.4 B	1.4 B	1.4 U	1.4 U	1.4 U	1.4 U	2.0 B	1.4 U	1.4 U	1.4 U	1.4 U	5.0 U	1.4 U	4.1	1.4 U	1.4 B	1.4 U	NS	1.4 U
Manganese	3,500	-	3,340	10.6 B	14.2 B	28.3	85.7	166	**7840**	79.7	794	6.2 B	3.4 B	**11,000**	**13,800**	**12,000**	7.3 B	39.6	25.6	1,140	2.1 B	NS	5.6 B
ICP METALS 3010/6010B (Field-filtered metals)																							
Arsenic	50	50	**144**	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	8.7 B	4.1 U	8.3 B	8.1 B	3.5 J	4.1 U	4.1 U	4.1 U	38.5	4.1 U	NS	6.1 B
Lead	15	5.0	1.4 B	1.6 B	1.6 B	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 B	1.4 U	1.4 U	1.4 U	1.4 U	5.0 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	NS	1.9 B
Manganese	3,500	-	3,450	5.1 B	6.2 B	25.0	89.0	226	**5410**	60.7	157	6.3 B	6.5 B	**13,800**	**13,300**	**13,600**	3.0 B	24.1	21.0	1,180	1.7 B	NS	2.3 B
TOC by SW846:9060																							
Total Organic Carbon	-		6,700	1,200	1,000 U	1,000 U	1100	1,000 U	1,100	1200	1,900	1,000 U	1,000 U	5,500	5,000	3,430	1,000 U	1,000 U	1,000 U	3,600	1,000 U	NS	232,000
AMMONIA (350.1)																							
Ammonia as N	-	24	17	24 U	25	24 U	24 U	24 U	440	69	24 U	24 U	29	33	51	280 J	40	180	39	200	63	NS	24 U
ALKALINITY, TOTAL																							
as CaCO3	-	10,000	110	40,900	29,600	11,500	151000	166000	165000	151,000	246,000	120,000	166,000	227,000	230,000	250,000	29,600	46,600	129,000	63,900	25,100	NS	2,700
ANIONS (300)																							
Nitrate (as N) by 353.2	-	200	#N/A	#N/A	#N/A	#N/A	#N/A									1,000	1,000	520	1,300	710	2,400	NS	#N/A
Phosphate by 365.2			27	10 U	16	10 U	10 U	19	45	36	66	10 U	10 U	64	25	55	19	69	27	33	10 U	NS	10 U
Sulfate by 375.4	-	1,000	14.7	23,100	35,600	19,900	34,900	23000	28,700	18,900	31,600	42,700	35900	24,500	22,500	20,000	34,500	12100	30,000	11,300	38,700	NS	5,000 U
Sulfide by 376.2			73	20 U	20 U	20 U	20 U	20 U	#N/A	20 U	68	20 U	20 U	43	150	6,000 J	20 U	20 U	20 U	20 U	20 U	NS	20 U
COD (410.4)																							
Chemical Oxygen Demand		50,000	40,600	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	32,200	25,900	29,000	20,000 U	20,000 U	< 10,000	20,000 U	20,000 U	NS	32,200
FIELD PARAMETERS																							
Temperature(deg C) initial		-	12.85	13.20	10.96	13.36	12.39	11.41	11.20	9.57	NS	14.32	11.09	13.40	13.40	13.40	14.92	10.19	12.07	14.23	14.26	NS	NS
Temperature (deg C) final		-	14.99	14.93	11.14	14.59	16.12	8.88	18.56	9.13	NS	15.75	13.39	16.30	16.30	16.30	15.00	14.47	13.89	16.35	16.29	NS	NS
ORP/Eh (mV)			-52.1	223.1	346.4	292.1	246.5	237.8	55.2	250.8	NS	194.5	103.7	45.1	45.1	45.1	246.6	195.2	268.5	160.7	257.2	NS	NS
pH (std units)		-	6.00	5.65	5.88	5.32	6.29	6.53	6.17	6.72	NS	6.16	7.29	6.43	6.43	6.43	5.79	7.05	7.49	5.99	5.76	NS	NS
Specific Conductance		-	249	164	161	96	633	571	462	579	NS	543	544	771	771	771	201	158	411	177	221	NS	NS
Dissolved Oxygen		-	1.10	1.68	9.23	8.16	3.96	2.83	1.17	7.70	NS	2.90	0.44	0.15	0.15	0.15	5.95	1.58	1.63	0.43	8.66	NS	NS

Shaded area with bold numbers indicates MCP RCGW-1 exceedance. : **25**

NS No sample result

U: the analyte concentration was below the number in the table (20 U indicates "below 20 ug/L")

* Site-specific Manganese Cleanup Goal: 3,500 ug/L

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Location Specific

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 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

Authority	Location Specific 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.	

SIGNED COPY

A3a, A10, portions of A24

MDSX SO. DIST. DEEDS
DOCUMENT: 368
DATE: 6-22-00
TIME: 11:35 AM

Quitclaim Deed

Land located in the Devens "Regio Enterprise Zone, Town of Ayer, Middlesex County.

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 Army has 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, successor in interest to the Government Land Bank under Chapter 289 of the Acts of 1998, notice of which was recorded October 7, 1998, with the Worcester County Registry of Deeds at Book 20505, Page 279, and with the Middlesex County, Southern District, Registry of Deeds at Book 29188, Page 568, as the Local Redevelopment Authority, was granted the authority to oversee and implement the civilian reuse of Fort Devens in accordance with a locally approved reuse plan and bylaws; and

WHEREAS, pursuant to a Memorandum of Agreement between the Massachusetts Development Finance Agency and the United States of America, acting by and through the Secretary of the Army dated May 9, 1996 ("MOA"), as may be amended from time to time, the Department of the Army transferred certain portions of Fort Devens to the Massachusetts Development Finance Agency by quitclaim deed dated May 9, 1996, recorded with the Middlesex County, Southern District, Registry of Deeds at Book 26317, Page 003, and with the Worcester County Registry of Deeds at Book 17907, Page 001, a portion of Lease Parcel A-24 by quitclaim deed dated June 6, 1997, recorded with the Middlesex County, Southern District, Registry of Deeds at Book 27380, Page 159, shown on plan titled "Ayer/Harvard, MA. Plan of Land Lot 140" dated June 10, 1997 recorded with the Middlesex County, Southern District, Registry of Deeds at Plan Book 27380, Page 150, a portion of Lease Parcel A3 by quitclaim deed dated November 24, 1997, recorded with the Middlesex County, Southern District, Registry of Deeds at Book 20441, Page 10, shown on plan titled "Plan of Land Conveyed to the Government Land Bank by the Secretary of the Army, Ayer, Harvard, Shirley, MA," dated May 9, 1996 recorded with the Middlesex County, Southern District, Registry of Deeds at Plan Book 500 of 1996 and leased certain other portions of Fort Devens (the "Lease Parcels") to the agency through a Lease in Furtherance of Conveyance ("Lease"), pending the completion of certain environmental clean-up activities on the Lease Parcels; and

WHEREAS, the terms of the MOA provide, among other things, that upon the completion of the environmental clean-up of any of the Lease Parcels pursuant to: applicable law, the approval by the Department of the Army of a Finding of Suitability of Transfer ("FOST"), and in accordance with Department of Defense policy guidance, the Department of the Army will convey said Lease Parcel(s) to the Massachusetts Development Finance Agency for consideration of less than one hundred dollars ($100.00);

Return to:
Scott T. Fenton, Esq.
Mass Development
75 Federal Street

EBS 00062 DCC

WHEREAS, the FOST for Lease Parcel A10 and the remainder of A24 and A3 (referred to hereinafter as "A3a"), as said Lease Parcels are 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," dated May 9, 1996, said plan being recorded with the Worcester County Registry of Deeds at Plan Book 703, Plan 112, and with the Middlesex County, Southern District, Registry of Deeds, as Plan 500 of 1996;

WHEREAS, the Massachusetts Development Finance Agency has requested and the Department of the Army has agreed to transfer Lease Parcels A3a, A10 and the remainder of A24 to the Massachusetts Development Finance Agency, in accordance with the terms set forth hereunder.

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 ("Army"), under and pursuant to the Defense Base Closure and Realignment Act of 1990, Public Law 101-510, as amended, and codified at 10 U.S.C. sec. 2687 (the "BRAC Law") and the Federal Property and Administrative Service Act of 1949, as amended, and codified at 40 U.S.C. sec. 584, for the utilization and disposal of excess and surplus property at closing and realignment bases, 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 County Registry of Deeds at Book 20505, Page 279, and with the Middlesex County, Southern District, Registry of Deeds at Book 29188, Page 568, having its principal place of business at 75 Federal Street, 10th Floor, Boston, Massachusetts 02110, and its successors and assigns, all its right, title, and interest in and to Lease Parcel A3a, A10 and a portion of A24 located in the Town of Ayer, Middlesex County (the "Property"), which lease parcels are more particularly described in Exhibit A, attached hereto and made a part hereof, said Property also being described in a Notice of Lease dated May 9, 1996, recorded with the Middlesex County, Southern District, Registry of Deeds in Book 26340, Page 168, and with the Worcester County Registry of Deeds in Book 17922, Page 223. 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 said lease shall remain in full force and effect with regard to the other lease parcels not being conveyed hereunder.

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; and

d. all mineral rights.

The legal description of the Property has been provided 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 Sections 120(h)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. Section 9601 et seq. ("CERCLA"):

A. 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 set forth in Exhibit B, Finding of Suitability to Transfer ("FOST") for Lease Parcel A3a dated April 2000, A10 dated April 2000 and A24 dated February 1997, attached hereto and made a part hereof. The information regarding the storage, release, and disposal indicates that: (i) there is no threat to human health and the environment; and (ii) Lease Parcel A3a will be subject to one or more institutional controls, as further discussed below.

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. 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 Property.

II. Access Rights under the Comprehensive Environmental Response, Compensation and Liability Act, as amended (42 U.S.C 9601 et seq.) ("CERCLA").

The Grantor hereby reserves 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 easement and shall, to the extent reasonable, consistent with the FFA 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") 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, acting by and through the Department of Environmental Protection ("DEP") 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 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, EPA and DEP shall give the Grantee or its successors or assigns reasonable notice or 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 Grantee, 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 Grantor assumes no liability to the Grantee, its successor, 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 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 for the Property, (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 DEP 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 Lease Parcel A3awhich are required by any record of decision ("ROD") or amendments thereto, related to Lease Parcel A3a, 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 for 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 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.

F. 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.

G. 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 United States that all remedial action is complete at the Fort Devens NPL site.

IV. Institutional Controls on Lease Parcel A3a

A. Lease Parcel A3a requires certain institutional controls to prohibit the use of ground water.

B. The Grantor is conveying Lease Parcel A3a and the Grantee is taking subject to following institutional controls:

(i) no extraction of ground water for industrial and/or potable purposes; and

(ii) the implementation of a long-term groundwater monitoring plan to be developed by the Grantor and approved by EPA and DEP, a copy of which along with any future amendments shall be provided to the Grantee, its successors and assigns.

C. The Grantor shall have access to and over said lease parcel as may be necessary and/or required to ensure such institutional controls are in place.

D. The Grantee agrees that notwithstanding any other provision of the Deed, the Grantor assumes no liability to the Grantee, its successor, or assigns, or any other person, should implementation of the institutional controls 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 any officer, agent, employee, or contractor thereof.

E. The Grantee and all subsequent transferees shall include the provisions of this Section IV 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.

F. The institutional controls identified in this Paragraph IV may be modified and/or terminated only after the receipt of prior written approval of the EPA, DEP, and the Army and only after the proponent demonstrates that there is no longer a risk to human health and the environment.

V. Environmental Baseline Survey ("EBS") and Finding of Suitability to Transfer ("FOST").

The Grantee has received the technical environmental reports, including the Final Base-Wide EBS dated March 1996 and the FOST(s) for Lease Parcel A3a and A10 dated February 2000 and Lease Parcel A24 dated February 1997, 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 based on the FOSTs and ROD 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 final base-wide EBS, Grantee or its successor or assigns shall be responsible for such release or newly discovered substance unless the Grantee is able to demonstrate that such release or such newly discovered substance was due to the Grantor's 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 was predicated on release of any hazardous substance on the Property occurring after the conveyance, where such substances were placed on the Property by the Grantee, or its agents, employees, invitees, or contractors, after the conveyance.

VI. "As Is"

All of the Property and personal property is conveyed under this Deed 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, unless otherwise noted hereunder.

VII. Wetlands and Floodplains

A. General Provisions

The Property may contain 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 wetland, 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 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 Massachusetts Department of Environmental Protection ("DEP").

C. Enforcement

The Grantee covenants for itself, its successors, and assigns that it shall include, and otherwise make legally binding, the restrictions in this Section VII 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 VII shall run with the land. The restrictions in this Section VII 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 restrictions provided for in this Section VII, 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 (it being agreed that the Grantor and the 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.

VIII. Notice of the Presence of Underground Storage Tanks ("USTs")

A. The Grantee is hereby informed and does acknowledge that USTs have been located on the Property, as described in the final base-wide EBS and 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 final base-wide EBS, the receipt of which the Grantee hereby acknowledges.

X. Notice of Unexploded Ordnance ("UXO")

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 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.

XI. Notice of Lead-Based Paint

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 16.11d. of the Lease, and in the Base-wide FOST. Lead from paint, paint chips, and dust can pose health hazards if not managed properly. The provisions of this Section XI shall apply only to the extent the presence of lead-based paint was disclosed in either the Base-wide FOST or the individual FOSTs for Lease Parcels A3a, A10 and A24.

B. The Grantor acknowledges that the Grantee, with the Grantor's prior approval, undertook and completed the demolition of all existing buildings located on the Property.

C. The Grantee acknowledges that it received the opportunity to conduct its own risk assessment and inspect the buildings for the presence of lead-based paint prior to demolition. The Grantee represents that it complied with all applicable solid or hazardous waste laws that may apply to any lead-paint wastes that may have been generated during the course of such lead-based paint abatement or demolition activities.

D. The Grantee covenants and agrees to be responsible for any future remediation of lead-based paint or lead-based paint hazards on the Property found to be necessary as result of the Grantee's activities on the Property. The Grantee agrees to be responsible for any future abatement and/or disposal of lead-based paint identified in the Base-Wide FOST, which is determined to be necessary on the Property, after the date of the Lease.

E. 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 the Lease.

F. 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 attorney's 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 lead based paint or lead based paint hazards on the Property.

XII. Notice of the Presence of Asbestos

A. The Grantee is hereby informed and does acknowledge that the buildings located on the Property contained friable and non-friable asbestos or asbestos-containing materials ("ACM") as identified in Section 16.11.c of the Lease and in the Base-wide FOST. The provisions of this Section XII shall apply only to the extent the asbestos and/or ACM was disclosed in either the Base-wide FOST or the individual FOSTs for Lease Parcels A3a, A10 and A24.

B. The Grantor acknowledges that the Grantee, with the Grantor's prior approval, undertook and completed the demolition of all existing buildings located on the Property. The Grantee acknowledges that it was given the opportunity to inspect the buildings as to the asbestos condition and content thereto prior to accepting the responsibilities imposed upon the Grantee under this section. The failure of the Grantee to inspect, or to be fully informed as to the asbestos condition of all or any portion of the property offered will not constitute grounds for any claim or demand against the United States, or any adjustment under this Deed or the Memorandum of Agreement between the Grantor and the Grantee. The Grantee represents that it complied with all applicable federal, state and local laws relating to the remediation and disposal of asbestos and/or asbestos containing materials that may have been generated during the course of the demolition of the buildings.

C. 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.

D. The Grantee agrees to be responsible for any future remediation of asbestos identified in the Base-Wide FOST, which is determined to be necessary on the Property, after the date of the Lease. The Grantee covenants and agrees to be responsible for any future remediation of asbestos on the Property. 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 the Lease, which was disclosed in the Base-Wide FOST.

E. 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 predicted upon, exposure to asbestos, identified in the Base-wide FOST, on any portion of the Property which exposure occurs after the date of Lease, or any future remediation or abatement of asbestos on any portion of the Property or the need therefor, which was identified in the Base-Wide FOST as being present on the Property. The Grantee's obligation hereunder shall apply whenever the United States incurs costs or liabilities for actions giving rise to liability under this section.

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.

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 after the date of the lease between the Grantor and the Grantee, 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.

IN WITNESS WHEREOF, the Grantor hereunder sets its hand and seal as of the 13th day of June, 2000.

UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY

By: Paul W. Johnson
Name: Paul W. Johnson
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, 2002, do hereby certify that this day personally appeared before me in the Commonwealth of Virginia, County of Arlington, Paul W. Johnson, Deputy Assistant Secretary of the Army (I&H), whose name is signed to the foregoing instrument and acknowledged the foregoing instrument to be his free act and deed, dated this 13th day of June 2000 and acknowledged the same for and behalf of the UNITED STATE OF AMERICA

Karen A. Cooper
Notary Public
My Commission Expires: 30 November 2002

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 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 21st day of June, 2000.

MASSACHUSETTS DEVELOPMENT FINANCE AGENCY

By: ______________________
Name: Michael P. Hogan
Title: Executive Director

COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss   June 21, 2000

Then personally appeared the above named Michael P. Hogan, Executive Director 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: Scott T. Fenton
My Commission expires: 5/7/04

____
Approved as to Form
Agency Counsel

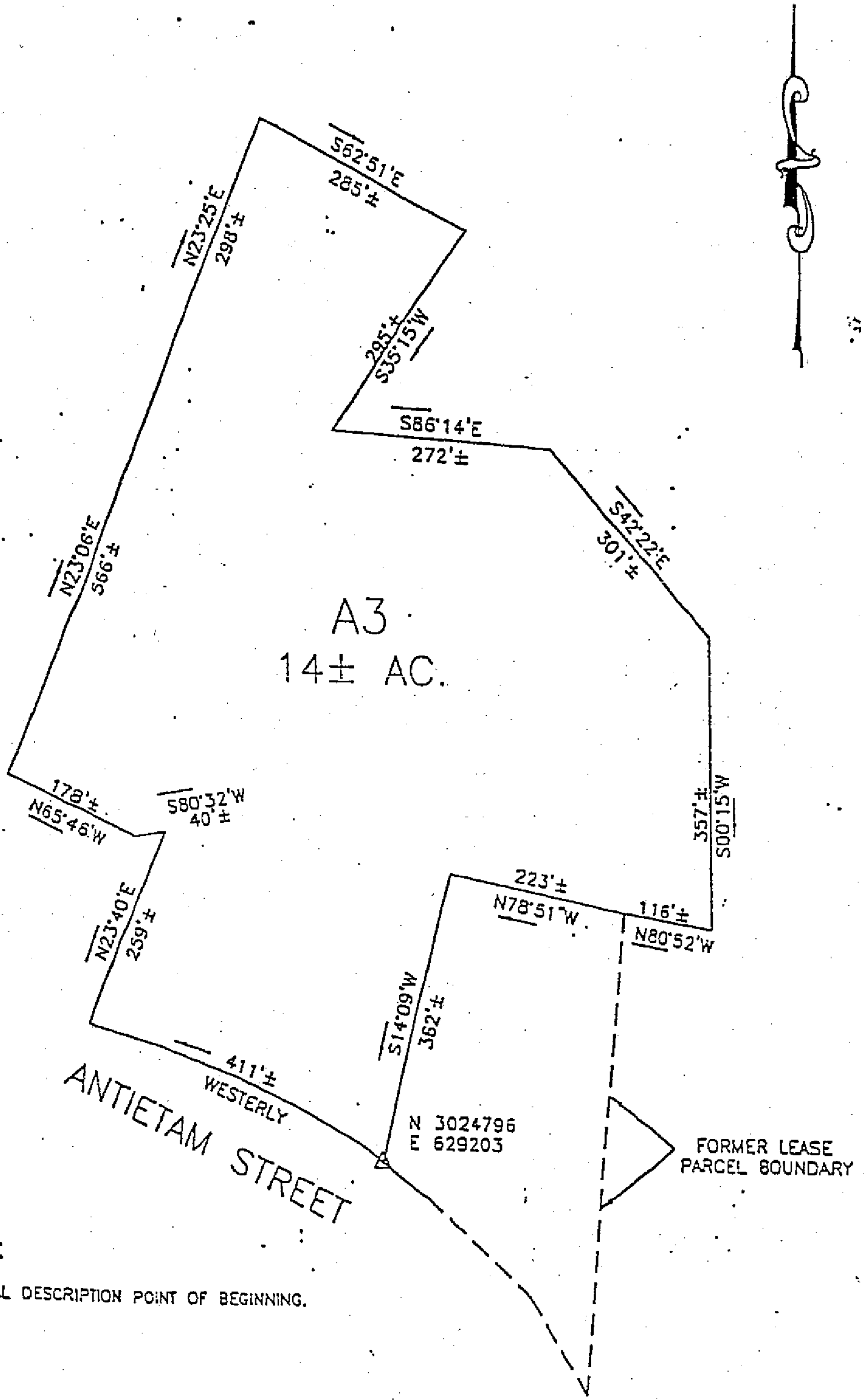
Attachment A: Legal Property Description

Legal Description
Lease Parcel A3a

A certain parcel of land located in the Town of Ayer, Middlesex County, MA, known as Lease Parcel A3, beginning at a point with the NAD coordinates (+/- 50') N3024796, E629203.

- Thence running westerly along Antietam Street five courses totaling four hundred and eleven feet +/-, (411' +/-) to a point;
- Thence turning and running North along Cook Street N23 degrees 40'E, two hundred and fifty nine feet +/-, (259' +/-) to a point;
- Thence S80 degrees 32'W, forty feet +/-, (40' +/-) to a point on the opposite side of Market Street;
- Thence N65 degrees 46'W, one hundred and seventy eight feet +/-, (178' +/-) to a point;
- Thence N23 degrees 06'E, five hundred and sixty six feet +/-, (566' +/-) to a point;
- Thence N23 degrees 25'E, two hundred and ninety eight +/-, (298' +/-) to a point;
- Thence S62 degrees 51'E, two hundred and eighty five feet +/-, (285' +/-) to a point;
- Thence S35 degrees 15'W, two hundred and ninety five feet +/-, (295' +/-) to a point;
- Thence S86 degrees 14'E, two hundred and seventy two feet +/-, (272' +/-) to a point;
- Thence S42 degrees 22'E, three hundred one feet +/-, (301' +/-) to a point;
- Thence S00 degrees 15'W, three hundred and fifty seven feet +/-, (357' +/-) to a point;
- Thence N80 degrees 52'W, one hundred and sixteen feet +/-, (116' +/-) to a point;
- Thence N78 degrees 51'W, two hundred and twenty three feet +/-, (223' +/-) to a point;
- Thence S14 degrees 09'W, three hundred sixty two feet +/-, (362' +/-) to the point of beginning.

Said parcel contains 14 acres +/-.



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

HOWE SURVEYING
ASSOCIATES, INC.

CIVIL ENGINEERS
&

PLAN OF REV. LEASED PARCEL A3
CONVEYED TO THE GOVERNMENT
LAND BANK, AYER, MA

PREPARED FOR:

THE GOVERNMENT LAND BANK

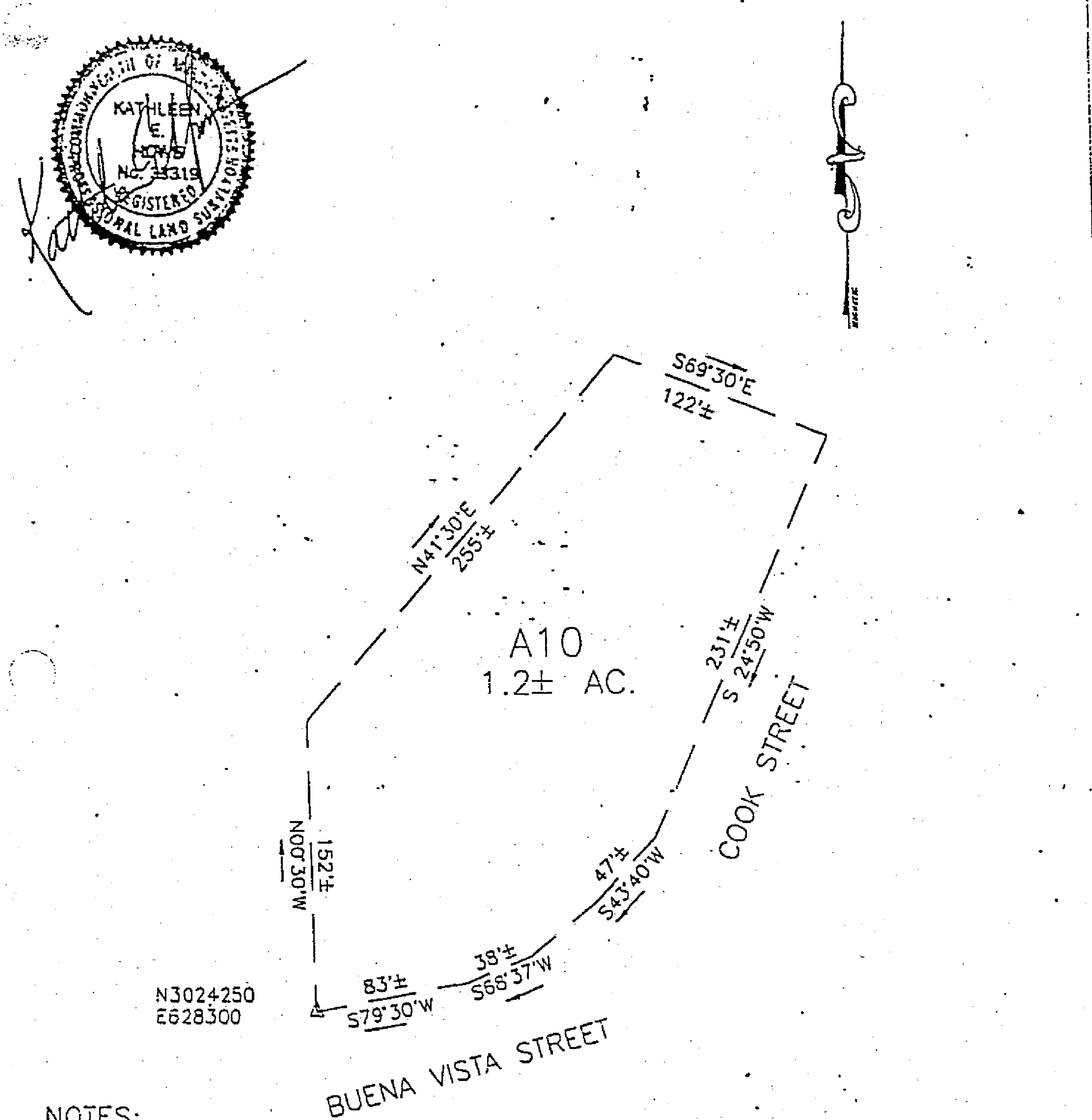
Attachment A: Legal Property Description

Legal Description
Lease Parcel A10

A certain parcel of land located in the Town of Ayer, Middlesex County, MA, known as parcel A10 located on the north side of Buena Vista, beginning at a point with the NAD coordinates (+/-) N3024250, E628300).

- Thence N00 degrees 30'W, one hundred and fifty two feet +/- (152'+/-) to a point;
- Thence N41 degrees 30'E, two hundred and fifty five feet +/-, (255' +/-) to a point;
- Thence S69 degrees 30'E, one hundred and twenty two feet +/-, (122' +/-) to a point on the west sideline of Cook Street;
- Thence along Cook Street S24 degrees 50'W, two hundred and thirty one feet +/-, (231' +/-) to a point;
- Thence still along Cook Street S43 degrees 40'W, forty seven feet +/-, (47'+/-)to a point on the north side of Buena Vista Street;
- Thence along Buena Vista Street S68 degrees 37'W, thirty eight feet +/-, (38' +/-) to a point;
- Thence still along Buena Vista Street S79 degrees 30'W, eighty three feet +/-, (83' +/-) to the point of beginning.

Said parcel contains 54,280 square feet +/- or 1.2 acres+/-.



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

CIVIL ENGINEERS & LAND SURVEYORS

HOWE SURVEYING ASSOCIATES, INC.

[illegible] BUENA VISTA STREET
BUILDING [illegible], SUITE [illegible]
FORT DEVENS, MA [illegible]
[illegible]

73 PRINCETON STREET
NO. CHELMSFORD MA [illegible]
[illegible]

PLAN OF LEASED PARCEL A10
CONVEYED TO THE GOVERNMENT
LAND BANK, AYER, MA

PREPARED FOR:

THE GOVERNMENT LAND BANK

DATE: [illegible]

SCALE: [illegible]

Attachment A: Legal Parcel Description and Plan of Transfer Parcel

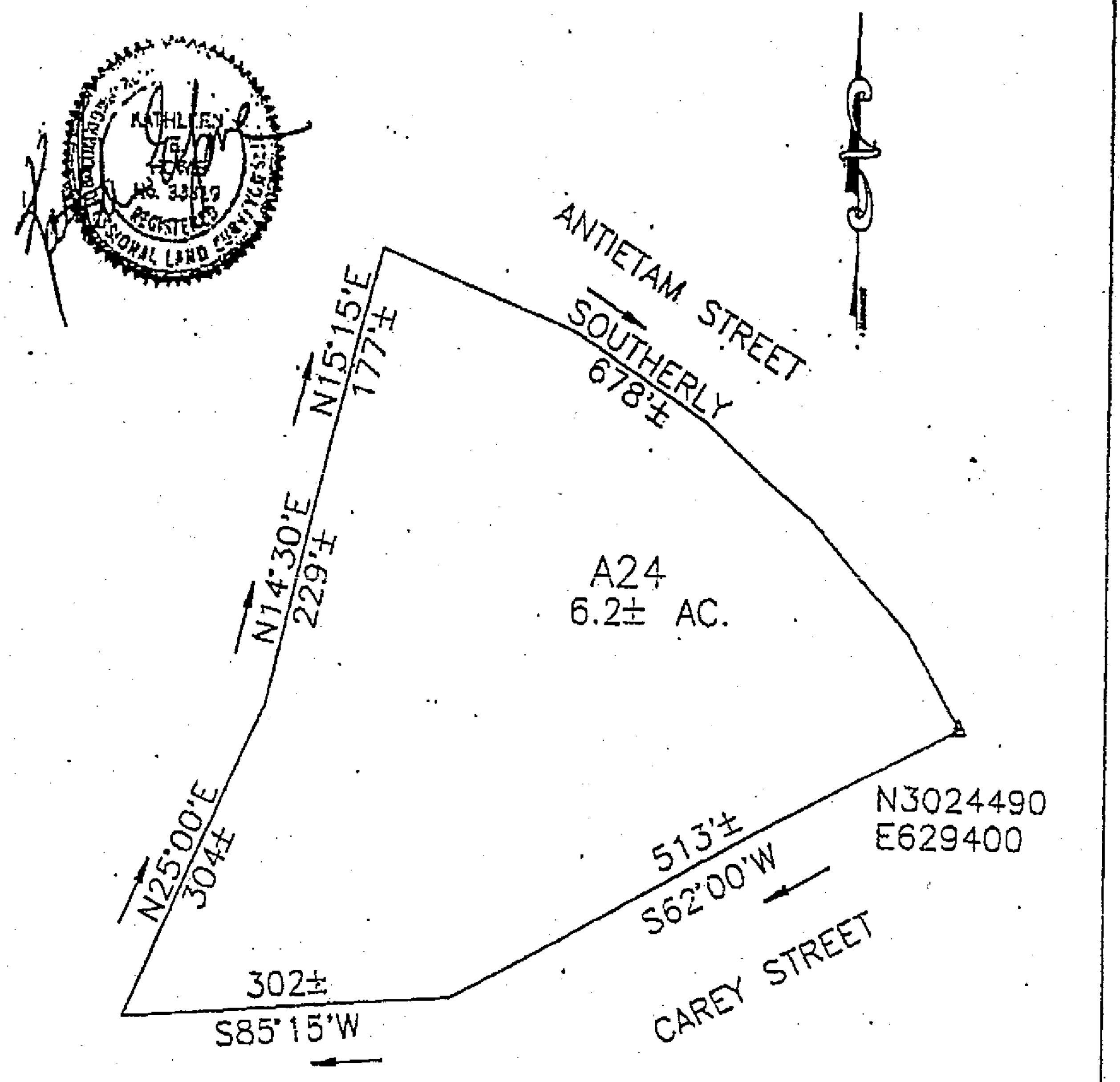
A24

Legal Description SA 33, SA 34, SA 35, AREE 61A, AREE 61AD, AREE 63B, and AREE 63BL

Located on the south sideline of Antietam Street, and the north sideline of Carey Street, beginning at a point with the NAD coordinates (± 50') N3024490, E629400.

- Thence along the north sideline of Carey Street S62° 00'W, five hundred and thirteen feet p (513' ±) to a point;
- Thence S85° 15'W, three hundred and two feet ±, (302' ±) to a point;
- Thence N25° 00'E, three hundred and four feet ±, (304' ±) to a point;
- Thence N14° 30'E, two hundred and twenty nine feet ±, (229' ±) to a point;
- Thence N15° 15'E, one hundred and seventy seven feet ±, (177' ±) to a point on the south sideline of Antietam Street;
- Thence southerly along the south side of Antietam Street, six hundred and seventy eight feet ±, (678' ±) to the point of beginning.

Said parcel contains 6.2 acres ±. Said parcel also contains Buildings 247, 254, 258, 259, and 262.



NOTES:

1. △ = LEGAL DESCRIPTION POINT OF BEGINNING.

CIVIL ENGINEERS & LAND SURVEYORS

HOWE SURVEYING ASSOCIATES, INC.

PLAN OF LEASED PARCEL A24 CONVEYED TO THE GOVERNMENT LAND BANK, AYER, MA

PREPARED FOR

THE GOVERNMENT LAND BANK

DATE [illegible]-1996

SCALE 1"=150'

Attachment C: Table of Hazardous Substances and Status at AOC 32

Finding Of Suitability To Transfer
14 Acre Parcel A3a
Table 1

c	Hazardous Substance Environmental Concerns	Disposal Storage Release	Quantity	Dates	CASRN No.	RCRA Waste No.	Regulatory Synonym	Site Status
)C 32	1. Scrap metal, vehicles, tires, office equipment. 2. Batteries 3. Transformers / Capacitors containing PCB's 4. Accumulation point for photographic solutions 5. Motor Oil 6. PAH's 7. Metals 8. Lead 9. PCB's	Storage/ Release Media Affected: Soil, GW Asphalt	1. Unknown 2. 40,000 lbs/month 3. Unknown 4. Unknown 5. Unknown 6. Unknown 7. Unknown 8. Unknown 9. Unknown	1964-1995	1. Unknown 2. Unknown 3. 1336363 4. Unknown 5. Unknown 6. N/A 7. Unknown 8. 7439921 9. 1336363	1. Unknown 2. Unknown 3. N/A 4. Unknown 5. Unknown 6. N/A 7. Unknown 8. Unknown 9. N/A	1. Unknown 2. Unknown 3. Unknown 4. Unknown 5. Unknown 6. N/A 7. Unknown 8. Unknown 9. Unknown	RI&FS Jan 1997 ROD Feb 1998 Work Plan Nov 1998 1300 cy soil removed Nov 1998 GW monitoring wells installed 1992,1993, 1998,1999 Remedial Action working properly & successfully July 1999

:s: CASRN=Chemical Abstracts Registration Number
FS=Feasibility Study
N/A=Not Applicable
GW=Ground Water

PPM=Parts Per Million
RCRA=Resource Conservation and Recovery Act
RI=Remedial Investigation
ROD=Record Of Decision

Attachment C: Table of Hazardous Substances and Status at AOC 43A

Finding Of Suitability To Transfer
14 Acre Parcel A3Q

Table 2

:	Hazardous Substance/ Environmental Concerns	Disposal Storage Release	Quantity	Dates	CASRN No.	RCRA Waste No.	Regulatory Synonym	Site Status
C \	1. Gasoline 2. 12000 gal UST (3) 3. 12000 gal UST (2) 4. 8000 gal AST (2) 5. TPHC 6. BTEX 7. Lead 8. Arsenic 9. Other inorganics Barium Calcium Cobalt Chromium Copper Iron Potassium Magnesium Manganese Sodium Nickel Vanadium Zinc	Storage/ Release Media Affected: Soil, GW	800 cy of contaminated soil removed in 1989 and 1990. 5. 1200 ppm soil, 23000 ppm GW. 6. BTEX 7600 ppm total. 7. 176 ppm lead 8. 650 ppm Arsenic in GW	Unknown installation AST's removed between 1965 and 1972. 4 (12,000gal) UST's and 1 (10,000gal) UST removed in 1989 and 1990.	1. Unknown 2. N/A 3. N/A 4. N/A 5. Unknown 6. Unknown 7. 7439921	1. Unknown 2. Unknown 3. Unknown 4. Unknown 5. Unknown 6. Unknown 7. N/A 8. N/A 9. Unknown	NA	RI & FS Jan 1997 ROD Feb 1998 Work Plan Nov 1998 GW monitoring wells installed 1992,1993, 1998,1999 Remedial Action working properly & successfully July 1999

es: CASRN=Chemical Abstracts Registration Number
FS=Feasibility Study
N/A=Not Applicable

PPM=Parts Per Million
ROD=Record Of Decision
RI=Remedial Investigation

Attachment D: Institutional Controls

A3a

Institutional Control Implementation and Monitoring

AOC 32 Soil

The Removal Action for AOC 32 conducted by the Army in October and November 1998 has permanently achieved three of the four remedial action objectives specified in the Record of Decision. The final confirmation data results indicate that not only were cleanup levels met, sample concentrations were actually lower then the more conservative MCP S-1 criteria. The fourth remedial action objective is to monitor the groundwater and review the site after five years. This objective will be met as part of the groundwater long-term monitoring.

AOC 32 and 43A Groundwater

One of the major components of the remedial action for AOC 32 Groundwater Operable Unit and AOC 32/43A Groundwater Operable Unit is the implementation of institutional controls. The human health risk at these two Groundwater Operable Units is associated with the consumption of unfiltered groundwater. Due to the thin saturated overburdened aquifer under AOC 32, the use of groundwater is impractical. Nevertheless, institutional controls will be implemented at AOC 32 and 43A to limit the potential exposure to the groundwater under both existing and future site conditions. These institutional controls will ensure that exposure to and the extraction of groundwater from the site for industrial and/or potable water supply would not be permitted. The institutional controls for AOC 32 and 43A will be incorporated either in full or by reference into all deeds, easements, mortgages, leases or any other instruments of transfer.

Institutional Controls

When the parcels containing AOC 32 and 43A are transferred by the Army, institutional controls will be consisted of in their respective conveyance documents as necessary and appropriate under Section 120 of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and Massachusetts General Law (M.G.L.) 21E. The conveyance documents will include the following:

a. Language ensuring that groundwater will not be extracted and used for industrial and/or potable water supply;

b. Language barring the installation of any drinking water wells on the AOCs;

c. Language ensuring that any grantee, successor and/or assignee shall comply with the institutional controls established in the conveyance documents;

d. A provision requiring the grantee, successor and/or assignee to obtain prior approval from EPA, Department of Environmental Protection (MADEP) and MassDevelopment for any modification to, or release of, institutional controls;

e. A provision requiring the proper recording of the institutional controls and any future modification or release of any institutional controls; and

f. A provision requiring annual monitoring and inspection of the AOCs to ensure that the institutional controls are being followed.

Institutional Control Monitoring

Existing land use and site conditions will be evaluated annually to ensure that the institutional control requirements are still being met. This inspection will be conducted as part of the long-term groundwater monitoring. If the future proposed land use at AOC 32 and 43A is inconsistent with these institutional controls, then the site exposure scenarios to human health and the environment will be re-evaluated at the five-year reviews to ensure that this response action is appropriate. Institutional control inspections will include the checklist components described in the following subsections.

Interview

The groundwater monitoring field crew leader will contact the property owner of the site, its manager or other designee with knowledge of the day-to-day activities of the property to make arrangements for groundwater sampling and to review compliance with the institutional controls. As part of the review, the monitoring crew will inquire regarding:

a. The owner's familiarity regarding institutional controls imposed upon the property and documentation of these controls.

b. Source of public drinking water for the property.

Physical On-Site Inspection

After the monitoring crew has contacted the property owner, groundwater monitoring will be performed as well as a physical on-site inspection of the property to determine compliance with the institutional controls. The physical on-site inspection shall include examination for evidence that there have been no groundwater extraction wells installed on the premises.

After the inspection is complete, the Army will provide a copy of the annotated inspection checklist, a written summary of the findings and all supporting documentation to the Devens Enterprise Commission (DEC), DEP, EPA, and MassDevelopment. This inspection report will be transmitted with the annual report. The inspection report shall explain the basis of any known or suspected violation identified during the inspection.

In the event the DEC, MADEP, EPA, MassDevelopment and/or the Army determines that any owner of, and/or tenant at is not complying with the institutional controls, then such party shall provide written notice to the owner and the other parties of such alleged violation. Upon such determination or notification the DEC, EPA, MADEP, MassDevelopment and/or the Army may take independent enforcement action against such owner and/or tenant pursuant to any applicable federal, state or local law, regulation, rule, permit, policy and/or ROD. Failure by the DEC, MADEP, EPA and/or MassDevelopment to provide such notification to the Army shall not give rise to any defense either in law or in equity in any cost recovery action or other action arising out of such non compliance.

Attachment C: Table of Hazardous Substances and Status of AREE 61AB
Finding Of Suitability To Transfer
1.2 Acre Parcel A10
Table 1

Site	Hazardous Substance Environmental Concerns	Disposal Storage Release	Quantity	Dates	CASRN No.	RCRA Waste No.	Regulatory Synonym	Site Status
AREE 61AB	1. Unpaved Parking Area 2. Maintenance Facility 3. Oil Water Separator/Catch basin/Dry Well 4. Satellite Accumulation Area for speedi dry, antifreeze, used motor oil filters, grease tubes, and 55 gal drums, degreasers, and fuel additives 5. Waste oil UST 1000 gal 6. 250 gal kerosene AST 7. 5000 gal diesel AST 8. 10000 gal gasoline AST 9. 2-methyl napthalene 10. TPHC 11. 2,2-bis(p-chlorphenyl-1,1 chloroethene (p,p'-DDE) 12. 2,2-bis(p-chlorophenyl)-1,1,1-trichlorethane (p,p'-DDT) 13. 2,2-bis(p-chlorophenyl)-1,1,1-trichlorothane (p,p'-DDT) 14. Chrysene	Storage/ Release Media Affected: Possibly GW	1. Unknown 2. Unknown 3. 4310 ppm TPHC 4. Unknown 5. 1000 gal removed 1992 6. In Place 7. 5000 gal removed 1992 8. 10000 gal removed 1992 9. Unknown 10. 4310 ppm soil 11. 30 ppm 12. 10 ppm 13. 20 ppm 14. .2 ppm	1934	9. Unknown 10. Unknown 11. 72548 12. 72559 13. 50293 14. 218019	9. Unknown 10. Unknown 11. U060 12. NA 13. U061 14. U050	9. Unknown 10. Unknown 11. Unknown 12. Unknown 13. Unknown 14. 1,2-Benzphenanthrene	Removal Site Evaluation 1996 150 cy soil removed Nov. 1998 Draft NFA Feb. 1999

Notes: CASRN=Chemical Abstracts Registration Number
FS=Feasibility Study
N/A=Not Applicable
NFAD=No Further Action Decision Document
RA=Removal Action
RI=Remedial Investigation
ROD=Record of Decision
SI=Site Investigation

Finding of Suitability to Transfer

Fort Devens

Parcel A.24

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
SA 34 Buildings 245 and 246	1: Chlordane 2: 2,4,5-TP (herbicide) 3: PAHs 4: 2,4-D (herbicide) 5: DDE 6: DDD 7: DDT	Storage	1: 46-110 ppm 2: 0.02 ppm 3: <10 ppm 4: 0.03 ppm 5: <1.0 ppm 6: <1.0 ppm 7: <10 ppm	1940s to 1980s	1: 57749 2: N/A 3: N/A 4: N/A 5: 72559 6: 72548 7: 50293	1: U036 2: N/A 3: N/A 4: N/A 5: N/A 6: U060 7: U061	1: Chlordane, alpha-gamma isomers, chlordane, technical 2: N/A 3: N/A 4: N/A 5: 4,4' DDE 6: Benzene, 1,1'-(2,2-dichloroethylidene) bis 7: Benzene, 1,1'-(2,2,2,trichloroethylidene) bis (4chloro-4,4'DDT)	NFA DD 9/96
SA 35 Building 254	1: PAHs 2: Organochlorine pesticides 3: Organophosphorus pesticides 4: Metals	Storage	1: Detected in surface soils 2: Detected in surface soils 3: Detected in surface soils 4: Detected in surface soils	1940s to 1990s	1: N/A 2: N/A 3: N/A 4: N/A	1: N/A 2: N/A 3: N/A 4: N/A	1: N/A 2: N/A 3: N/A 4: N/A	NFA DD 11/95

Notes: CASRN = Chemical Abstracts Registration Number
DD = Decision Document
GW = Ground Water
N/A = Not Applicable
NFA = No Further Action
ppm = Parts Per Million
RCRA = Resource Conservation and Recovery Act
TPH = Total Petroleum Hydrocarbon
TRPH = Total Recoverable Petroleum Hydrocarbons
VOC = Volatile Organic Compound

Finding of Suitability to Transfer

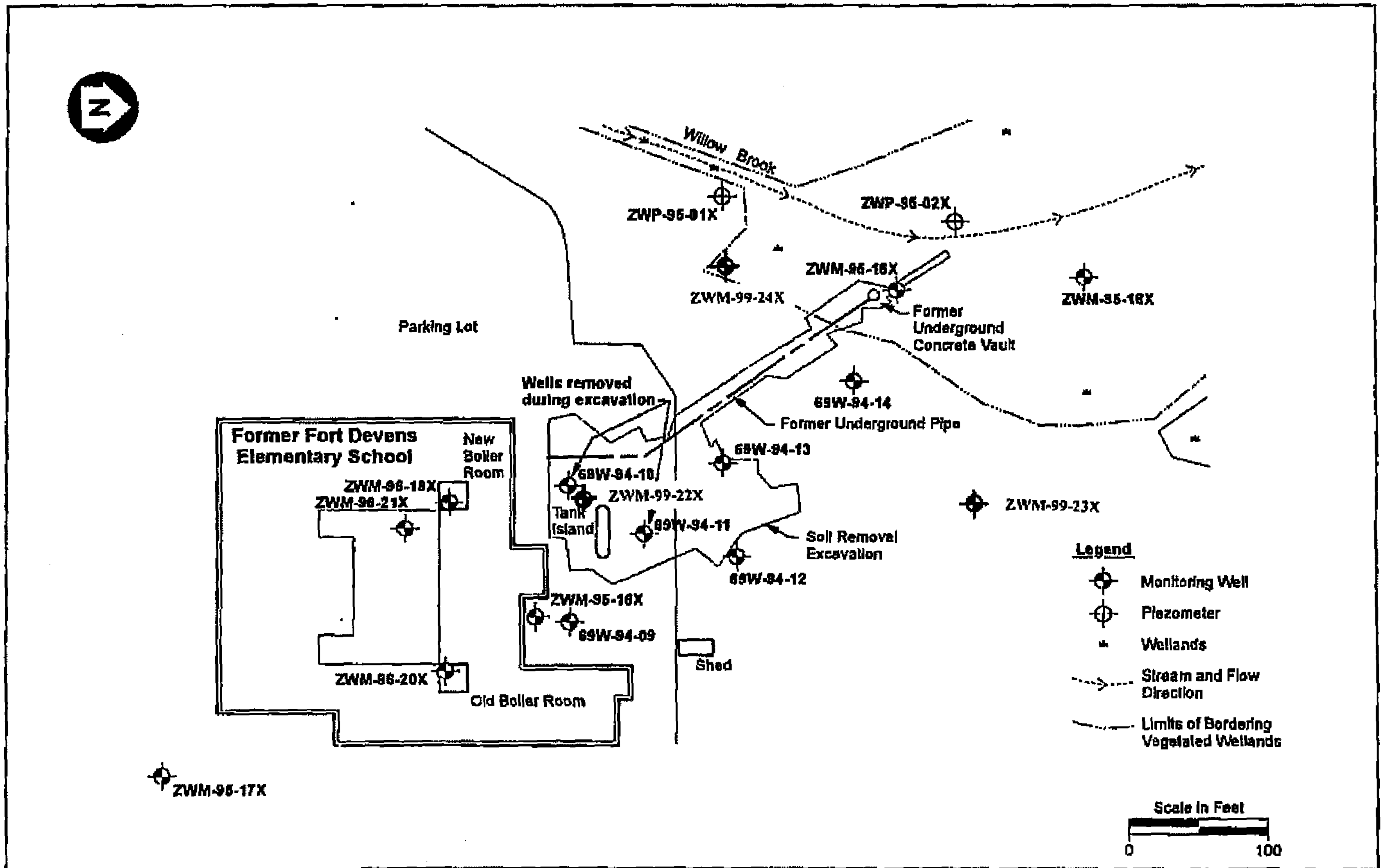
Table 1: Fort Devens

Parcel A.24

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 61A Building 242	1: 1,000-Gallon No. 2 Fuel Oil UST 2: TPH 3: 2,methyl naphthalene 4: cPAHs a: benzo(a)anthracene b: benzo(a)pyrene c: benzo(b)fluoranthene d: benzo(k)fluoranthene e: chrysene f: dibenzo(a,h)anthracene	Storage	1: Tank removed 2: >500 ppm 3: 0.8 ppm 4: Total = 33.09 ppm	Tank in ground 1940s to 1996	1: N/A 2: N/A 3: N/A 4: a: 56553 b: 50328 c: 205992 d: 207089 e: 218019 f: 53703	1: N/A 2: N/A 3: N/A 4: a: U018 b: U022 c: N/A d: N/A e: U050 f: U063	1: N/A 2: N/A 3: N/A 4: a: Benz(a)anthracene, 1,2--Benzanthracene b: 3,4-Benzopyrene c: N/A d: N/A e: 1,2-Benzphenathrene f: Dibenz(a,h)anthracene, 1,2:5,6-Dibenzanthracene	NFA DD 1/97
AREE 61AD Building 247	1: 1,000-Gallon No. 2 Fuel Oil UST	Storage	1: NA	1984 to present	1: N/A	1: N/A	1: N/A	NFA DD 10/95
AREE 63B Building 242	1: 1,000-Gallon Waste Oil UST 2: TPH 3: Methylene chloride	Storage	1: Tank removed 2: >500 ppm 3: <20 ppm	Tank inground 1940s to 1992	1: N/A 2: N/A 3: 75092	1: N/A 2: N/A 3: U060	1: N/A 2: N/A 3: Methane,dichloro	NFA DD 1/96
AREE 63BL Building 242	1: 4 4,000-Gallon Gasoline USTs 2: TPH	Storage	1: Tanks removed 2: >500 ppm	Tanks inground 1940s to 1992	1: N/A 2: N/A	1: N/A 2: N/A	1: N/A 2: N/A	NFA DD 1/96
SA 33 Building 262	1: VOCs 2: PAHs 3: Organochlorine pesticides 4: Organo phosphorus pesticides 5: Herbicides	Storage and Release	1: 1,.2 to 1.5 ppm 2: <10 ppm 3: Detected in surface soils 4: Detected in surface soils 5: Detected in surface soils	1984 to early 1990s	1: N/A 2: N/A 3: N/A 4: N/A 5: N/A	1: N/A 2: N/A 3: N/A 4: N/A 5: N/A	1: N/A 2: N/A 3: N/A 4: N/A 5: N/A	NFA DD 3/96

APPENDIX G

AOCS 69W

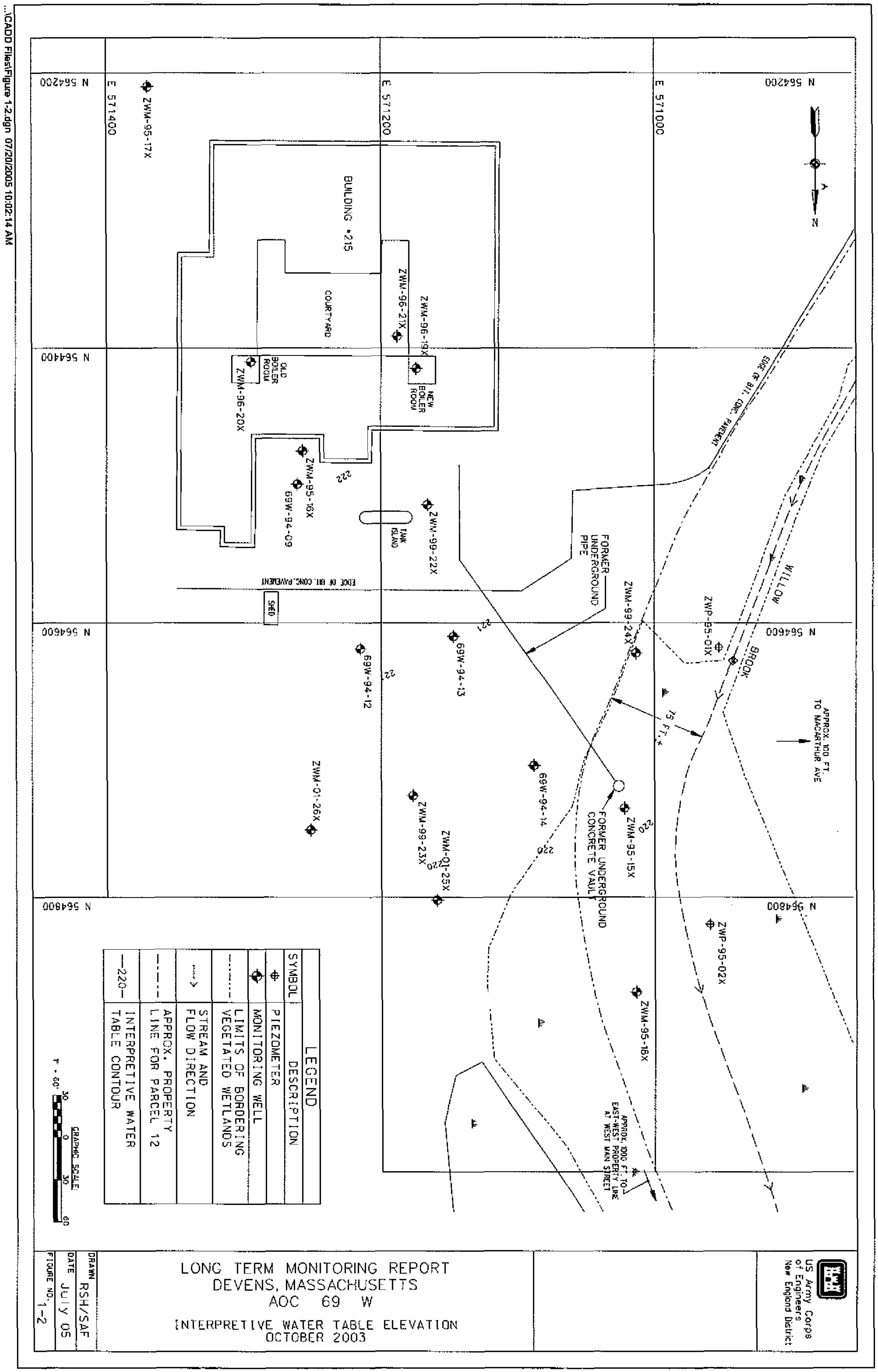


Harding Lawson Associates
Engineering and Environmental Services

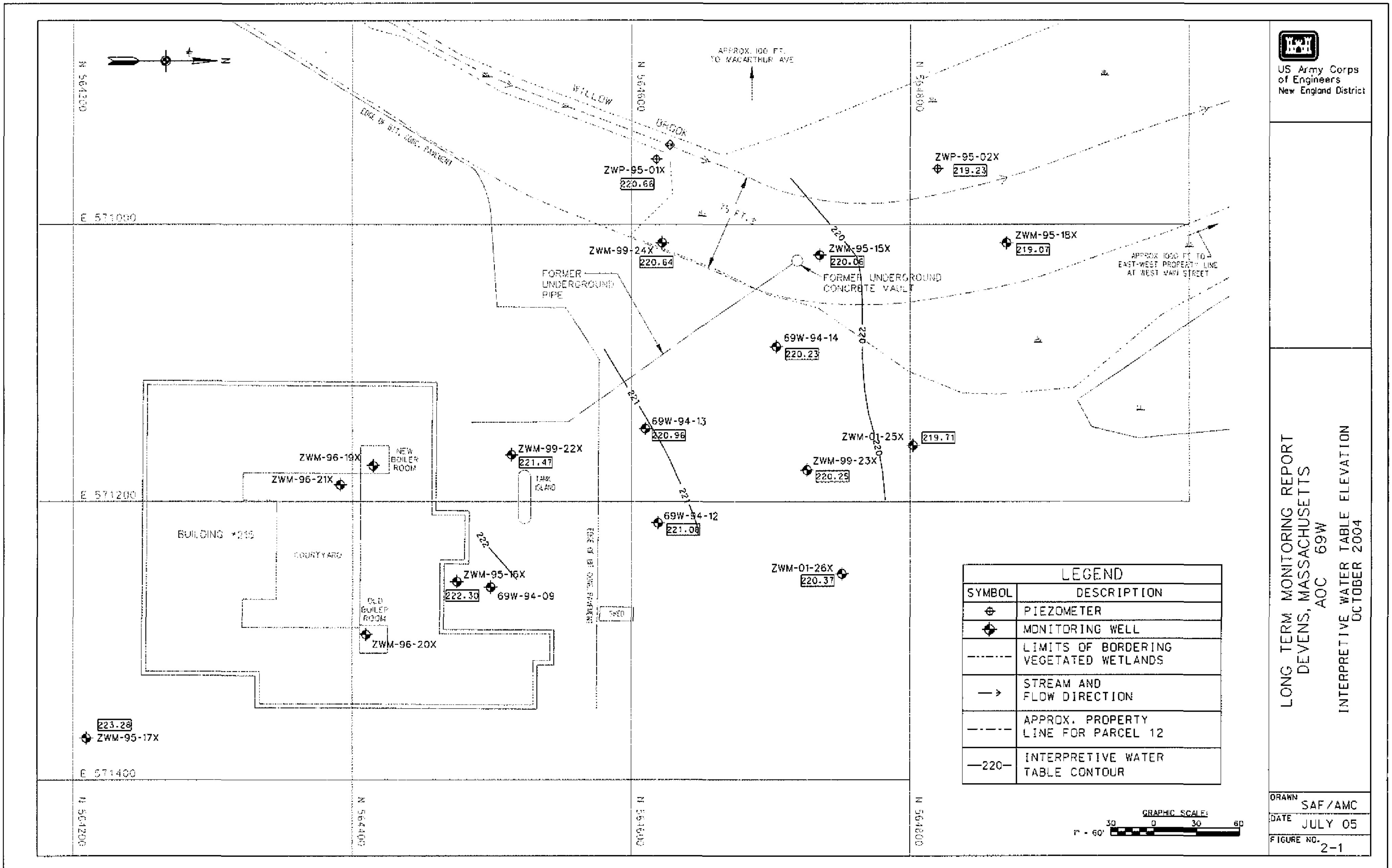
AOC 69W Site Plan
Long-term Monitoring Plan
Devens, Massachusetts

FIGURE
1-2

DRAWN:	JOBNUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
jph	45001	W9906003(b)		6/99	



...\CADD Files\Figure 1-2.dgn 07/20/2005 10:02:14 AM
N 564200
N 564400
N 564600
N 564800
E 571400
E 571200
E 571000
BUILDING #215
COURTYARD
OLD BOILER ROOM
NEW BOILER ROOM
TANK ISLAND
SHED
EDGE OF BIT. CONC. PAVEMENT
FORMER UNDERGROUND PIPE
FORMER UNDERGROUND CONCRETE VAULT
WILLOW BROOK
75 FT.±
APPROX. 100 FT. TO MACARTHUR AVE
APPROX. 1000 FT. TO EAST-WEST PROPERTY LINE AT WEST MAIN STREET
ZWM-95-17X
ZWM-96-21X
ZWM-96-19X
ZWM-96-20X
ZWM-95-16X
69W-94-09
ZWM-99-22X
ZWM-99-24X
ZWP-95-01X
69W-94-13
69W-94-12
ZWM-01-26X
69W-94-14
ZWM-95-15X
ZWM-99-23X
ZWM-01-25X
ZWP-95-02X
ZWM-95-18X
222
221
220
LEGEND
SYMBOL
DESCRIPTION
PIEZOMETER
MONITORING WELL
LIMITS OF BORDERING VEGETATED WETLANDS
STREAM AND FLOW DIRECTION
APPROX. PROPERTY LINE FOR PARCEL 12
INTERPRETIVE WATER TABLE CONTOUR
GRAPHIC SCALE
1" = 60'
US Army Corps of Engineers New England District
LONG TERM MONITORING REPORT
DEVENS, MASSACHUSETTS
AOC 69 W
INTERPRETIVE WATER TABLE ELEVATION
OCTOBER 2003
DRAWN RSH/SAF
DATE July 05
FIGURE NO. 1-2



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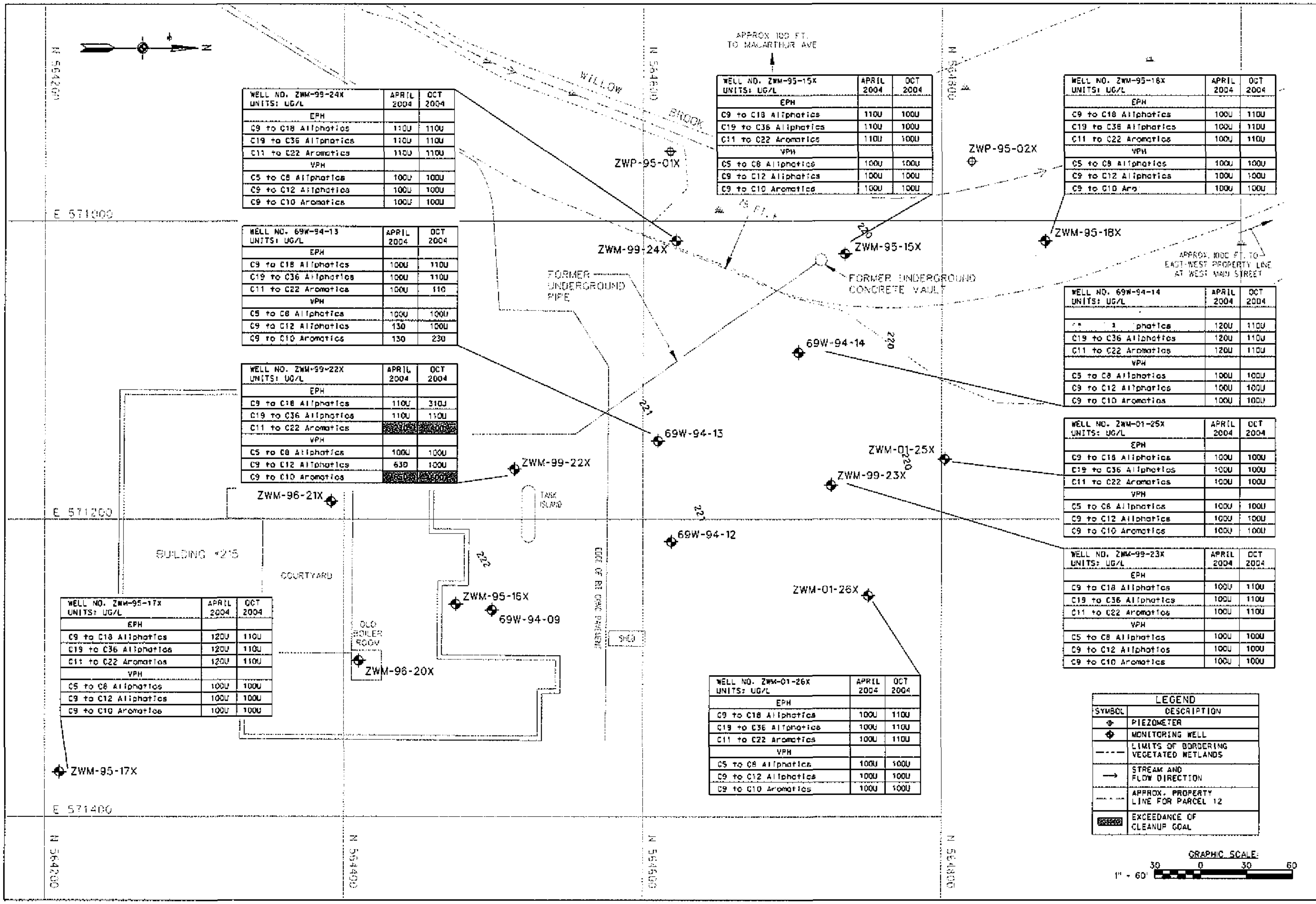

WELL NO. ZWM-99-24X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	110U	110U
C19 to C36 Aliphatics	110U	110U
C11 to C22 Aromatics	110U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. 69W-94-13 UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	100U	110U
C19 to C36 Aliphatics	100U	110U
C11 to C22 Aromatics	100U	110
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	130	100U
C9 to C10 Aromatics	130	230

WELL NO. ZWM-99-22X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	110U	310J
C19 to C36 Aliphatics	110U	110U
C11 to C22 Aromatics	[illegible]	[illegible]
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	630	100U
C9 to C10 Aromatics	[illegible]	[illegible]

WELL NO. ZWM-95-15X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	110U	100U
C19 to C36 Aliphatics	110U	100U
C11 to C22 Aromatics	110U	100U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. ZWM-95-18X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	100U	110U
C19 to C36 Aliphatics	100U	110U
C11 to C22 Aromatics	100U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aro	100U	100U

WELL NO. 69W-94-14 UNITS: UG/L	APRIL 2004	OCT 2004
[illegible]		
[illegible] phatics	120U	110U
C19 to C36 Aliphatics	120U	110U
C11 to C22 Aromatics	120U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. ZWM-01-25X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	100U	100U
C19 to C36 Aliphatics	100U	100U
C11 to C22 Aromatics	100U	100U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. ZWM-99-23X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	100U	110U
C19 to C36 Aliphatics	100U	110U
C11 to C22 Aromatics	100U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. ZWM-95-17X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	120U	110U
C19 to C36 Aliphatics	120U	110U
C11 to C22 Aromatics	120U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

WELL NO. ZWM-01-26X UNITS: UG/L	APRIL 2004	OCT 2004
EPH		
C9 to C18 Aliphatics	100U	110U
C19 to C36 Aliphatics	100U	110U
C11 to C22 Aromatics	100U	110U
VPH		
C5 to C8 Aliphatics	100U	100U
C9 to C12 Aliphatics	100U	100U
C9 to C10 Aromatics	100U	100U

LEGEND

SYMBOL	DESCRIPTION
⊕	PIEZOMETER
⊕	MONITORING WELL
----	LIMITS OF BORDERING VEGETATED WETLANDS
→	STREAM AND FLOW DIRECTION
-·-·-	APPROX. PROPERTY LINE FOR PARCEL 12
	EXCEEDANCE OF CLEANUP GOAL

GRAPHIC SCALE
30 0 30 60
1" = 60'

US Army Corps of Engineers
New England District

LONG TERM MONITORING REPORT
DEVENS, MASSACHUSETTS
AOC 69W

EPH - VPH CONCENTRATIONS
APRIL AND OCTOBER 2004

DRAWN RSH/AM
DATE JULY 05
FIGURE NO. 4-1

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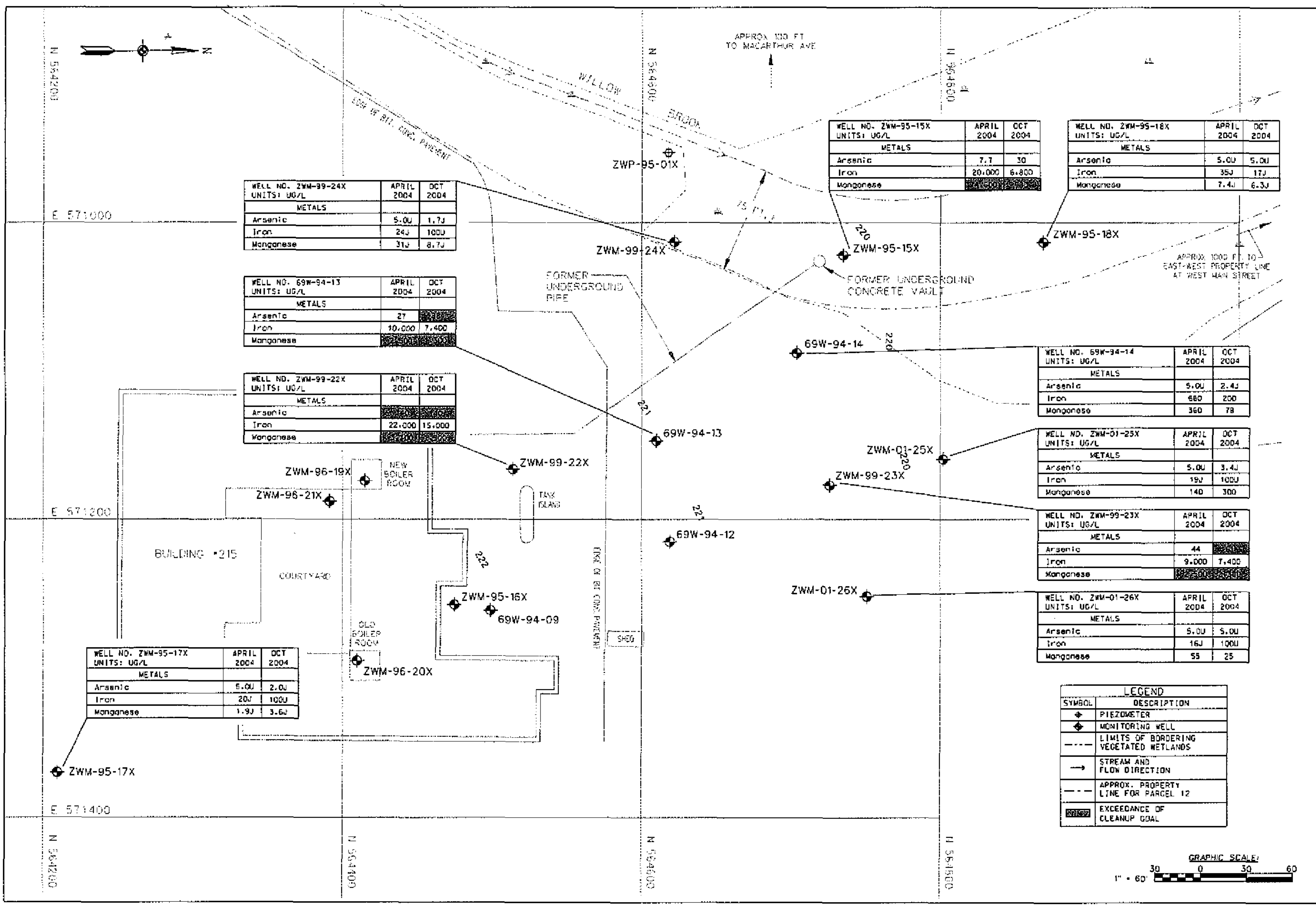

WELL NO. ZWM-99-24X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	1.7J
Iron	24J	100U
Manganese	31J	8.7J

WELL NO. 69W-94-13 UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	27	[illegible]
Iron	10,000	7,400
Manganese	[illegible]	[illegible]

WELL NO. ZWM-99-22X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	[illegible]	[illegible]
Iron	22,000	15,000
Manganese	[illegible]	[illegible]

WELL NO. ZWM-95-17X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	2.0J
Iron	20J	100U
Manganese	1.9J	3.6J

WELL NO. ZWM-95-15X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	7.7	30
Iron	20,000	6,800
Manganese	[illegible]	[illegible]

WELL NO. ZWM-95-18X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	5.0U
Iron	35J	17J
Manganese	7.4J	6.3J

WELL NO. 69W-94-14 UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	2.4J
Iron	660	200
Manganese	360	78

WELL NO. ZWM-01-25X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	3.4J
Iron	19J	100U
Manganese	140	300

WELL NO. ZWM-99-23X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	44	[illegible]
Iron	9,000	7,400
Manganese	[illegible]	[illegible]

WELL NO. ZWM-01-26X UNITS: UG/L	APRIL 2004	OCT 2004
METALS		
Arsenic	5.0U	5.0U
Iron	16J	100U
Manganese	55	25

LEGEND

SYMBOL	DESCRIPTION
	PIEZOMETER
	MONITORING WELL
	LIMITS OF BORDERING VEGETATED WETLANDS
	STREAM AND FLOW DIRECTION
	APPROX. PROPERTY LINE FOR PARCEL 12
	EXCEEDANCE OF CLEANUP GOAL

GRAPHIC SCALE
1" = 60'
30 0 30 60

US Army Corps of Engineers
New England District

LONG TERM MONITORING REPORT
DEVENS, MASSACHUSETTS
AOC 69W

METALS CONCENTRATIONS IN GROUNDWATER
APRIL AND OCTOBER 2004

DRAWN RSH/AM
DATE JULY 05
FIGURE NO. 4-2

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Figure 1-3
Exceedances Over Time
AOC 69W
C11-C22 Aromatics

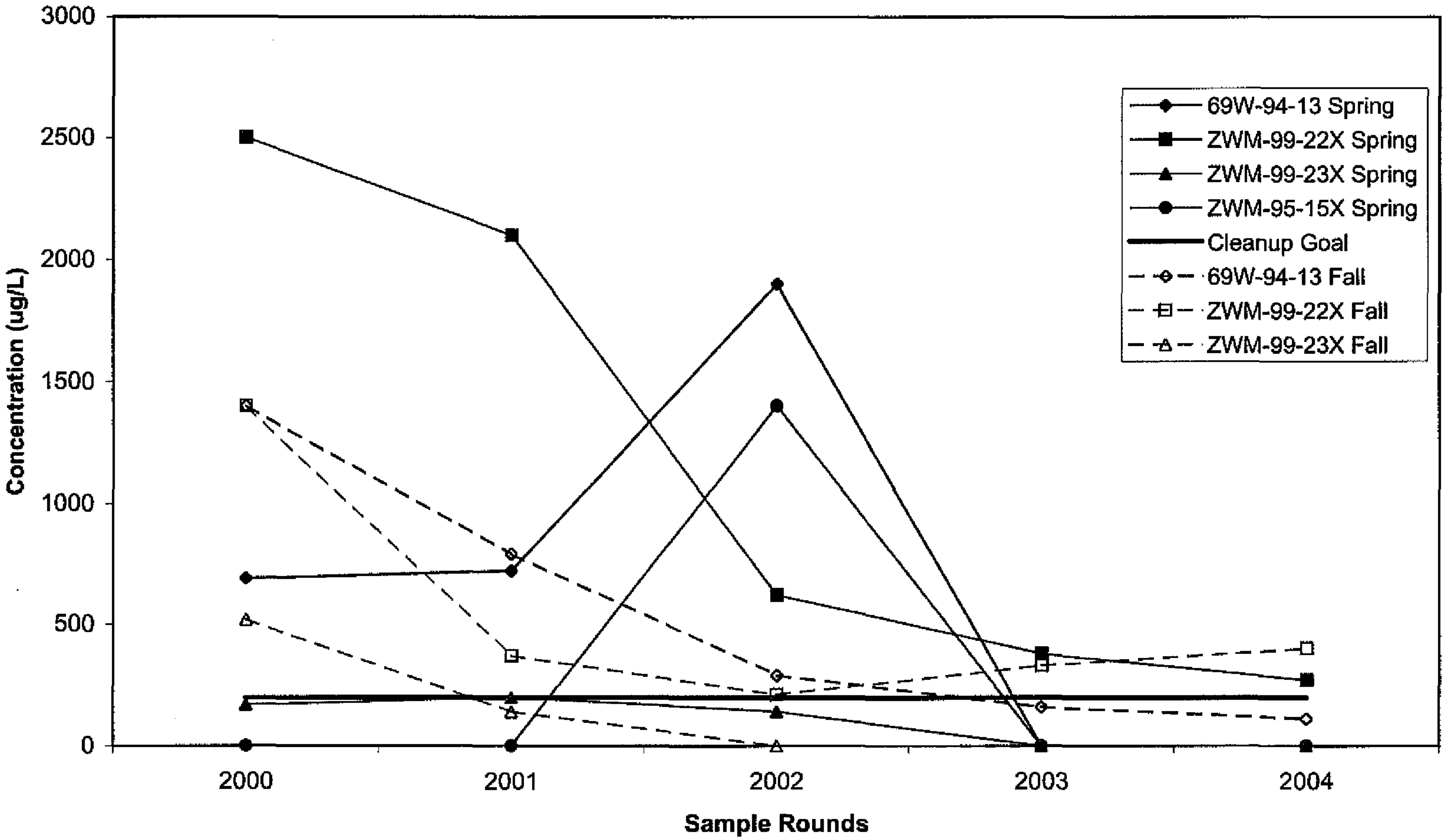


Figure 1-4
Exceedances Over Time
AOC 69W
C9-C10 Aromatics

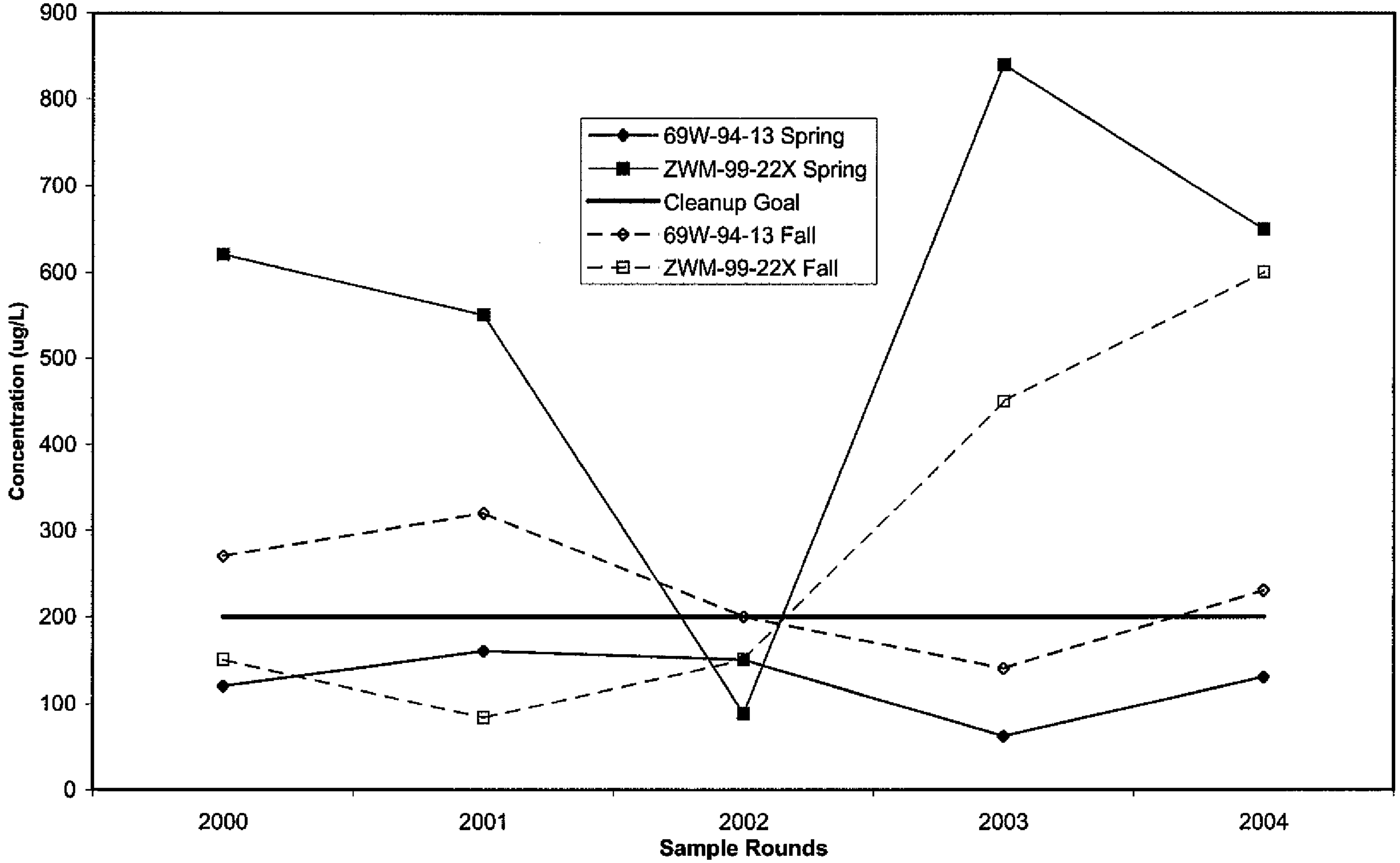


Figure 1-5
Exceedances Over Time
AOC 69W
Arsenic

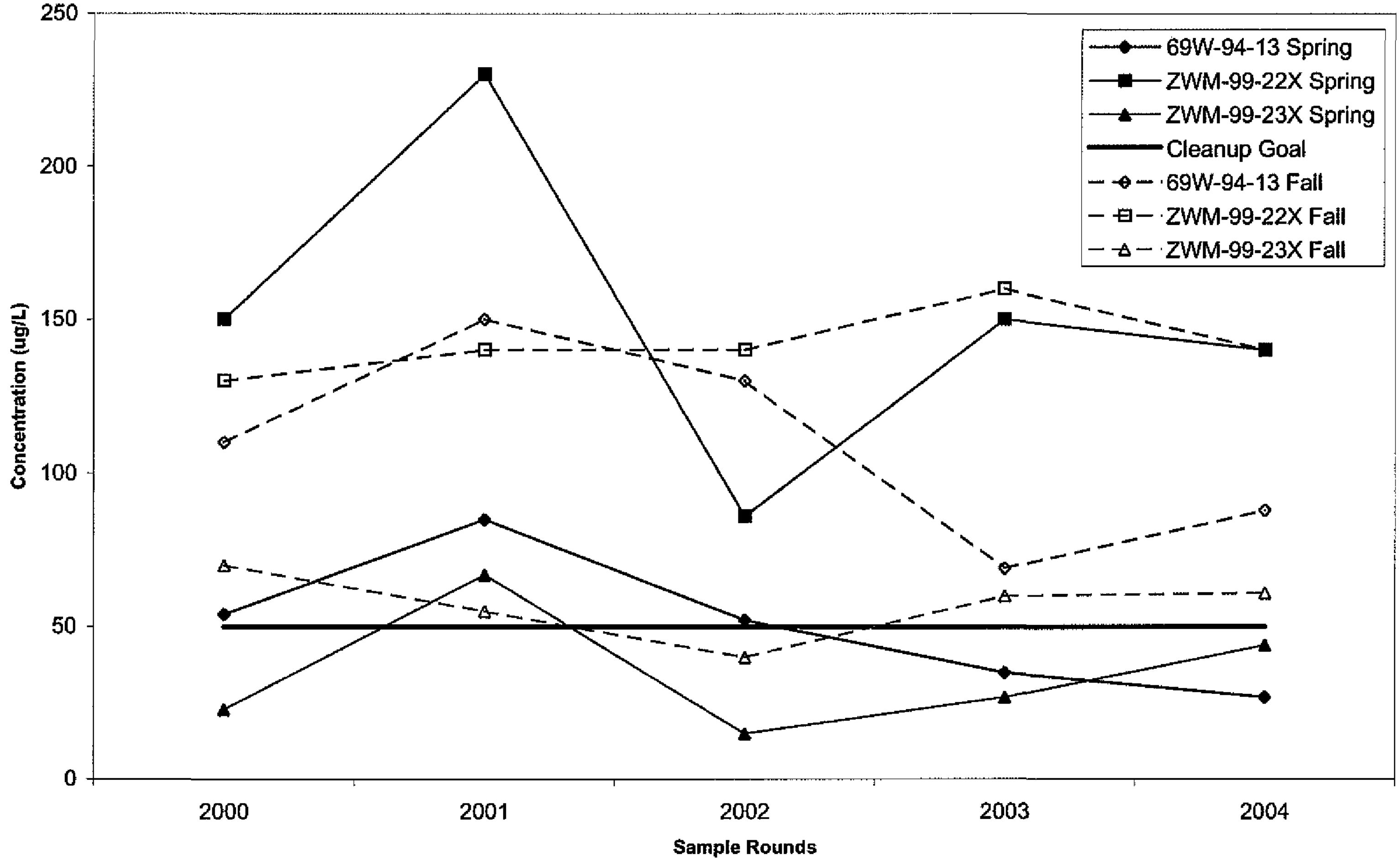


Figure 1-6
Exceedances Over Time
AOC 69W
Manganese

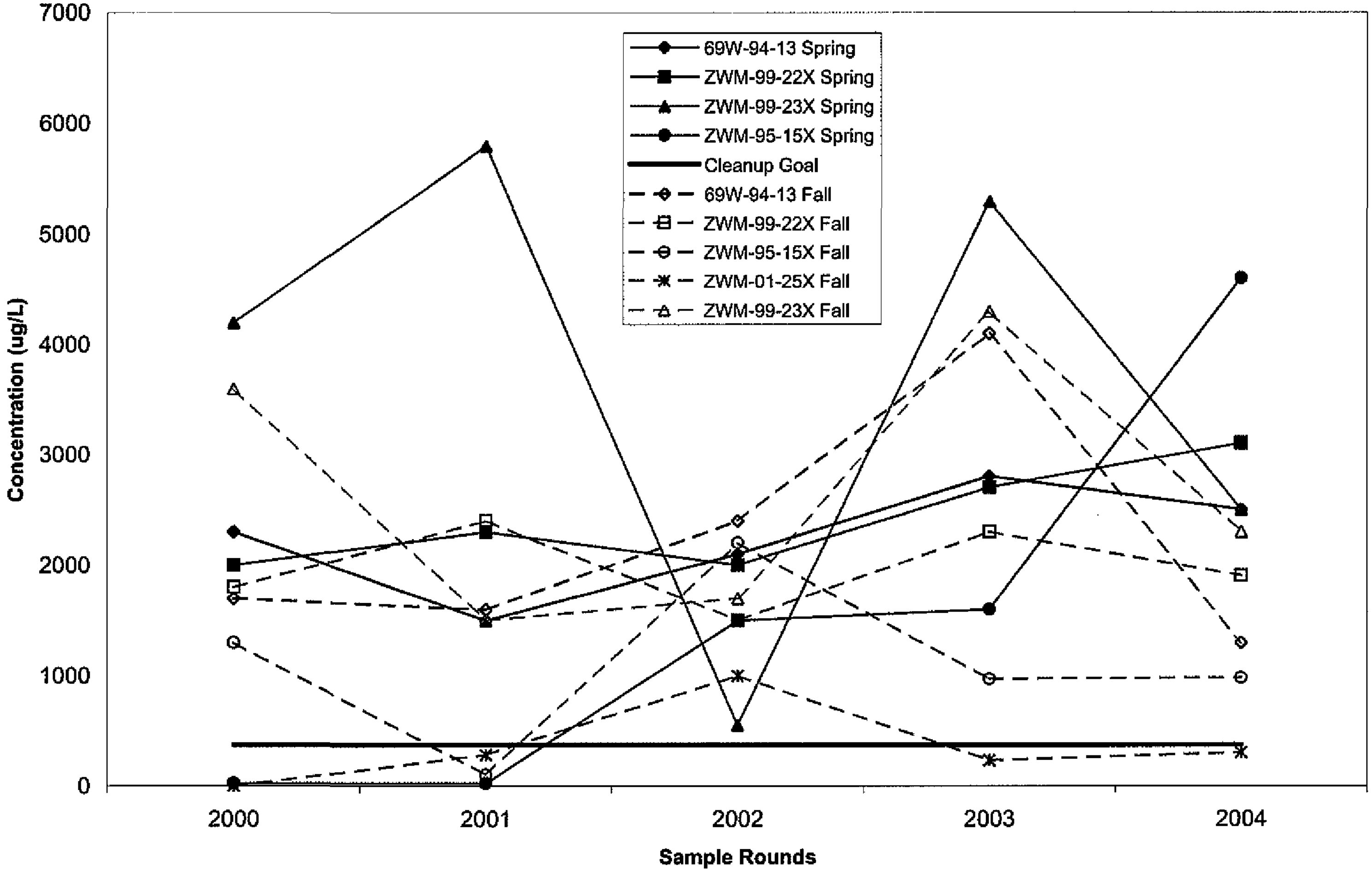


Table 2

Groundwater Analytical Results - April 28 and 30, 2004 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	69W-Dup	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL [1]											
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	100 U	120 U	110 U	120 U	100 U	110 U	120 U	100 U	110 U	100 U	100 U
C19 - C36	5,000	100 U	120 U	110 U	120 U	100 U	110 U	120 U	100 U	110 U	100 U	100 U
Aromatic Hydrocarbons												
C11 - C22	200	100 U	120 U	110 U	120 U	100 U	**270**	**420**	100 U	110 U	100 U	100 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	130	100 U	100 U	100 U	100 U	630	630	100 U	100 U	100 U	100 U
Aromatic Hydrocarbons												
C9 - C10	200	130	100 U	100 U	100 U	100 U	**650**	**650**	100 U	100 U	100 U	100 U
METALS (200.7, 206.2)												
Arsenic	50	27	5.0 U	7.7	5.0 U	5.0 U	**140**	**150**	44	5.0 U	5.0 U	5.0 U
Iron	9,100 [2]	10,000	660	20,000	20 J	35 J	22,000	22,000	9,000	24 J	19 J	16 J
Manganese	375	**2,500**	360	**4,600**	1.9 J	7.4 J	**3,100**	**3,000**	**2,500**	31	140	55
FIELD PARAMETERS												
ORP (mv)		142.4	243.4	132.2	350.0	628.5	13.3	NA	673.0	380.8	601.2	547.3
DO (mg/L)		0.25	0.64	0.47	8.49	5.96	0.20	NA	1.37	1.66	4.15	7.38

Notes:

J = Estimated value detected below the PQL
U = Not detected at or above the Reporting Limit indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
69W-Dup is a duplicate of ZWM-99-22X
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Groundwater Analytical Results - October 18 and 19, 2004 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	69W-Dup	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL [1]											
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	110 U	110 U	100 U	110 U	110 U	310 J	100 UJ	110 U	110 U	100 U	110 U
C19 - C36	5,000	110 U	110 U	100 U	110 U	110 U	110 U	120 U	110 U	110 U	100 U	110 U
Aromatic Hydrocarbons												
C11 - C22	200	110	110 U	100 U	110 U	110 U	**400**	**330**	110 U	110 U	100 U	110 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aromatic Hydrocarbons												
C9 - C10	200	**230**	100 U	100 U	100 U	100 U	**600**	**570**	100 U	100 U	100 U	100 U
METALS (200.7, 206.2)												
Arsenic	50	**88**	2.4 J	30.0	2.0 J	5.0 U	**140**	**180**	**61**	1.7 J	3.4 J	5.0 U
Iron	9,100 [2]	7,400	200	6,800	100 U	17 J	15,000	16,000	7,400	100 U	100 U	100 U
Manganese	375	**1,300**	78	**980**	3.6 J	6.3 J	**1,900**	**2,000**	**2,300**	8.7 J	300	25
FIELD PARAMETERS												
ORP (mv)		124.3	156.4	30.9	181.3	392.0	-111.0	NA	7.6	411.6	468.8	206.9
DO (mg/L)		0.32	1.18	0.19	8.57	5.49	0.53	NA	0.23	0.65	4.79	2.98

Notes:

J = Estimated value detected below the PQL
U = Not detected at or above the Reporting Limit indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
69W-Dup is a duplicate of ZWM-99-22X
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above.
Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Table 4-1

Groundwater Analytical Results - May 6 and 7, 2003 Sampling Event.
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-DUP	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	GOAL (1)											
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	31 U	30 U	31 U	30 U	30 U	31 U	31 U	30 U	30 U	31 U	31 U
C19 - C36	5,000	41 U	40 U	41 U	40 U	40 U	41 U	42 U	40 U	40 U	41 U	41 U
Aromatic Hydrocarbons												
C11 - C22	200	87 U	86 U	89 U	85 U	85 U	88 U	**380**	86 U	85 U	88 U	87 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aromatic Hydrocarbons												
C9 - C10	1,000	62	56	25 U	25 U	25 U	25 U	840	53	25 U	25 U	25 U
METALS (200.7, 206.2)												
Arsenic	50	35	35	2.2 J	5.0 U	2.0 J	5.0 U	**150**	27	5.0 U	2.3 J	5.0 U
Iron	9,100 (2)	12,000	12,000	550	470	100 U	100 U	31,000	11,000	100 U	59 J	100 U
Manganese	375	**2,800**	**2,900**	200	**1,600**	15 U	15 J	**2,700**	**5,300**	6.0 J	89	11 J
FIELD PARAMETERS												
ORP (mv)		40.7	NA	181	167.2	163.6	316	-50.5	66	204.6	219	190
DO (mg/L)		0.25	NA	5.11	2.84	8.26	6.39	0.84	0.74	5.35	6.49	8.28

Notes:

J = Estimated value detected below the PQL
U = Not detected at or above the Reporting Limit Indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
69W-Dup is a duplicate of 69W-94-13
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup goal as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Table 4-2

Groundwater Analytical Results - October 14 and 16, 2003 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	69W-Dup	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP GOAL (1)	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	32 U	31 U	32 U	31 U	33 U	31 U	31 U	31 U	32 U	32 U	31 U
C19 - C36	5,000	42 U	41 U	42 U	41 U	44 U	41 U	42 U	41 U	42 U	42 U	42 U
Aromatic Hydrocarbons												
C11 - C22	200	160	88 U	90 U	88 U	92 U	**330**	**290**	87 U	90 U	90 U	88 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aromatic Hydrocarbons												
C9 - C10	1,000	140	25 U	25 U	25 U	25 U	450	420	59	25 U	25 U	25 U
METALS (200.7, 206.2)												
Arsenic	50	**69**	1.9 J	16	5.0 U	5.0 U	**160**	**170**	**60**	5.0 U	5.0 U	5.0 U
Iron	9,100 (2)	8,500	500	3,700	100 U	100 U	18,000	18,000	7,900	100 U	100 U	100 U
Manganese	375	**4,100**	250	**970**	15 U	5.5 J	**2,300**	**2,300**	**4,300**	31	230	85
FIELD PARAMETERS												
ORP (mv)		-23.0	192.9	29.4	172.5	206.2	-92.2	NA	18.6	191.3	208.0	230.6
DO (mg/L)		0.48	1.87	0.37	7.68	7.97	0.14	NA	0.26	0.37	4.56	2.25

Notes:

J = Estimated value detected below the PQL
U = Not detected at or above the Reporting Limit indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
69W-Dup is a duplicate of 69W-94-13
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Table 4-2

Groundwater Analytical Results - May 6-7, 2002 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-DUP	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP GOAL (1)	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	180	170	100 U	430	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C19 - C36	5,000	180	160	100 U	280	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Aromatic Hydrocarbons												
C11 - C22	200	**1,900**	**1,800**	100 U	**1,400**	100 U	100 U	**620**	140	100 U	100 U	100 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aromatic Hydrocarbons												
C9 - C10	1,000	150	140	25 U	25 U	25 U	25 U	88	25 U	25 U	25 U	25 U
METALS (200.7, 206.2)												
Arsenic	50	**52**	**54**	4.5 J	36	5.0 U	5.0 U	**86**	15	5.0 U	5.0 U	5.0 U
Iron	9,100 (2)	11,000	11,000	1,100	11,000	100 U	100 U	13,000	2,000	100 U	100 U	100 U
Manganese	375	**2,100**	**2,100**	320	**1,500**	15 U	4.4 J	**2,000**	**550**	15 U	61	8.6J
FIELD PARAMETERS												
ORP (mv)		7.0	NA	134.2	-23.4	538.2	221.0	31	107	607	148.7	625
DO (mg/L)		2.9	NA	28.7	2.9	6.74	27.4	0.58	3.78	8.32	68.0	10.06

Notes:

J = Estimated value detected below the laboratorys' Practical Quantitation Limit (PQL)
U = Analyte is undetected at the laboratorys' PQL
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
RL = Reporting limits
69W-Dup is a duplicate of 69W-94-13
Shaded areas with bold numbers indicate cleanup goal exceedances. **25**
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator or remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Table 4-3

Groundwater Analytical Results - November 12 and 14, 2002 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13	69W-DUP	69W-94-14	ZWM-95-15X	ZWM-95-17X	ZWM-95-18X	ZWM-99-22X	ZWM-99-23X	ZWM-99-24X	ZWM-01-25X	ZWM-01-26X
	CLEANUP GOAL [1]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
EPH (MADEP METHOD)	ug/L											
Aliphatic Hydrocarbons												
C9 - C18	1,000	33 U	31 U	31 U	160	33 U	34 U	34 U	32 U	30 U	31 U	35 U
C19 - C36	5,000	43 U	41 U	41 U	44 U	43 U	45 U	45 U	43 U	40 U	42 U	47 U
Aromatic Hydrocarbons												
C11 - C22	200	**290**	**290**	89 U	93 U	92 U	96 U	**210**	90 U	86 U	89 U	100 U
VPH (MADEP Method)												
Aliphatic Hydrocarbons												
C5 - C8	400	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
C9 - C12	1,000	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Aromatic Hydrocarbons												
C9 - C10	1,000	200	210	25 U	25 U	25 U	25 U	150	25 U	25 U	25 U	25 U
METALS (200.7, 206.2)												
Arsenic	50	**130**	**130**	4.3 J	40	5.0 U	5.0 U	**140**	40	5.0 U	5.0 U	5.0 U
Iron	9,100 [2]	20,000	21,000	1,300	12,000	100 U	100 U	21,000	6,500	100 U	240	100 U
Manganese	375	**2,400**	**2,400**	350	**2,200**	15 U	15 U	**1,500**	**1,700**	15 U	**1,000**	15 U
FIELD PARAMETERS												
ORP (mv)		0.3	NA	240.2	138.3	169.7	275.1	-56.7	17.8	226.4	195.5	289.9
DO (mg/L)		1.96	NA	4.11	1.41	7.77	7.20	0.98	2.73	4.79	6.85	6.03

Notes:

J = Estimated value detected below the PQL

U = Not detected at or above the Reporting Limit indicated.

NA = Compound not analyzed for.

ug/L = Micrograms per Liter

69W-Dup is a duplicate of 69W-94-13

Shaded areas with bold numbers indicate cleanup goal exceedances. **25**

ORP (mv) = Oxidation Reduction Potential in millivolts

DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards.

(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X

Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X

Background well: ZWM-95-17X

Table 4-2

Groundwater Analytical Results - May 21-22, 2001 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13		69W-DUP		69W-94-14		ZWM-95-15X		ZWM-95-17X		ZWM-95-18X		ZWM-99-22X		ZWM-99-23X		ZWM-99-24X	
	CLEANUP GOAL [1] ug/L	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL
EPH (MADEP METHOD)																			
Aliphatic Hydrocarbons																			
C9 - C18	1,000	ND	110	ND	110	ND	100	ND	110	ND	110	ND	110	210	100	ND	110	ND	100
C19 - C36	5,000	ND	110	ND	110	ND	100	ND	110	ND	110	ND	110	130	100	ND	110	ND	100
Aromatic Hydrocarbons																			
C11 - C22	200	**720**	**110**	**550**	**110**	ND	100	ND	110	ND	110	ND	110	**2,100**	**100**	**200**	**110**	ND	100
VPH (MADEP Method)																			
Aliphatic Hydrocarbons																			
C5 - C8	400	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100
C9 - C12	1,000	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25
Aromatic Hydrocarbons																			
C9 - C10	1,000	160	25	170	25	ND	25	ND	25	ND	25	ND	25	550	25	40	25	ND	25
METALS (200.7, 206.2)																			
Arsenic	50	**85**	**30**	**82**	**30**	ND	5.0	ND	5.0	ND	5.0	ND	5.0	**230**	**100**	**67**	**30**	ND	5.0
Iron	9,100 [2]	7,700	100	7,700	100	520	100	ND	100	ND	100	ND	100	25,000	100	13,000	100	ND	100
Manganese	375	**1,500**	**15**	**1,600**	**15**	5.1 J	15	25	15	ND	15	ND	15	**2,300**	**15**	**5,800**	**15**	ND	15
FIELD PARAMETERS																			
ORP (mv)		-24.2		NA		113.8		292.3		252.7		217.7		-64.1		14.7		326.8	
DO (mg/L)		0.30		NA		6.05		5.10		7.52		6.47		0.37		0.44		4.10	

Notes:

J = Estimated value detected below the PQL.
ND = Not detected at or above the Reporting Limit (RL) indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
RL = Reporting limits
69W-Dup is a duplicate of 69W-94-13
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above. Iron concentrations will be used as an indicator or remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X
Background well: ZWM-95-17X

Table 4-3

Groundwater Analytical Results - November 13 and 14, 2001 Sampling Event
AOC 69W
Devons, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	69W-94-13		69W-94-14		ZWM-95-15X		ZWM-95-17X		ZWM-95-18X		ZWM-99-22X		69W-DUP		ZWM-99-23X		ZWM-99-24X		ZWM-01-25X		ZWM-01-26X	
	CLEANUP GOAL [1] ug/L	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL
EPH (MADEP METHOD)																							
Aliphatic Hydrocarbons																							
C9 - C18	1,000	ND	100	ND	110	ND	110	ND	110	ND	100	ND	110	ND	100	ND	100	ND	100	ND	100	ND	100
C19 - C36	5,000	ND	100	ND	110	ND	110	ND	110	ND	100	ND	110	ND	100	ND	100	ND	100	ND	100	ND	100
Aromatic Hydrocarbons																							
C11 - C22	200	**790**	100	ND	110	ND	110	ND	110	ND	100	**370**	110	**430**	100	140	100	ND	100	ND	100	ND	100
VPH (MADEP Method)																							
Aliphatic Hydrocarbons																							
C5 - C8	400	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100
C9 - C12	1,000	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25
Aromatic Hydrocarbons																							
C9 - C10	1,000	320	25	ND	25	ND	25	ND	25	ND	25	83	25	72	25	34	25	ND	25	ND	25	ND	25
METALS (200.7, 206.2)																							
Arsenic	50	**150**	50	5.9	5.0	22	10	ND	5.0	ND	5.0	**140**	100	**130**	50	**55**	25	ND	5.0	4.1 J	5.0	ND	5.0
Iron	9,100[2]	12,000	100	1,400	100	4,300	100	ND	100	ND	100	10,000	100	14,000	100	8,000	100	ND	100	170	100	ND	100
Manganese	375	**1,600**	15	340	15	100	15	ND	15	4.4 J	15	**2,400**	15	**2,300**	15	**1,600**	15	14 J	15	280	15	58	15
FIELD PARAMETERS																							
ORP (mv)		-49.7		177.7		29.0		197.8		313.8		-25.8		NA		-22.2		275.7		233.9		252.3	
DO (mg/L)		0.24		2.42		0.47		5.67		5.36		0.82		NA		1.50		2.93		4.82		47.6	

Notes:

J = Estimated value detected below the PQL
ND = Not detected at or above the Reporting Limit (RL) indicated.
NA = Compound not analyzed for.
ug/L = Micrograms per Liter
RL = Reporting limits
69W-Dup is a duplicate of ZWM-99-22X
Shaded areas with bold numbers indicate cleanup goal exceedances.
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards
(2) Iron is no longer considered a COC but will be compared to the background concentration as shown above.
Iron concentrations will be used as an indicator of remediation efficacy.

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X, ZWM-01-25X, ZWM-01-26X
Background well: ZWM-95-17X

Table 4-2

Groundwater Analytical Results - May 15 - 16, 2000 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

Well No.		69W-94-13		69W-94-13 Dup		69W-94-14		ZWM-95-15X		ZWM-95-17X		ZWM-95-18X		ZWM-96-19X		ZWM-99-22X		ZWM-DUP-001		ZWM-99-23X		ZWM-99-24X	
PARAMETERS	CLEANUP GOAL (1) ug/L	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL
EPH (MADEP METHOD)																							
Aliphatic Hydrocarbons																							
C9 - C18	1,000	ND	110	110	110	ND	110	ND	110	ND	100	ND	120	ND	100	250	110	NA		ND	100	ND	110
C19 - C36	5,000	ND	110	ND	110	ND	110	ND	110	ND	100	ND	120	ND	100	180	110	NA		ND	100	ND	110
Aromatic Hydrocarbons																							
C11 - C22	200	**690**	**110**	**830**	**110**	ND	110	ND	110	ND	100	ND	120	ND	100	**2500**	**110**	NA		170	100	ND	110
VPH (MADEP Method)																							
Aliphatic Hydrocarbons																							
C5 - C8	400	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	NA		ND	100	ND	100
C9 - C12	1,000	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	NA		ND	25	ND	25
Aromatic Hydrocarbons																							
C9 - C10	1,000	120	25	130	25	ND	25	ND	25	ND	25	ND	25	ND	25	620	25	NA		46	25	ND	25
SVOC (8270C)																							
Bis(2-ethylhexyl) phthalate	6	NA		NA		NA		NA		ND	5.6	NA		NA		ND	5.3	ND	5.8	NA		NA	
METALS (200.7, 206.2)																							
Arsenic	50	**64**	**5.0**	**51**	**5.0**	8.3	5.0	ND	5.0	ND	5.0	ND	5.0	9.6	5.0	**150**	**50**	NA		23	5.0	2.3 J	5.0
Iron	9,100	**9800**	**100**	**9100**	**100**	1300	100	ND	100	220	100	49JB	100	2900	100	**21000**	**100**	NA		8000	100	340	100
Manganese	375	**2300**	**15**	**2200**	**15**	300	15	28	15	ND	15	9.2J	15	200	15	**2000**	**15**	NA		**4200**	**15**	27	15
FIELD PARAMETERS																							
ORP (mv)		12.1		NA		117.5		258.0		244.2		255.6		64.2		-45.9		NA		67.4		277.2	
DO (mg/L)		0.03		NA		0.64		1.20		4.79		3.20		0.39		-0.03		NA		0.39		1.80	

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance **25**

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

ND = Not detected at or above the Reporting Limit (RL) indicated.

NA = Compound not analyzed for.

ug/L = Micrograms per Liter

RL = Reporting limits

ZWM-DUP-001 is a duplicate of ZWM-99-22X for Bis(2-ethylhexyl) phthalate only

ORP (mv) = Oxidation Reduction Potential in millivolts

DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup values as identified in the ROD using the MCP GW-1/GW-2 Ground Water Standards

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X, ZWM-96-19X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X
Background well: ZWM-95-17X

Table 4-3

Groundwater Analytical Results - November 3 - 6, 2000 Sampling Event
AOC 69W
Devens, Massachusetts
(SHEET 1 of 1)

	Well No.	69W-94-13		69W-94-14		ZWM-95-15X		ZWM-95-17X		ZWM-95-18X		ZWM-99-22X		ZWM-99-22XDUP		ZWM-99-23X		ZWM-99-24X	
PARAMETERS	CLEANUP GOALS (1) ug/L	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL	ug/L	RL
EPH (MADEP METHOD)																			
Aliphatic Hydrocarbons																			
C9 - C18	1,000	ND	100	ND	110	ND	100	ND	120	ND	110	ND	120	ND	110	ND	100	ND	100
C19 - C36	5,000	ND	100	ND	110	ND	100	ND	120	ND	110	150	120	150	110	ND	100	ND	100
Aromatic Hydrocarbons																			
C11 - C22	200	1,400	100	ND	110	ND	100	ND	120	ND	110	1,400	120	1,400	110	520	100	ND	100
VPH (MADEP Method)																			
Aliphatic Hydrocarbons																			
C5 - C8	400	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100	ND	100
C9 - C12	1,000	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25	ND	25
Aromatic Hydrocarbons																			
C9 - C10	1,000	270	25	ND	25	ND	25	ND	25	ND	25	150	25	140	25	62	25	ND	25
METALS (200.7, 206.2)																			
Arsenic	50	110	10	12	5.0	7.9	5.0	ND	5.0	ND	5.0	130	10	120	10	70	5.0	ND	5.0
Iron	9,100	9,400	100	2,000	100	5,100	100	ND	100	ND	100	14,000	100	15,000	100	11,000	100	ND	100
Manganese	375	1,700	15	340	15	1,300	15	ND	15	ND	15	1,800	15	1,800	15	3,600	15	12 J	15
FIELD PARAMETERS																			
ORP (mv)		-29.4		91.0		38.2		200.8		236.8		-30.1		NA		22.0		194.9	
DO (mg/L)		0.79		2.59		1.70		6.50		7.46		0.52		NA		0.84		1.70	

Notes:

J = Estimated value detected below the PQL
ND = Not detected at or above the Reporting Limit (RL) indicated.
NA = Not Applicable
ug/L = Micrograms per Liter
RL = Reporting limits
ORP (mv) = Oxidation Reduction Potential in millivolts
DO (mg/L) = Dissolved Oxygen in milligrams per Liter

(1) Cleanup value as identified in the ROD using the MCP GW-1/GW-2 Groundwater Standards

Source wells: 69W-94-13, 69W-94-14, ZWM-99-22X
Sentry wells: ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, ZWM-99-24X
Background well: ZWM-95-17X

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 Instiitutional 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 Instiitutional 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 H

AOCS 9, 11, 40, SAS 6, 12, 13, 41
(SOLID WASTE)

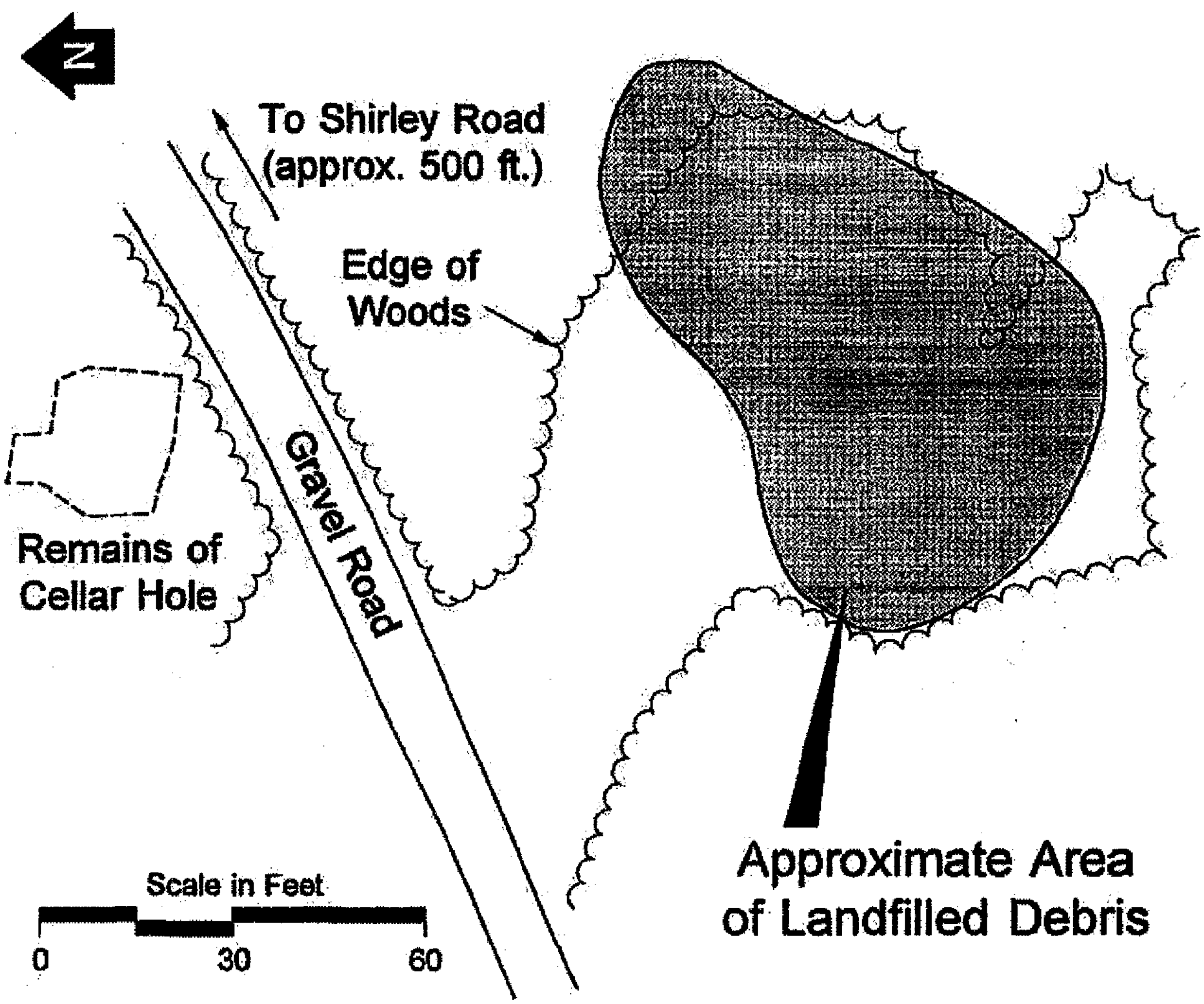
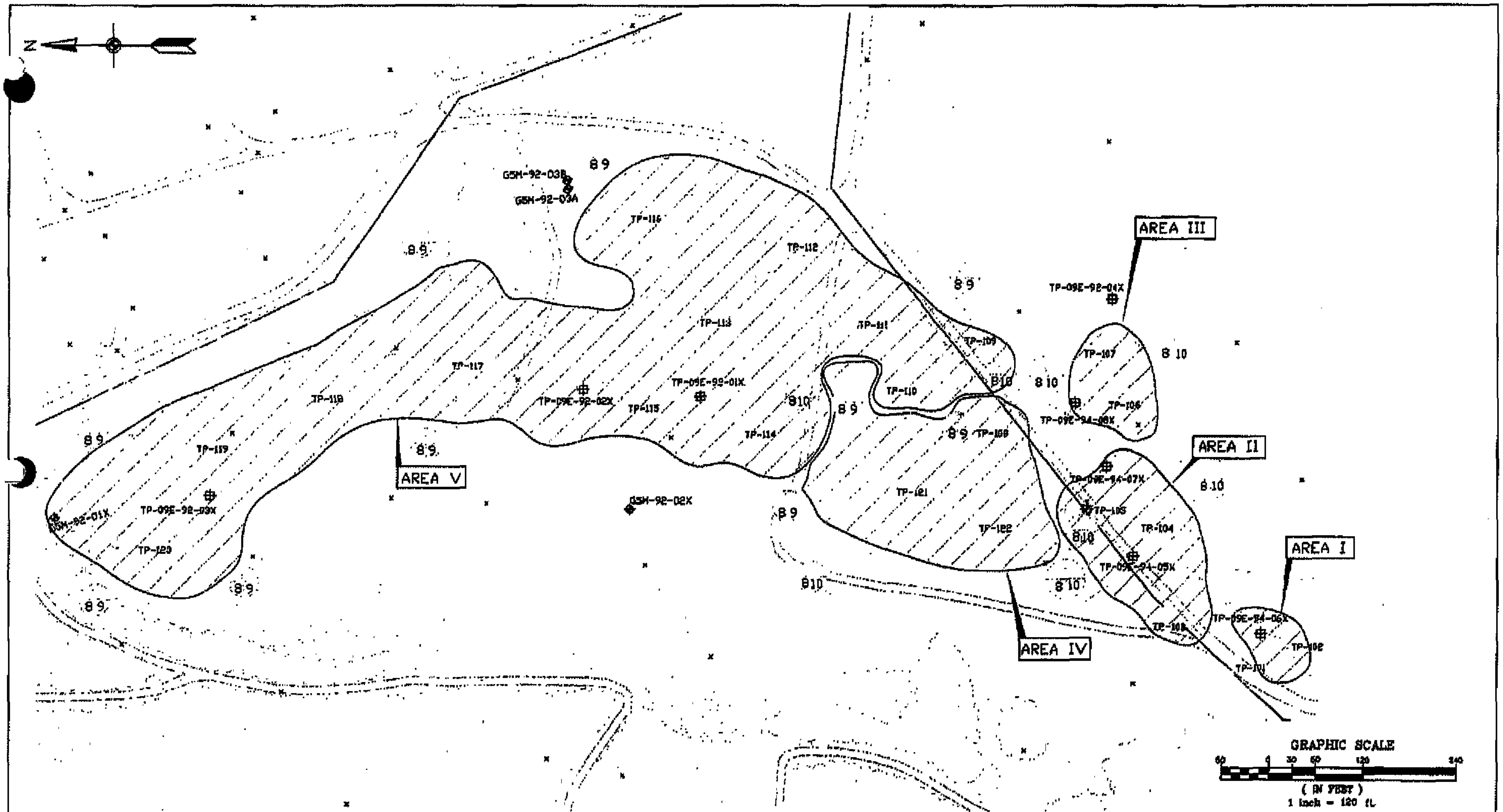


FIGURE 2
SA 6 SITE MAP
DEVENS, MA
Harding Lawson Associates

W9903001



DATE	REVISIONS	NO.	BY

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PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NORTH CENTRAL RESIDENCE OFFICE
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

AOC-9
SITE PLAN - EXISTING CONDITIONS
LANDFILL REMEDIATION PROJECT

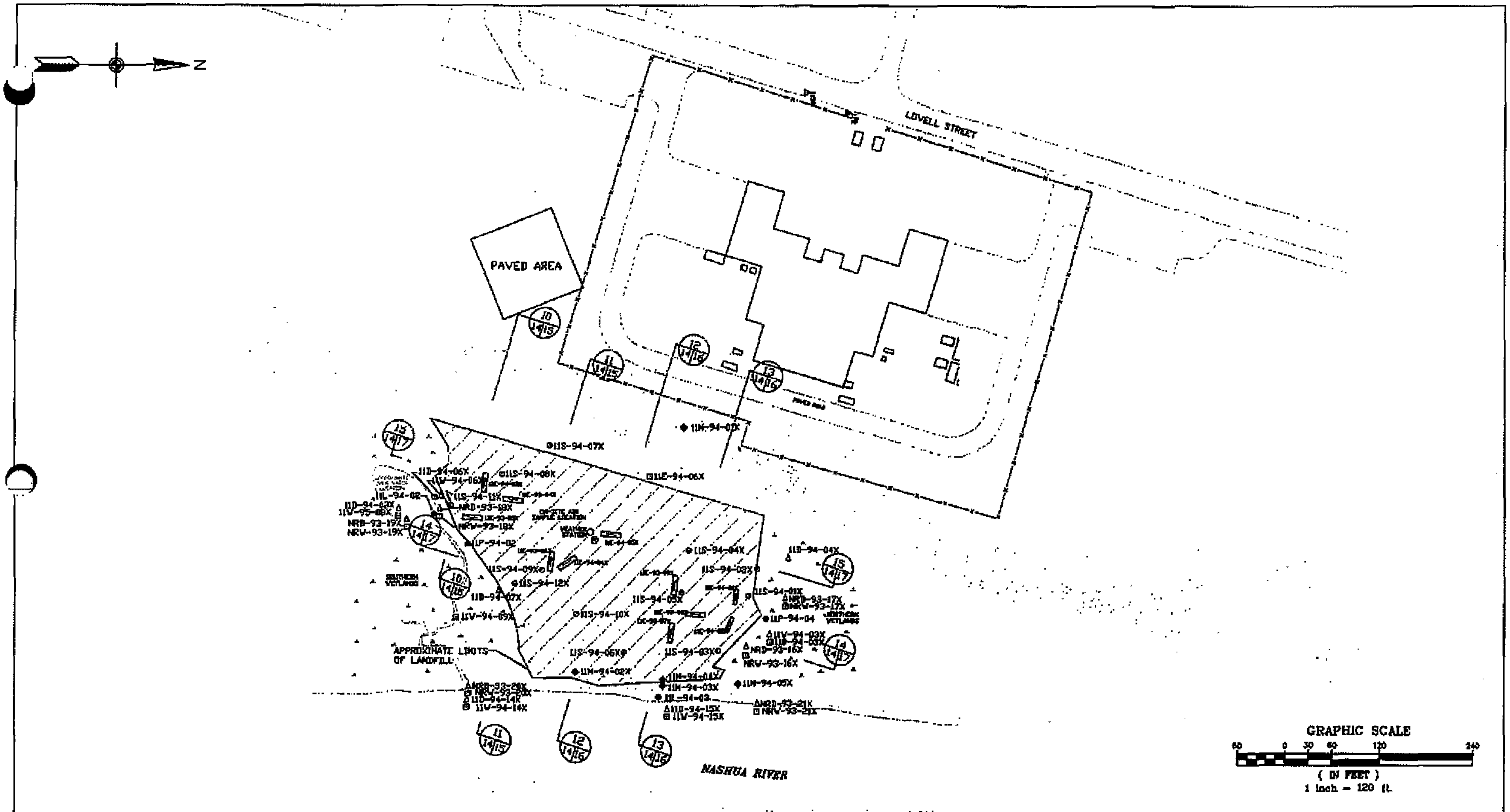
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

SCALE: AS SHOWN

REFERENCE NO.

C-3

SHEET 4 OF 38



DATE	REVISIONS	NO.	BY

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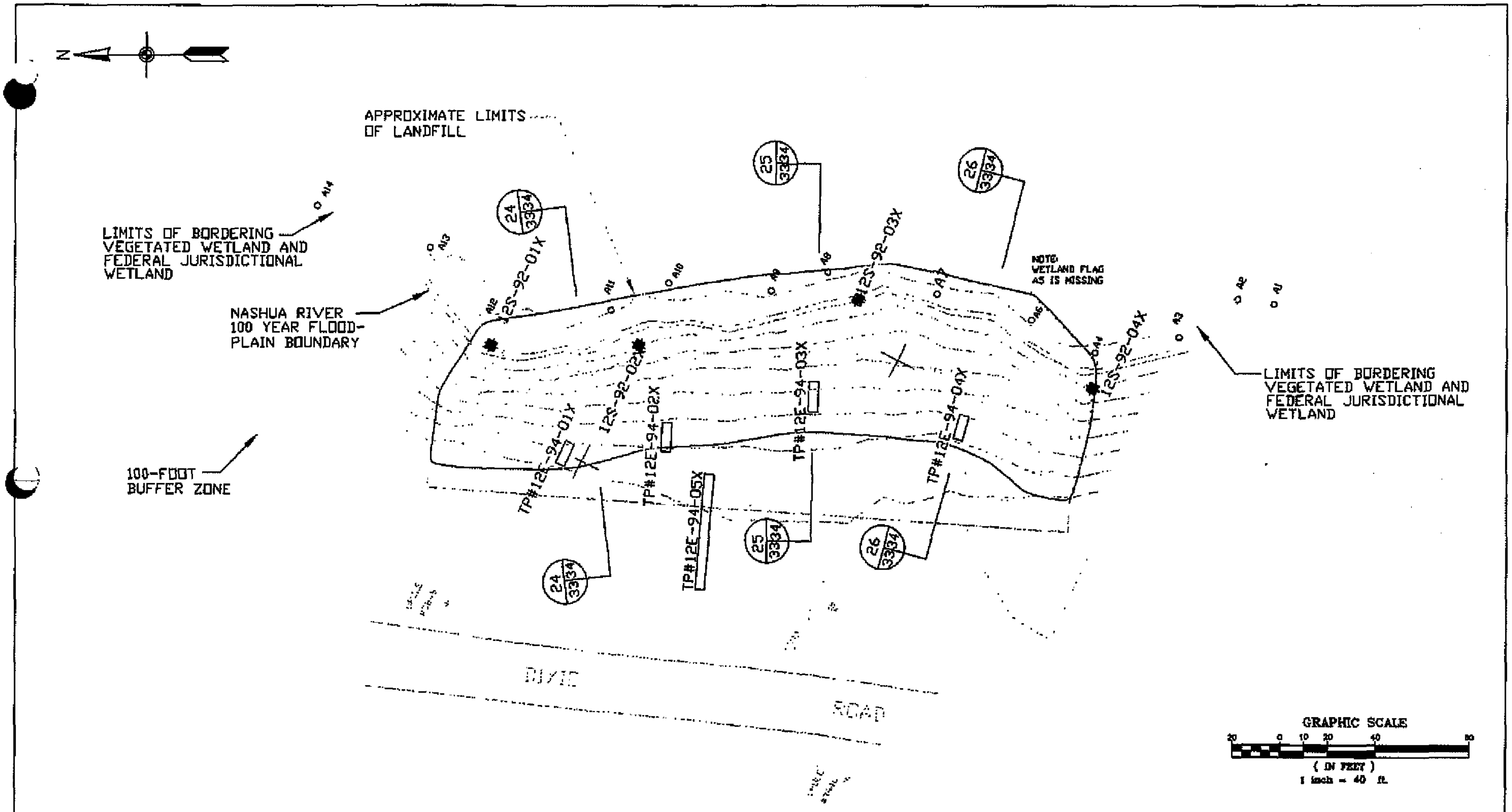
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

AOC 11
SITE PLAN - EXISTING CONDITIONS
LANDFILL REMEDIATION PROJECT

DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
SCALE AS SHOWN
S&W PROJECT NO. 0468511000
REV. AUGUST 9, 2000
FEBRUARY 9, 2000

REFERENCE NO.
C-8
SHEET 11 OF 38



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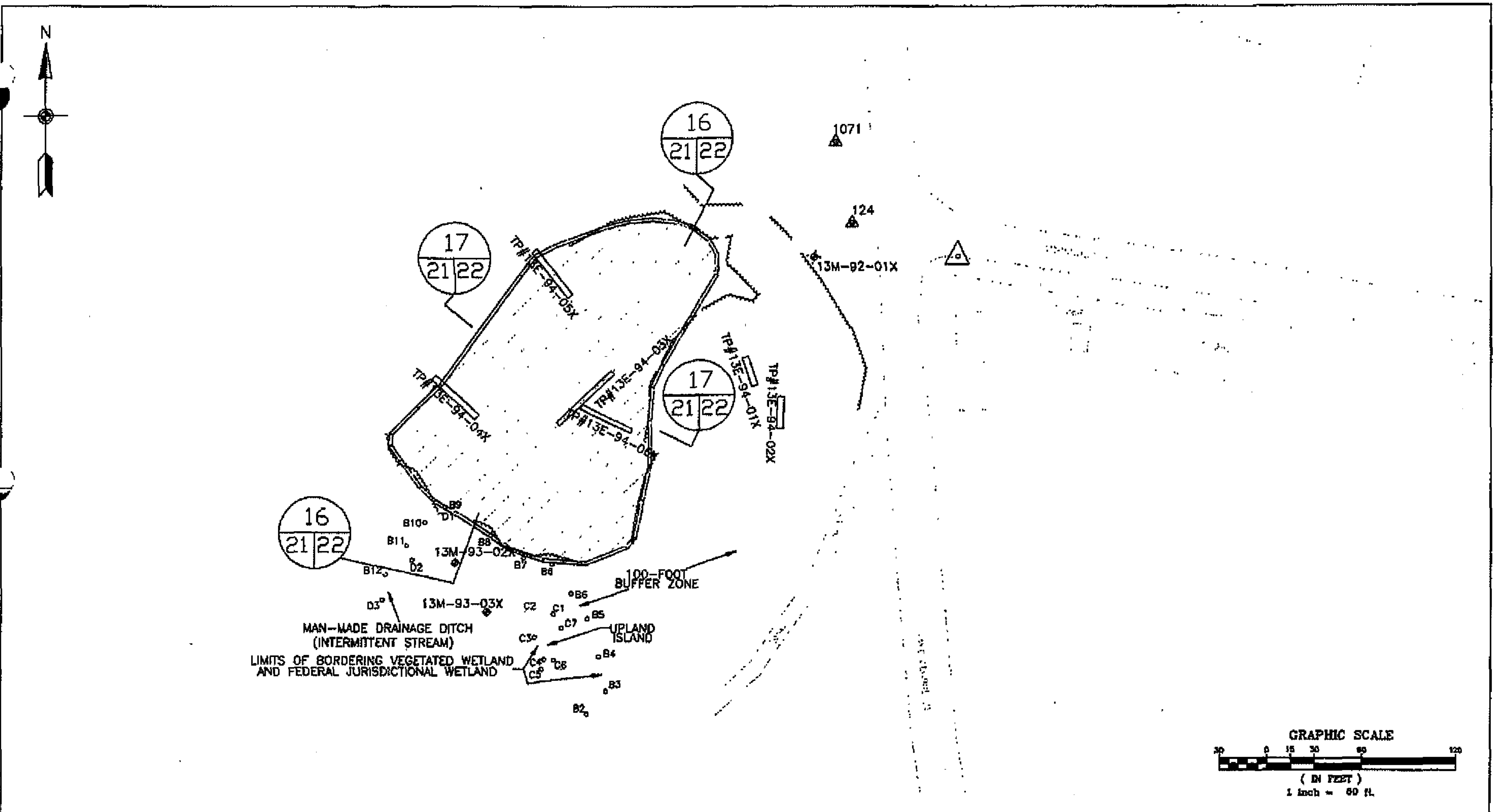
NORTH CENTRAL RESIDENCE OFFICE
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

SA 12
SITE PLAN-EXISTING CONDITIONS
LANDFILL REMEDIATION PROJECT

DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
SCALE: AS SHOWN
S&W PROJECT NO. [illegible]
REV. AUGUST 4, [illegible]
FEBRUARY [illegible]

REFERENCE NO.
C-22
SHEET 30 OF 36



DATE	REVISIONS	NO.	BY

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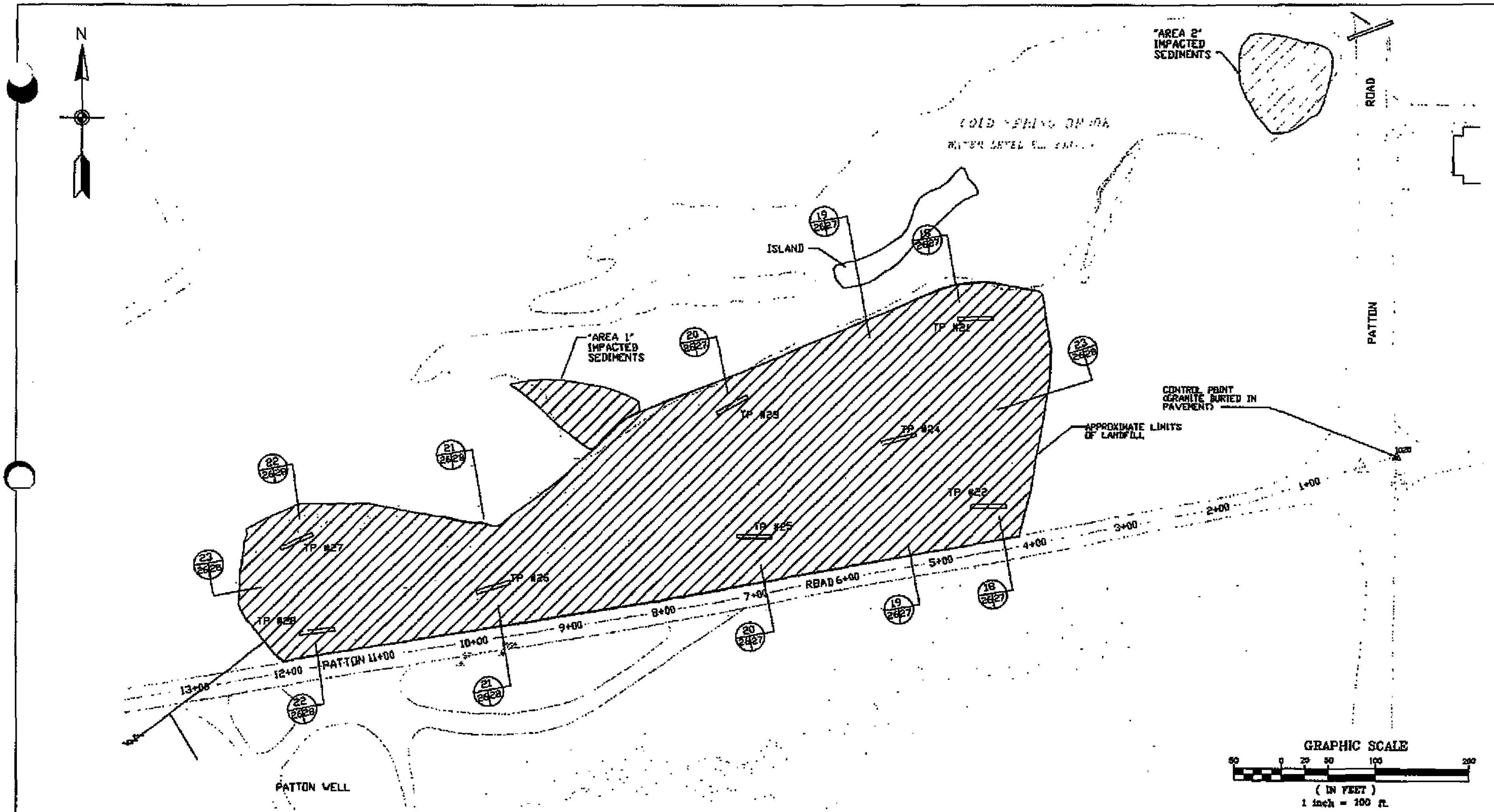
NORTH CENTRAL RESIDENCE OFFICE
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

SA 13
SITE PLAN – EXISTING CONDITIONS
LANDFILL REMEDIATION PROJECT
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
SCALE: AS SHOWN

REFERENCE NO.
C-13
SHEET 18 OF 38



DATE	REVISIONS	NO.	BY

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PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NORTH CENTRAL RESIDENCE OFFICE
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

AOC 40
EXISTING CONDITIONS PLAN
LANDFILL REMEDIATION PROJECT

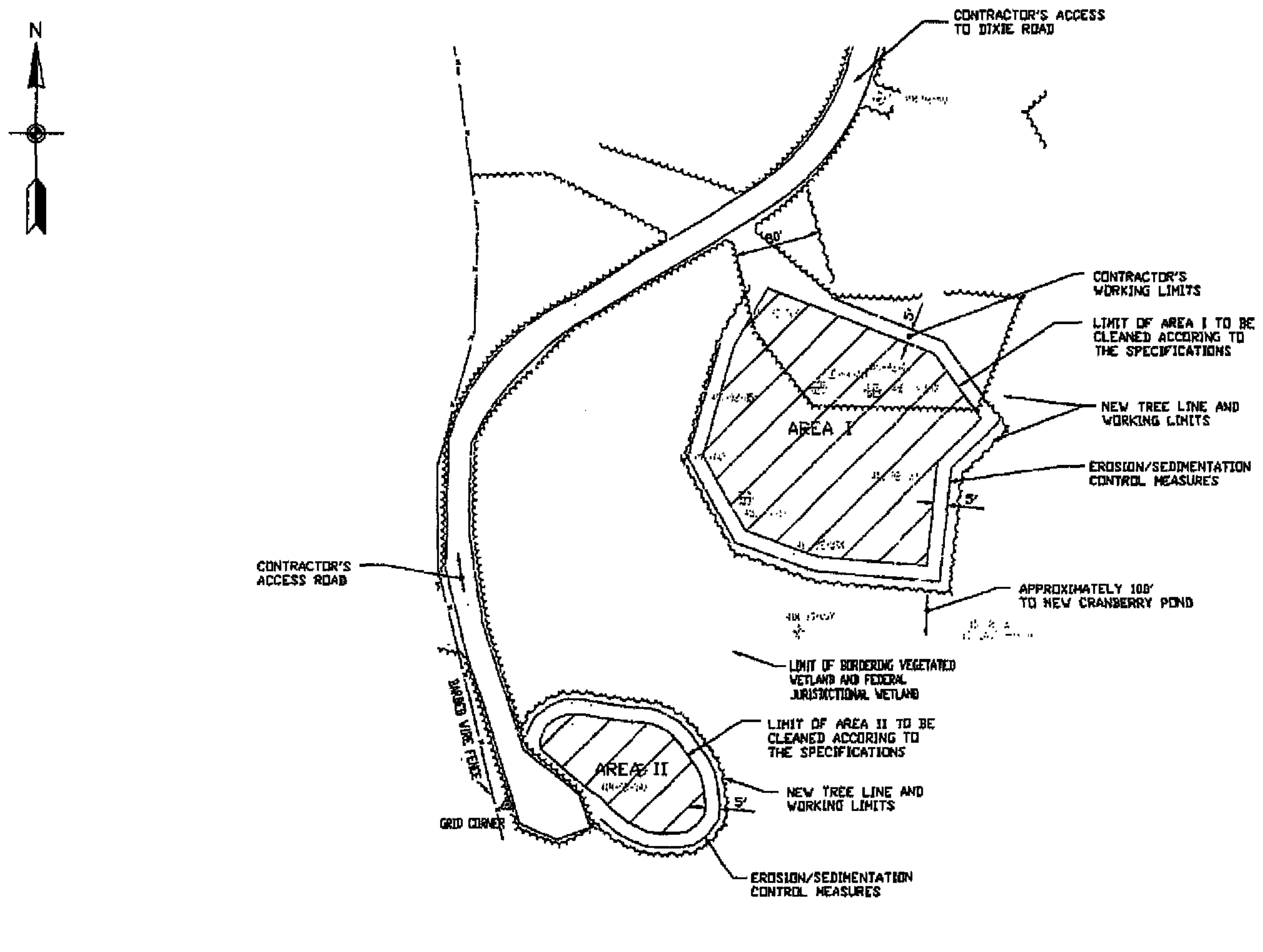
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
S&W PROJECT NO. 0583611000

SCALE: AS SHOWN

REV. AUGUST 4, 2003
FEBRUARY 9, 2000

REFERENCE NO.
C-16

SHEET 23 OF 38



NOTE:

CONTRACTOR'S STAGING AREA FOR THIS SITE SHALL BE DETERMINED BY THE CONTRACTING OFFICER.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

1 inch = 40 ft.

DATE	REVISIONS	NO.	BY

PREPARED BY:

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PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NORTH CENTRAL RESIDENCE OFFICE
DEVENS, MASSACHUSETTS
CONTRACT NO. DACW33-97-D-0002, TASK ORDER 10

AOC 41
SITE PLAN-EXISTING CONDITIONS
LANDFILL REMEDIATION PROJECT

DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
S&W PROJECT NO. 0668511000

SCALE: AS SHOWN

REV. AUGUST 4, 2003
FEBRUARY 9, 2000

REFERENCE NO.
C-24

SHEET 35 OF 38

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 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.	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).

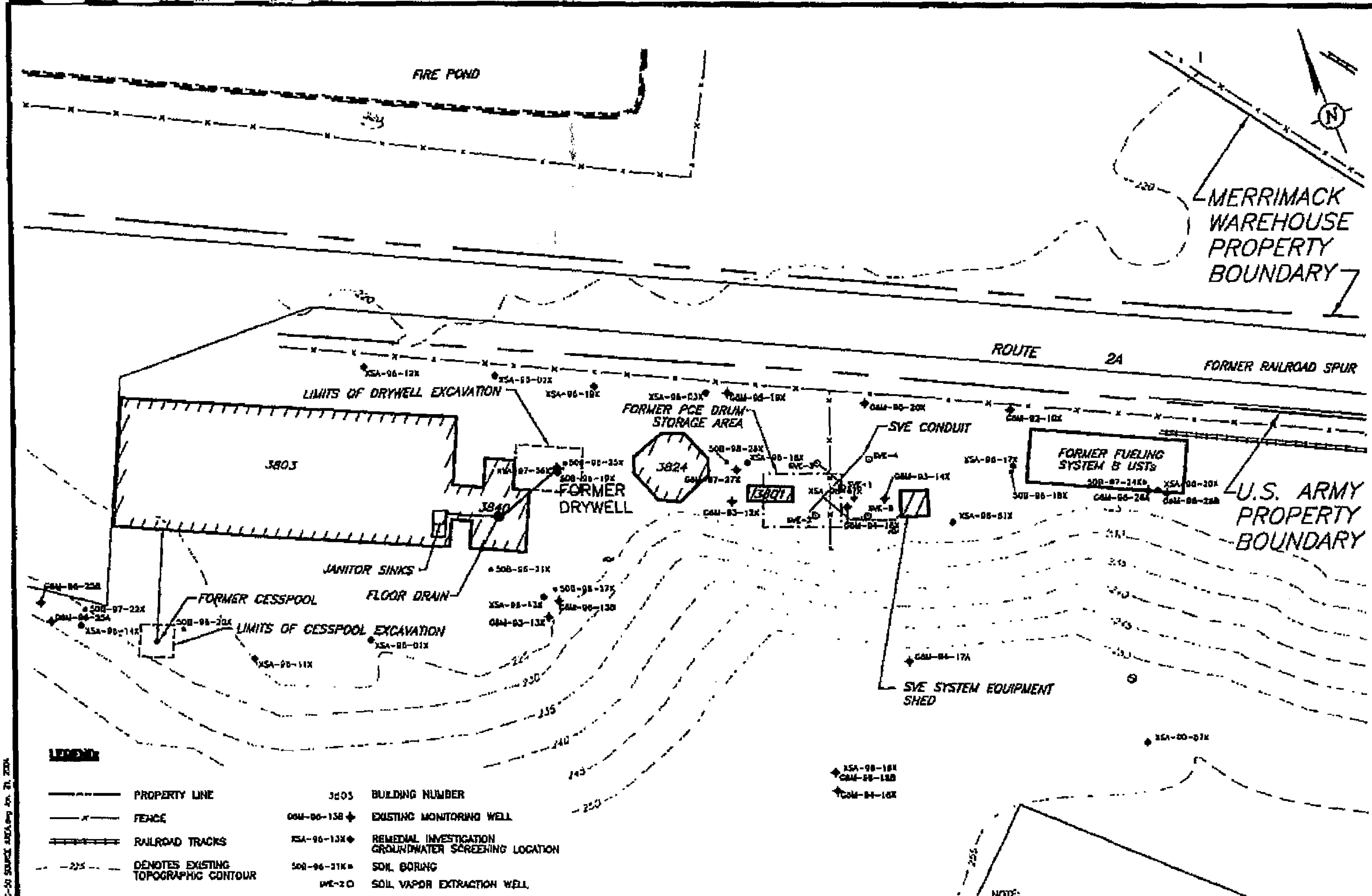
Notes:

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.

APPENDIX I

AOC 50



SOURCE : HARDING LAWSON ASSOCIATES, DRAFT FEASIBILITY STUDY REPORT (FIGURES 1-4 & 1-5)

0 60
SCALE IN FEET

ARCADIS

175 Cabot Street, Suite 400
Lowell, Massachusetts 01854
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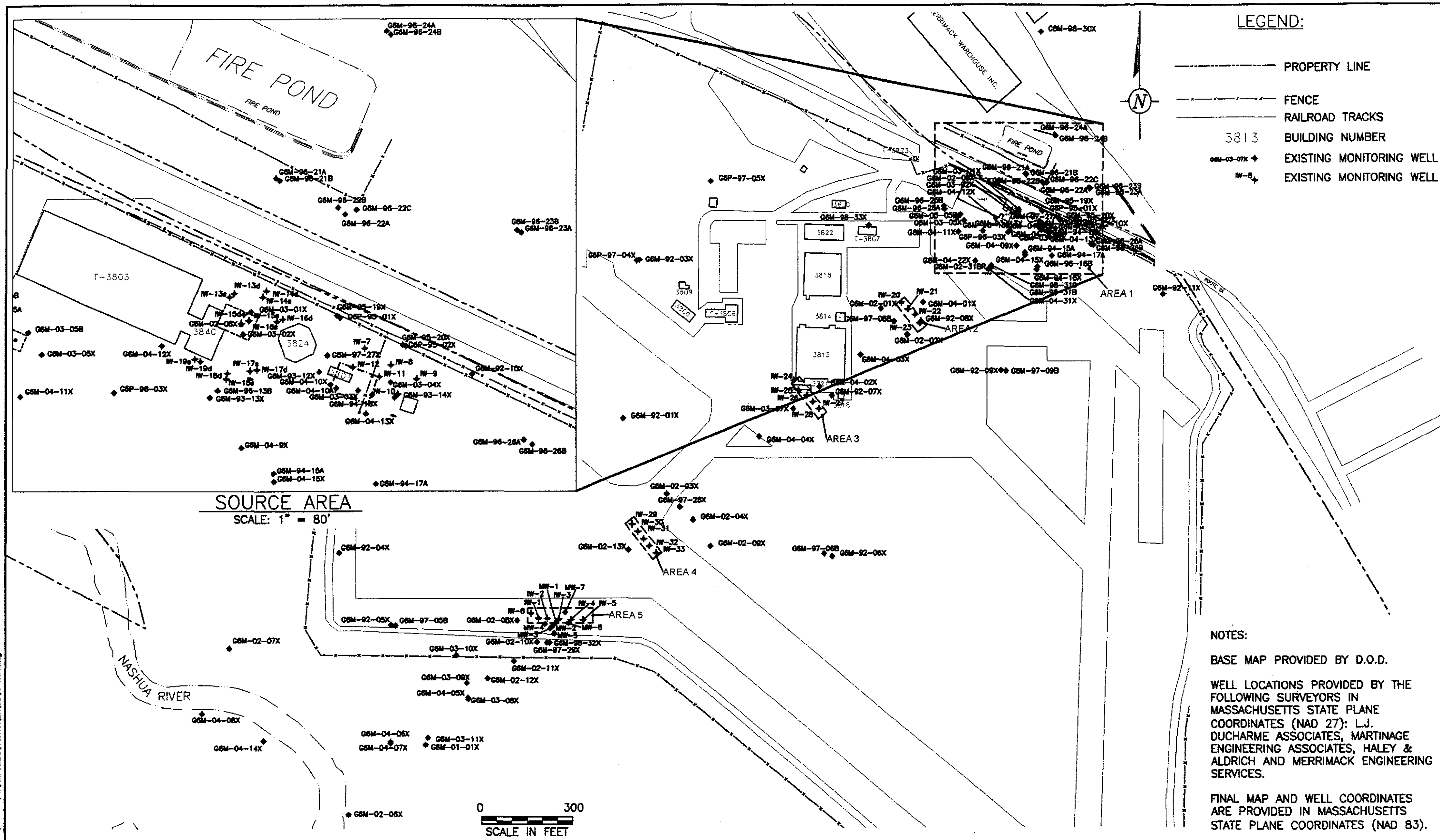
DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/06/02	C. CASTELLUCCIO	A. HANNUM
SOURCE AREA		LEAD DESIGN PROF. M. HANSEN	CHECKED J. HORST
AOC 50 DEVENS, MASSACHUSETTS		PROJECT NUMBER MA000664.0001	DRAWING NUMBER 2



NOTES:

BASE MAP PROVIDED BY D.O.D.

WELL LOCATIONS PROVIDED BY THE FOLLOWING SURVEYORS IN MASSACHUSETTS STATE PLANE COORDINATES (NAD 27): L.J. DUCHARME ASSOCIATES, MARTINAGE ENGINEERING ASSOCIATES, HALEY & ALDRICH AND MERRIMACK ENGINEERING SERVICES.

FINAL MAP AND WELL COORDINATES ARE PROVIDED IN MASSACHUSETTS STATE PLANE COORDINATES (NAD 83).

Area Manager	D. KNOX
Project Director	C. CASTELLUCCIO
Task Manager	C. CASTELLUCCIO
Technical Review	C. CASTELLUCCIO

ARCADIS

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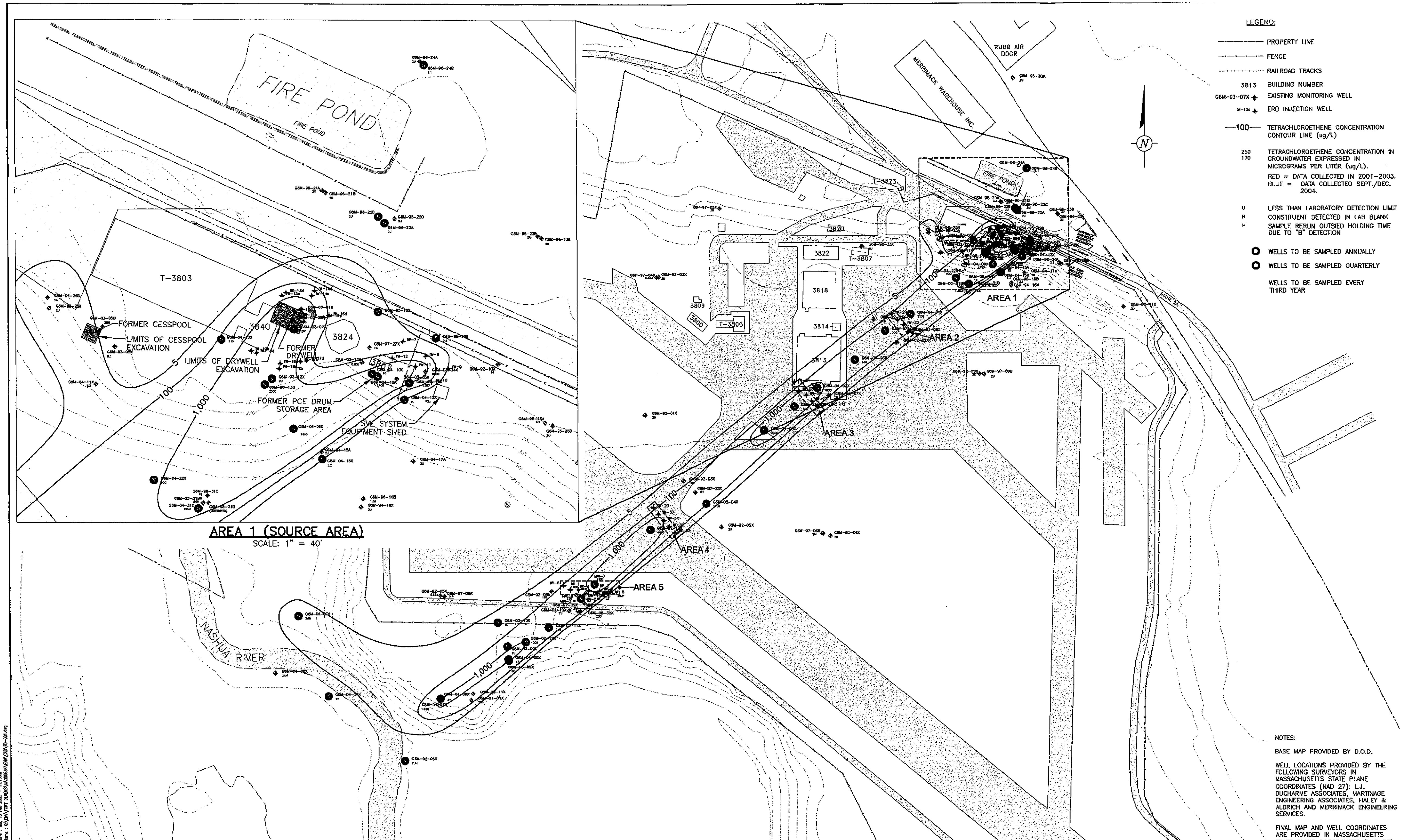
SITE PLAN

AOC 50
DEVENS, MASSACHUSETTS

Project Number: MA000664.0016
Drawing Date: 8 FEBRUARY 2005
Figure: 2



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0 300
SCALE IN FEET

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PCE CONCENTRATIONS DETECTED IN GROUNDWATER DECEMBER 2004

AOC 50
DEVENS, MASSACHUSETTS

Project Number	MA000664.0016
Date	02/07/05
Figure	6

Table 6. Summary of Key Analytical Results and Field Parameter Measurements, AOC 50, Devens, Massachusetts

Well ID	Date	Laboratory Parameters																	Field Parameters					
		PCE	TCE	c-1,2-DCE	t- 1,2-DCE	1,1-DCE	VC	TOC	Alkalinity	Nitrate	Sulfate	Sulfide	Dissolved Arsenic	Dissolved Iron (Fe2+)	Dissolved Manganese	Ethane	Ethene	Methane	pH	DO	ORP	SpC	Turbidity	Temp
		(ug/L)						(mg/L)					(ug/L)	(mg/L)	(ug/L)	(ng/L)		(ug/L)	(SU)	(mg/L)	(mV)	(mS)	(NTUs)	°C
G6M-02-01X	2/28/2002	11	2U	2U	2U	1U	2U												6.91	4.7	66.6	0.624	14	13.53
G6M-02-01X	9/23/2004	24B	2U	2U	2U	1U	2U												6.64	2.54	145	0.784	6.11	19.41
G6M-02-03X	2/26/2002	210	2U	2U	2U	1U	2U												11.61	2.21	11	1.154	18.1	16.08
G6M-02-03X	9/23/2004	48	2U	2U	2U	1U	2U												4.95	1.17	632.1	1.374	3.8	18.88
G6M-02-04X	2/26/2002	470	0.88J	1.3J	2U	1U	2U												6.47	3.4	189.5	0.26	24	14.39
G6M-02-04X	9/23/2004	170B	2U	2.9	2U	1U	2U						5U	1U	15U				6.29	3.03	175.5	0.453	8.48	17.99
G6M-02-05X	2/28/2002	130	2U	1.9J	2U	1U	2U												6.15	6.61	181.1	0.597	11	13.1
G6M-02-05X	1/30/2003	170	2U	2.3	2U	1U	2U																	
G6M-02-06X	3/1/2002	2U	2U	2U	2U	1U	2U												7.16	8.91	134.8	0.135	32	11.16
G6M-02-06X	9/24/2004	5.5B	2U	2U	2U	1U	2U												7.33	9.48	152.8	0.09	0.02	14.01
G6M-02-07X	2/26/2002	24	2U	2U	2U	1U	2U												7.34	-0.68	110.3	0.259	46	12.86
G6M-02-07X	9/23/2004	26B	2U	2U	2U	1U	2U												7.26	1.72	332.8	0.423	25	13.93
G6M-02-08X	5/17/2002	2300	35	250	2U	1U	5.8																	
G6M-02-08X	1/31/2003	3600	46	480	2.3	1U	2.2																	
G6M-02-08X	3/31/2005	1300	38J	250	50U	50U	50U	15	61.5	1.1	6.2	2U	5U	0.3J	770	49	790	1.2	7.08	9.1	-50	0.563	24.6	11.44
G6M-02-08X	7/5/2005	1000	130	1800	12U	12U	12U	450	350	0.05U	3.7	8.3	33	110	29000	160	220	3	4.23	1.66	19.1	1.616	4.72	15.95
G6M-02-11X	8/1/2002	450	2.8	2U	2U	1U	2U						5U						6.01	0.46	184	0.984	8.13	16.6
G6M-02-11X	8/28/2002	540J	2U	2U	2U	1U	2U	5U	44				5U						6.05	0.51	173	0.905	6.49	15
G6M-02-11X	10/29/2002	970	22	3	2U	1U	2U	5U	51	0.10U	17	2.0U	5U	1.0U	1700				6.02	0.49	51	0.92	5.04	12.1
G6M-02-11X	2/3/2003	710	22	2U	20U	1U	2U	5U	65				5U	1.0U					6.22	0.71	178	0.971	12.7	9.8
G6M-02-11X	7/16/2003	530	54	33	2U	1U	2U	5U	120		16M	2.0U	5U	1.0U		5.0U	14	460	6.31	0.86	166	0.813	11.9	15.4
G6M-02-11X	9/26/2003	590	31	37	2U	1U	2U	19					5U		1700	5.0U	5.0U	1200	6.6	0.41	146	0.921	7.2	13.9
G6M-02-11X	1/8/2004	300	15	49	2U	1U	2U	5U	150		12J	2.0U	5U	1.0U	1900	5.0U	9.3	2300	6.29	0	104	0.729	0.6	10.7
G6M-02-11X	3/10/2004	160	11	53	2U	1U	2U	1.8	130		9.6M	2U	5U	1U	2200	5U	68	14000	6.39	0.82	103	0.847	7.5	13.2
G6M-02-11X	6/4/2004	440	23	54	2U	1U	2U	2.4J	110		12M	1.9J	5U	1U	1900	5U	10	2300	6.72	12.13	54.5	0.807	21.3	14.12
G6M-02-11X	9/22/2004	540	50	140	2U	1U	2U	1.2	100	0.5U	12	1.5J	5U	1U	2400	5U	5U	13000	6.19	0.96	412.7	0.996	1.25	16.05
G6M-02-11X	12/15/2004	760	47	120	2U	1U	2U	5U	95	1	15	2U	5U	1U	2100	5U	21	9700	6.35	1.36	200.1	0.675	21.2	8.61
G6M-02-11X	3/28/2005	1100	41	45	40U	40U	40U	3.6J	90	0.2U	13	2UJ*	5U	1UM	2200	5U	65	10000	6.19	1.02	84.3	0.938	48.3	6.55
G6M-02-11X	7/1/2005	1500	90	280	10U	10U	10U	9.4	98.4	0.05U	14	1U	2.1	1UJ*	1800	28	420	15000	5.78	0.37	221.6	0.806	6.66	15.58
G6M-02-12X	8/1/2002	330	2U	2U	2U	1U	2U						5U						6.24	0.64	19	0.924	37.6	18.2
G6M-02-12X	8/28/2002	520	6.5	2U	2U	1U	2U	5U	54				5U						6.15	0.19	156	0.868	2.96	14.2
G6M-02-12X	10/29/2002	790	10	2U	2U	1U	2U	2.0J	40	0.10U	17	2.0U	5U	1.0U	1100				6.14	0.27	68	0.927	2.08	13.5
G6M-02-12X	2/3/2003	580	4	2U	2U	1U	2U	5U	52				5U	1.0U					6.04		78	0.947	5.06	12.8
G6M-02-12X	7/14/2003							5U																
G6M-02-12X	9/22/2004	1000	43	110	2U	1U	2U	1U	84	0.5U	13	2U	5U	1U	450	5U	5U	2900	5.87	0.35	570.2	0.873	4.95	14.83
G6M-02-13X	8/2/2002	4600	4	2U	2U	1U	2U						5U						6.17	0.54	141	0.665	7.62	19.7
G6M-02-13X	9/23/2004	5000	13	16	2U	1U	2U	1U	31	2.3	17	1.8J	5U	1U	1200	270	150	57	6.37	0.34	170.8	0.618	2.14	17.11
G6M-02-13X	12/13/2004	4600	14	21	2U	1U	2U	5U	34	2.5	16M	2U	5U	1U	1300	270	110	88	5.79	0.89	274.8	0.518	2.63	13.11
G6M-02-13X	3/30/2005	2100	64J	210	100U	50U	100U	8.1	60	0.23	13	2U	36	4.2	4000	160	110	38	5.97	0.89	-22.6	0.735	2.91	14.37
G6M-02-13X	8/11/2005	2300	190	460	5.9	2U	2U	66	230	.05U	2.3	1U	150	34J*	12000J*	26	45	46	5.82	0.74	-68.8	0.897	5.6	21.32
G6M-03-02X	5/12/2003	1300	2U	4.4	2U	1U	2U																	
G6M-03-02X	10/11/2004	690	2U	5.6	2U	1U	2U	1U	12	3.7	20	1.7J	5U	1U	17	51	30	2.6	6.29	8.25	97.4	0.321	12.1	14.82
G6M-03-02X	12/15/2004	200	2U	5	2U	1U	2U	390	29	2.4	30	2U	5U	1U	610	56	63	3.4	5.86	1.75	-132.9	0.382	1.93	8.4
G6M-03-02X	3/29/2005	340	20U	14J	20U	10U	20U	1300	366	0.2U	230	6.7J*	640	140M	49000	150	340	5.1	5.23	0.65	-20.1	1.654	28.7	11.99
G6M-03-02X	6/29/2005	190	11	91	2.5U	2.5U	2.5U	1200	431	.05U	74	11	130	220J*	35000J*	290	650	43	4.62	1.13	2.9	1.723	29.1	20.17

Table 6. Summary of Key Analytical Results and Field Parameter Measurements, AOC 50, Devens, Massachusetts

Well ID	Date	Laboratory Parameters																	Field Parameters					
		PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC	TOC	Alkalinity	Nitrate	Sulfate	Sulfide	Dissolved Arsenic	Dissolved Iron (Fe2+)	Dissolved Manganese	Ethane	Ethene	Methane	pH	DO	ORP	SpC	Turbidity	Temp
		(ug/L)						(mg/L)					(ug/L)	(mg/L)	(ug/L)	(ng/L)		(ug/L)	(SU)	(mg/L)	(mV)	(mS)	(NTUs)	°C
G6M-03-07X	5/12/2003	1200	7.2	34	2U	1U	2U																	
G6M-03-07X	9/24/2004	1700	6.3	31	2U	1U	2U	1U	10U	4.3J*	12	1.6J	5U	1UJ*	20	35	280	5.7	5.77	7	168.3	0.341	84.6	18.13
G6M-03-07X	12/16/2004	1500	6	35	2U	1U	2U	5U	10U	4.2	12	2.9	5U	1U	190	26	80	0.39	6.02	17.09	321.7	0.348	8.46	13.03
G6M-03-07X	3/30/2005	1100	91	140	40U	20U	40U	29	76	0.33	8	2U	18	18	10000	78	210	1.8	6.33	1.9	-54.6	0.671	0.7	16.73
G6M-03-07X	6/29/2005	940	78	940	40U	20U	40U	83	118	0.079	6.4	1U	31	39J*	15000J*	60	340	3.9	11.97	1.12	-20.1	0.915	5.93	23.98
G6M-03-08X	5/14/2003	750	2U	2U	2U	1U	2U						5U	1.0U										
G6M-03-08X	9/22/2004	690	6.3	5.4	2U	1U	2U	1U	16	8.3	13	1.5J	5U	1U	15U	5U	5U	1.8	5.89	1.81	247.6	0.463	3.22	15.28
G6M-03-08X	12/16/2004	1100	11	9.6	2U	1U	2U	5U	20	5.7	13	2.9	5U	1U	17	69	30	4.7	5.93	0.7	135.7	0.495	8.98	9.73
G6M-03-08X	3/31/2005	340	20U	9.6J	20U	20U	20U	0.3J	12.0	2.3	17	2U	5U	1U	15U	11	450	14	5.94	1.96	166.3	0.205	0.93	12.88
G6M-03-08X	7/6/2005	780	8.2	15	2U	1U	2U	5.5	28.6	1.8	14	1U	4U	1U	10U	110	68	410	5.85	0.78	236.1	0.463	5.37	15.32
G6M-03-09X	5/14/2003	2U	2U	2U	2U	1U	2U						5U	1.0U										
G6M-03-09X	9/23/2004	3.7B	2U	2U	2U	1U	2U	1U	23	19	15	2.2	5U	1U	15U	5U	5U	1.9	6.23	8.67	176.2	0.13	4.57	14.33
G6M-03-09X	12/14/2004	2U	2U	2U	2U	1U	2U	5U	25	11	15	2U	5U	1U	15U	15	26	2	6.08	8.17	417.6	0.106	12.1	10.23
G6M-03-09X	3/29/2005	1.5J	2U	2U	2U	1U	2U	0.3J	18.0	1.5	13	2U	5U	1UM	15U	13	260	1.4	6.18	6	113.2	0.123	72.4	11.28
G6M-03-09X	6/30/2005	5.8	2U	2U	2U	1U	2U	15	25.1	1.3	13	1U	2U	1UJ*	10U	77	32	1.2	5.75	2.81	160.2	0.135	53.6	15.19
G6M-03-10X	5/14/2003	15	2U	2U	2U	1U	2U						5U	1.0U										
G6M-03-10X	9/22/2004	27	2U	2U	2U	1U	2U	1U	51	2.8	12	1.5J	5U	1U	340	50	680	680	6.28	1.28	-77.2	0.539	20.5	15.41
G6M-03-10X	12/14/2004	19	2U	44	2U	1U	2U	5U	110	3.8	21	2U	5U	1U	880	20	25	1.9	6.52	0.94	62	0.801	1.57	12.1
G6M-03-10X	3/29/2005	14	0.98J	68	1.2J	1U	2U	5.9	146	0.2U	12	2U	5U	1UM	1200	5U	380	2600	6.44	0.59	-14.5	0.869	6.77	11.09
G6M-03-10X	6/30/2005	3.6	2U	2U	2U	1U	2U	19	199	0.1	11	1U	2U	1UJ*	1900	26	21	8600	5.18	0.39	273.2	0.702	5.06	16.6
G6M-04-01X	9/23/2004	250B	3.6	21	2U	1U	2U						5U	1U	220				6.82	3.92	245.2	2.391	9.42	18.11
G6M-04-02X	9/23/2004	1900	2U	3.8	2U	1U	2U						5U	1U	86				6.59	7.25	152.4	0.704	9.52	22.11
G6M-04-03X	9/23/2004	440	2U	3.3	2U	1U	2U	1.4	53	5.1	23	2.2	5U	1U	3100	220	36	100	6.37	3.41	446.5	1.236	12.2	18.36
G6M-04-04X	9/24/2004	2300	7.8	24	2U	1U	2U	1U	10U	5.5	20	2U	5U	1UJ*	560	37	120	13	5.75	5.05	197.3	1.637	169	15.8
G6M-04-05X	9/22/2004	140	2U	2U	2U	1U	2U	1U	14	4.9	14	2U	5U	1U	15U*	5U	9.2	1.3	6.1	9.68	233.9	0.099	0.68	14.76
G6M-04-05X	12/15/2004	17	2U	2U	2U	1U	2U	5U	14	7.5	13	2U	5U	1U	15U	5U	16	1.4	5.87	1.17	228.7	0.098	1.04	12.74
G6M-04-05X	3/30/2005	130	10U	10U	10U	5U	10U	0.5J	14	1.2	10	2U	5U	1U	15U	7.4	28	15	6.04	2.8	123.1	0.093	1.92	13.84
G6M-04-05X	6/30/2005	200	2U	2U	2U	1U	2U	2.4	15.9	0.87	8.9	1U	2U	1UJ*	10U	41	22	96	5.48	0.88	207.1	0.094	8.19	15.41
G6M-04-06X	9/22/2004	160	2U	2U	2U	1U	2U	1U	110	5.3	8.7	2U	5U*	1U	15U	56	5U	3.4	11.01	9.17	-0.6	0.341	1.34	15.84
G6M-04-06X	12/16/2004	24	2U	2U	2U	1U	2U	5U	54	7.9	10	2.9	21	1U	15U	17	28	0.47	10.89	9.42	106.9	0.254	2.26	12.77
G6M-04-06X	3/30/2005	37	2U	2U	2U	1U	2U	5U	37	2.0	12	2U	7.5	1U	15U	8.7	51	0.58	9.47	10.46	10.6	0.235	0.32	15.25
G6M-04-06X	7/1/2005	140	2U	2U	2U	1U	2U	2.8J	10.3	1.5	25	1U	2U	1UJ*	190	34	56	9.7	9.08	9.77	457.2	0.214	0.95	17.23
G6M-04-07X	9/22/2004	900	2.7	8.4	2U	1U	2U	1U	56	5.4	32	2U	5U	1U	260	61	120	3.1	7.1	3.42	110.1	0.243	9.28	14.61
G6M-04-07X	12/17/2004	1100	2	9.3	2U	1U	2U	0.6J	43	6.4M	14	2U	28	1U	47	110	2200	2.1	7.51	1.98	-38.9	0.246	74.7	10.34
G6M-04-07X	3/29/2005	240	10U	10U	10U	5U	10U	0.5J	43.2	1.5	14	2U	12	1UM	27	31	640	1.9	6.88	4.19	22	0.229	4.2	12.76
G6M-04-07X	7/5/2005	170	2U	2U	2U	1U	2U	5U*	41.1	1.7	14	1U	4	1U	37	70	42	1.8	5.83	5.44	369.9	0.186	23.4	17.93
G6M-04-08X	9/24/2004	4.2B	2U	2U	2U	1U	2U												7.29	0.81	-75.5	0.632	52.8	14.46
G6M-04-09X	9/24/2004	7400	4.2	9	2U	1U	2U						5U	1UJ	160				5.15	3.84	637.6	0.495	0.82	17.2
G6M-04-10A	9/20/2004	2900	2.5	3.4	2U	1U	2U	1U	41	4.5J*	22	2	5U	1	170	21	30	1.1	5.91	3.75	206.5	0.552	1.7	13.59
G6M-04-10A	12/14/2004	2400	2U	2U	2U	1U	2U	5U	25	1.7	13	2U	5U	1U	120	15	96	1500	5.89	2.81	215.4	0.965	2.04	8.84
G6M-04-10A	3/30/2005	640	40U	40U	40U	40U	40U	52	107	0.33	16	2U	8.4	1.2	8100	330	70	1.4	5.9	4.22	68.3	1.01	1.76	10.62
G6M-04-10A	8/11/2005	380	45	390	2U	2U	2U	240	359	.05U	7.8	1U	77	87J*	50000J*	240	230	3.4	5.65	1.84	11.9	0.977	14.9	19.56
G6M-04-10X	9/20/2004	70	7.5	32	2U	1U	2U	1U	11	6.7J*	21	3.4	5U	1	260	19	39	1	5.59	6.87	246.2	0.902	0.95	14.64
G6M-04-10X	12/14/2004	65	7.8	35	2U	1U	2U	5U	10U	6.6	23	2U	5U	1U	200	22	53	2.2	5.4	7.57	424.2	0.816	5.5	6.31
G6M-04-10X	3/31/2005	56	6.8	30	2U	2U	2U	0.4J	10U	1.5	25	2U	5U	1U	190	22	860	1.1	5.18	7.65	256.7	1.337	0.41	11.18
G6M-04-10X	7/1/2005	50	5.4	23	2U	1U	2U	5.9	43.5	1.7	12	1U	4.2	1UJ*	10U	35	50	12	5.33	6.09	265.2	1.502	0.9	15.77
G6M-04-11X	9/20/2004	8.5	2U	2U	2U	1U	2U												6.54	3.42	374.7	0.782	16.8	16.22
G6M-04-12X	9/20/2004	310	7.5	56	2U	1U	2U						5U*	1	44				11.03	0.86	102.6	2.003	5.22	15.88
G6M-04-13X	9/21/2004	8	2U	2U	2U	1U	2U						5U	1U	350				5.96	8	551.8	0.138	1.75	14.39

Table 6. Summary of Key Analytical Results and Field Parameter Measurements, AOC 50, Devens, Massachusetts

Well ID	Date	Laboratory Parameters																	Field Parameters					
		PCE	TCE	c-1,2-DCE	t- 1,2-DCE	1,1-DCE	VC	TOC	Alkalinity	Nitrate	Sulfate	Sulfide	Dissolved Arsenic	Dissolved Iron (Fe2+)	Dissolved Manganese	Ethane	Ethene	Methane	pH	DO	ORP	SpC	Turbidity	Temp
		(ug/L)						(mg/L)					(ug/L)	(mg/L)	(ug/L)	(ng/L)		(ug/L)	(SU)	(mg/L)	(mV)	(mS)	(NTUs)	°C
G6M-04-14X	11/16/2004	12	2U	2U	2U	1U	2U																	
G6M-04-15X	9/21/2004	5.2	2U	5.3	2U	1U	2U						5U*	4.8	8100				5.26	0.82	410	2.64	0.23	14.4
G6M-04-22X	9/21/2004	900	24	110	2U	1U	2U						5U	1U	990				6.3	4.78	192.2	0.897	19	15.24
G6M-04-31X	9/21/2004	1600	2U	4.2	2U	1U	2U						5U	1U	190				5.69	5.1	211	1	2.99	16.33
G6M-93-13X	10/15/2001	0.55J	2U	2U	2U	1U	2U												5.3	9.9	355	6	1.2	14.5
G6M-93-13X	9/20/2004	3.8	2U	2U	2U	1U	2U	1U	23	1.3J*	10	2.7J*	5U	1	15U	8.1	14	0.89	6.14	13.07	250.7	0.059	4.31	16.26
G6M-93-13X	12/13/2004	2U	2U	2U	2U	1U	2U	5U	20	1.2	9.6M	2U	5U	1U	15U	5U	5U	3.8	6.16	10.41	192.5	0.08	1.42	12.95
G6M-93-13X	3/29/2005	2U	2U	2U	2U	1U	2U	0.6J	22.0	0.2U	9.1	2U	5U	1UM	15U	6.3	280	3.1	6.24	10.4	97.3	0.09	0.64	10.89
G6M-93-13X	6/28/2005	2U	2U	2U	2U	1U	2U	4.9	41.2	0.081	8.2	1U	2U	1U	10U	23	20	9.4	11.3	11.43	146.1	0.275	2.46	19.81
G6M-94-18X	10/16/2001	2U	2U	2U	2U	1U	2U												5.2	8.4	291	7	6.4	12.6
G6M-94-18X	2/25/2002	6400	2U	2U	2U	1U	2U																	
G6M-94-18X	2/27/2002	2800								0.91									6.11	8.9	147	0.086	45.3	12.07
G6M-94-18X	2/4/2003	37000	2U	2U	2U	1U	2U																	
G6M-94-18X	9/20/2004	3400	2U	2U	2U	1U	2U	1U	18	2	11	4	5U	1	15U	11	22	1.1	6.15	9.03	321.7	0.078	3.8	13.89
G6M-94-18X	12/15/2004	2300	2U	2U	2U	1U	2U	5U	110	1.6	10	2U	5U	1U	15U	5U	8.5	9.1	6	9.36	441	0.062	64.7	11.35
G6M-94-18X	3/31/2005	17000	1000U	1000U	1000U	1000U	1000U	1.1J	14.4	0.23	10	2U	5U	1U	15U	11	710	0.97	6.17	10.34	171.9	0.063	16.6	11.34
G6M-94-18X	7/1/2005	2000	2.5U	2.5U	2.5U	2.5U	2.5U	4.7J	14	0.13	9.2	1U	2U	1UJ*	10U	51	25	2.7	5.77	8.03	247.9	0.083	21.3	18.31
G6M-95-19X	10/15/2001	110	6.6	42	1.5J	1U	2U												5.46	6.24	202	2.87	8.5	14.8
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	15.91
G6M-95-20X	10/16/2001	4.4	2U	2U	2U	1U	2U												5.9	7.2	212	0.27	4.1	16
G6M-95-20X	2/25/2002	5	2U	2U	2U	1U	2U												6.59	12.37	155.7	0.171	7.67	15.24
G6M-95-20X	2/27/2002									4.7														
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	15.69
G6M-96-13B	10/15/2001	3600	39	220	12	1U	1.1J												6.1	2.9	219	0.12	6.8	12.4
G6M-96-13B	2/25/2002	5200	34	200	1.4J	1U	1.5J												6.4	3.85	181.5	1.142	6.59	10.96
G6M-96-13B	1/31/2003	3800	31	190	2U	1U	2U																	
G6M-96-13B	9/20/2004	4500	35	210	2U	1U	2.1	1U	38	5.4J*	19	2	5U	1	15U	22	120	1.7	6.3	3.57	186.4	1.035	0.5	12.7
G6M-96-13B	12/13/2004	2500	24	150	2U	1U	2U	5U	35	5	31M	2U	5U	1U	23	50	25	24	6.26	2.57	316.5	0.787	2.68	11.05
G6M-96-13B	3/28/2005	4500	200U	180J	200U	200U	200U	5.7	47	0.46	17	2UJ*	5U	2.6M	1600	170	220	37	6.24	0.87	21.2	0.943	0.68	10.67
G6M-96-13B	8/10/2005	2800	190	1500	3.6	4.8	6.8	140	98.9	0.23	4.6	5.3	32	24J*	8100	150	440	2.9	4.35	0.16	-35.6	0.838	3.5	14.53
G6M-96-22A	10/16/2001	2U	2U	2U	2U	1U	2U												5.5	5.1	210	2	0	12.6
G6M-96-22A	2/28/2002	2U	2U	2U	2U	1U	2U			0.10U									5.7	8.37	183.5	1.78	0.5	9.54
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	13.42
G6M-96-22B	10/19/2001	2U	2U	2U	2U	1U	2U												6.76	6.95	176	2.09	0.6	12.51
G6M-96-22B	2/28/2002	2U	2U	2U	2U	1U	2U			0.10U									6.35	7.83	198.5	2.002	1.5	10.08
G6M-96-22B	1/31/2003	2U	2U	2U	2U	1U	2U																	
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	13.5
G6M-96-24B	10/16/2001	18	2U	2U	2U	1U	2U												6.37	0	81	0.42	19	12.96
G6M-96-24B	3/1/2002	11	2U	2U	2U	1U	2U												6.35	-6.27	106.7	0.43	2.8	10.53
G6M-96-24B	1/31/2003	7.5	2U	2U	2U	1U	2U																	
G6M-96-24B	1/12/2004	11	2U	2U	2U	1U	2U																	
G6M-96-24B	9/24/2004	13B	2U	2U	2U	1U	2U												6.17	0.2	152.2	0.422	0.44	12.34
G6M-96-24B	12/17/2004	8.1	2U	2U	2U	1U	2U												6.05	0.46	259.6	0.384	2.43	11.49
G6M-96-24B	4/13/2005	8.2	1U	2.8	1U	1U	1U												5.32	0.2	216.6	0.429	2.49	10.82
G6M-96-24B	7/6/2005	7.6	2U	3	2U	1U	2U												5.69	1.34	242.8	0.77	0.02	16.85

Table 6. Summary of Key Analytical Results and Field Parameter Measurements, AOC 50, Devens, Massachusetts

Well ID	Date	PCE (ug/L)	TCE (ug/L)	c-1,2-DCE (ug/L)	t-1,2-DCE (ug/L)	1,1-DCE (ug/L)	VC (ug/L)	TOC (mg/L)	Alkalinity (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (ug/L)	Dissolved Iron (Fe2+) (mg/L)	Dissolved Manganese (ug/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (ug/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
		Laboratory Parameters																	Field Parameters					
G6M-96-25B	10/15/2001	360	2U	2U	2U	1U	2U												5.81	5.3	142	0.498	3.9	14.55
G6M-96-25B	2/25/2002	130	2U	2U	2U	1U	2U												6.7	11.51	158.5	0.15	9.75	11.1
G6M-96-25B	2/27/2002									7.2														
G6M-96-25B	1/31/2003	52	2U	2U	2U	1U	2U																	
G6M-96-25B	9/20/2004	56	2U	2U	2U	1U	2U												4.98	7.63	593	0.589	0	13.13
G6M-97-08B	10/18/2001	92	6.1	36	1.6J	1U	2U												5.6	4.8	224	0.13	18	15
G6M-97-08B	2/26/2002	100	5.9	32	2U	1U	2U												5.87	5.13	186.4	1.157	5.3	14.44
G6M-97-08B	9/22/2004	220	9.3	41	2U	1U	2U	1U	10U	6.1	12	1.5J	5U	1U	26	7.5	5U	1.3	5.69	4.66	252.8	1.516	18.3	17.01
G6M-97-08B	12/16/2004	200	7.7	41	2U	1U	2U	5U	10U	6.1	12	5.4	5U	1U	25	130	72	0.92	5.79	8.78	165	1.633	3.81	13.61
G6M-97-08B	3/30/2005	95	3.4J	16	4U	2U	4U	0.4J	12	0.80	7	2U	5U	1U	21	15	32	0.54	5.58	8.06	202.8	0.999	9.42	14.41
G6M-97-08B	6/28/2005	140	8	36	1.4	1U	2U	7.1	16.7	1.4	12	1U	2U	1J	27	16	41	35	11.3	4.94	173.7	1.506	8.16	19.31
MW-3	10/17/2001	4300	1500	540	20U	10U	20U												5.7	0.9	-127	1.4	3.1	14
MW-3	12/19/2001	26	4000	2200	20U	6.5J	20U	92			0.43J								6.28	0.43	-46	0.912	7.28	14.4
MW-3	1/3/2002							44					180	30		63	210	18	4.77	1.33	-48	2.795	4.4	13.4
MW-3	1/31/2002							38											6.64	0	-293	0.999		12
MW-3	2/13/2002	4400	1700	1600	1.6J	3.7	2U	15		0.10U	14	1.0J	190#	20	8300	79	290	53	6.65	0.75	-71	0.893	1.3	12
MW-3	3/13/2002	5200	640	1400	1.4J	2.8	2U	7.3		0.10U	15	2.0U	180	16	8400	93	370	66	6.72	0.25	-75	0.795	1.04	13.7
MW-3	4/2/2002	3100	1000	1700	2.2	4	2U	3.3J											6.74	4.28	-120	0.634	2.08	13.8
MW-3	4/17/2002	1200	1300	1600	1.2J	3.4	2U	6.1		3.0	7.9J	1.6J	240	37	17000	25	87	54	6.6	4.39	-102	0.771	0.81	17
MW-3	5/15/2002	31	23	2600	3.5	6.7	2U	96		0.10U	3.9	1.6J	260	42	19000	52	240	560	6.66	0.31	-124	1.46	1.68	13.7
MW-3	6/27/2002	200U	200UJ	1800	200UJ	100UJ	200UJ*	270		14	4.4J	2.0U	490J*	140	37000J	21	82	3900	6.7	1.64	-107	3.804	2.9	17
MW-3	7/31/2002							31											6.76	0.15	-225	1.606		12.2
MW-3	8/26/2002	990	640	580	2.1	4.4	2U	30	320				270			53	160	14000	6.83	0.15	-138	1.285	6.5	16.3
MW-3	10/28/2002	1900	820	1700	3.9	4.2	2U	6.3	190	0.10U	10	2.0U	330	39	9700	300	230	6300	6.7	0.4	-129	1.129	5.01	14.5
MW-3	2/3/2003	3	2U	2900	2U	7.1	2U	180	580		1.0U		330	120		5.0U	260	28000	6.84	0.3	-159	1.322	6.7	10.5
MW-3	7/16/2003	2.4	2U	2700	2U	7.5	2.5	17	450		4.0UB	2.0U	520	170		5.0U	100	23000	7.02	1.09	-138	1.464	39.2	16.3
MW-3	9/24/2003	670	1100	1900	2.4	6.9	2U	5.9					460	89	7900	5.0U	12	22000	6.1	9.17	-138	1.222	18.9	16.8
MW-3	1/9/2004	9.7	64	2000	2U	5.6	2U	130	500J		1.0U	2.0U	530	200J	15000	5.0U	5.0U	45000	6.73	0.4	-195	1.347	14.6	12.7
MW-3	3/11/2004	680	620	4700	2U	7.6	2U	6.1	200		4.4	2U	420	11	8400	5U	5U	27000	6.58	0.62	-161	0.972	4.3	12.4
MW-3	6/2/2004	2U	2U	1800	2U	4.5	2U	290	810		0.98JM	2U	670MSA	150	23000	5U	14	31000	6.95	0.1	-149	1.905	38.7	14.61
MW-3	9/21/2004	210	250	1900	2U	5.2	3.5	17	310	1J*	4.3J*	2UM	660	200J*	7200	86	5U	28000	6.66	0.95	-153.6	0.725	2.27	13.76
MW-3	12/13/2004	2U	2U	750	2U	1U	610	8	210	1.1	1.4M	2U	510	160	5400	92	3500	17000	6.62	1.6	-103.3	1.009	15.1	11.07
MW-3	3/28/2005	23J	16J	1000	50U	50U	280	21	405	0.2U	1U	7.5J*	670	150M	7300	5U	5100	25000	6.49	0.34	-134.9	1.26	2.37	12.46
MW-3	8/10/2005	440	80	120	2U	5.1	760	43	338	0.05U	2U	8	680	180	4400	61J*	13000	22000	11.13	0.71	-118.5	1.401	28.9	18.92
MW-7	2/14/2002	5900	4.5	2U	2U	1U	2U			5.2	20	0.6J	5U	1.0U	170J	120	80	8.4	6.12	1.58	104	0.787	90	13.8
MW-7	3/14/2002	5700	4.2	2U	2U	1U	2U	2.0J		4.1	22J	2.0U	5U	1.0U	1000U	94	180	5.9J	6.12	2.29	203	0.808	8.85	13.9
MW-7	4/17/2002	4200	2.9	2U	2U	1U	2U	5U		4.2	18J	1.6J	2.3J	1.0U	1000U	72	200	6.0	6.11	0.5	145	0.656	19.5	18.8
MW-7	5/16/2002	5700	4.3	2U	2U	1U	2U	5U		4.3	18J	2.0UJ	5U	1.0U	1000U	97	200	9.0	6.05	0.21	185	0.759	23.9	15.7
MW-7	6/27/2002	5300	3.8J*	2UH	2UH	10H	2UH	5U		4.2	19J	2.0U	5U	1.0U	170UJ				6.13	0.73	163	1.198	100	18.2
MW-7	8/27/2002	4700	3.5	2U	2U	1U	2U	5U	29				5U						6.13	0.29	136	0.632	1.86	16.1
MW-7	10/30/2002	5400	2.7	2U	2U	1U	2U	5U	23	4.9	16	2.0U	5U	1.0U	200J	47	180	20	6.05	0.37	66	0.779	3.63	15.3
MW-7	12/14/2002							5U																
MW-7	1/30/2003	4700	3.1	2U	2U	1U	2U	5U	19		16		5U	1.0U		44	75	23	5.8	2.2	171	0.773	1.08	13.9
MW-7	9/24/2003	4200	3.3	2U	2U	1U	2U	5U					5U	1.0U	140	15	27	58	3.4	1.43	522	0.691	0.3	15.7
MW-7	1/8/2004	4300	2.8	2U	2U	1U	2U	5U	27		14J	2.0U	5U	1.0U	130	11	26	25	6.02	0	198	0.481	15	11.1
MW-7	3/12/2004	3100	2.7	2U	2U	1U	2U	1U	24		15M	2U	5U	1U	120	20	280	6.3	6.04	0.47	162	0.556	1	13.9
MW-7	6/3/2004	2900	2.6	2U	2U	1U	2U	1.5J	24		15M	2U	5U	1U	110	12	34	34	5.96	0.31	205.2	0.58	1.92	14.44
MW-7	9/21/2004	2900	3.4	3.1	2U	1U	2U						5U	1U	110				5.98	0.21	240.4	0.58	0	15.67

Table 6. Summary of Key Analytical Results and Field Parameter Measurements, AOC 50, Devens, Massachusetts

Well ID	Date	Laboratory Parameters																	Field Parameters					
		PCE	TCE	c-1,2-DCE	t- 1,2-DCE	1,1-DCE	VC	TOC	Alkalinity	Nitrate	Sulfate	Sulfide	Dissolved Arsenic	Dissolved Iron (Fe2+)	Dissolved Manganese	Ethane	Ethene	Methane	pH	DO	ORP	SpC	Turbidity	Temp
		(ug/L)						(mg/L)					(ug/L)	(mg/L)	(ug/L)	(ng/L)		(ug/L)	(SU)	(mg/L)	(mV)	(mS)	(NTUs)	°C

Notes

- J Estimated value
- B Detected in laboratory blank
- U Less than the detection limit
- H Sample rerun outside holding time due to "B" detection
- M Recovery poor for MS/MSD
- * *Value qualified from reported laboratory data based on data validation results.*

Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

Well ID	Event	Date	TD	DTW	Laboratory Parameters																Field Parameters					
			(feet)	(feet)	PCE (µg/L)	TCE (µg/L)	c-1,2-DCE (µg/L)	t-1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (ug/L)	Dissolved Iron (Fe^{2+}) (mg/L)	Dissolved Manganese (mg/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (ug/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
IW-1	Baseline	12/21/01	135.00	63.75	1,600	<20	<20	<20	<10	<20	<1.6	--	--	--	--	--	--	--	--	--	6.45	3.49	228	0.776	11.00	11.8
	Monitoring event 1	01/02/02	--	--	--	--	--	--	--	--	21,000	--	--	--	--	--	--	--	--	--	5.85	0.33	-189	1.832	--	12.1
	Monitoring event 2	01/16/02	--	64.81	--	--	--	--	--	--	5,900	--	--	--	--	--	--	--	--	--	4.47	0.67	-433	2.183	--	12.0
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	2,900	--	--	--	--	--	--	--	--	--	4.53	0.00	-376	1.854	--	12.1
	Monitoring event 4	02/13/02	--	64.20	--	--	--	--	--	--	1,900	--	--	--	--	--	--	--	--	--	4.28	0.30	-465	1.586	--	12.3
	Monitoring event 5	03/12/02	--	64.06	--	--	--	--	--	--	4,000	--	--	--	--	--	--	--	--	--	4.18	0.51	-363	2.617	--	12.3
	Monitoring event 6	04/02/02	--	--	--	--	--	--	--	--	4,000	--	--	--	--	--	--	--	--	--	4.09	--	-374	1.798	--	12.4
	Monitoring event 7	04/18/02	--	63.09	--	--	--	--	--	--	1,100	--	--	0.319*	--	--	--	--	--	--	4.66	2.17	-467	1.148	--	12.3
	Monitoring event 8	05/15/02	--	63.32	--	--	--	--	--	--	2,100	--	--	--	--	--	--	--	--	--	4.27	1.26	-462	1.657	--	12.3
	Monitoring event 9	06/25/02	--	62.80	--	--	--	--	--	--	2,500	--	--	--	--	--	--	--	--	--	4.21	4.30	-378	1.452	--	12.6
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 12	10/28/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 13	01/29/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 14	07/16/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 15	09/22/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 16	01/06/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 17	03/08/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 18	06/01/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
IW-2	Baseline	12/21/01	135.00	63.63	4,800	<20	<20	<20	<10	<20	<1.6	--	--	--	--	--	--	--	--	--	11.38	2.82	139	0.931	15.00	14.2
	Monitoring event 1	01/02/02	--	--	--	--	--	--	--	--	14,000	--	--	--	--	--	--	--	--	--	8.54	0.71	-155	1.963	--	11.8
	Monitoring event 2	01/16/02	--	64.95	--	--	--	--	--	--	10,000	--	--	--	--	--	--	--	--	--	5.28	0.56	-454	5.598	--	12.1
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	4,800	--	--	--	--	--	--	--	--	--	4.65	0.00	-460	3.528	--	12.1
	Monitoring event 4	02/13/02	--	64.24	--	--	--	--	--	--	2,600	--	--	--	--	--	--	--	--	--	4.47	0.34	-476	2.322	--	12.3
	Monitoring event 5	03/12/02	--	64.14	--	--	--	--	--	--	5,400	--	--	--	--	--	--	--	--	--	4.32	0.70	-298	4.123	--	12.2
	Monitoring event 6	04/02/02	--	--	--	--	--	--	--	--	5,000	--	--	--	--	--	--	--	--	--	4.65	--	-407	2.140	--	12.2
	Monitoring event 7	04/18/02	--	63.06	--	--	--	--	--	--	1,200	--	150	0.18/<2*	110	83	2	--	--	--	5.24	0.06	-451	1.865	--	16.4
	Monitoring event 8	05/15/02	--	63.42	--	--	--	--	--	--	3,600	--	--	--	--	--	--	--	--	--	4.62	1.74	-473	3.137	--	12.3
	Monitoring event 9	06/25/02	--	62.76	--	--	--	--	--	--	2,500	--	--	--	--	--	--	--	--	--	4.68	4.06	-449	2.691	--	12.4
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	7,400	--	--	--	--	--	--	--	--	--	4.56	0.27	-371	2,083	--	12.3
	Monitoring event 11	08/28/02	--	--	--	--	--	--	--	--	3,700	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 12	10/28/02	--	63.79	--	--	--	--	--	--	5,200	--	--	--	--	--	--	--	--	--	4.44	0.82	48	3.147	--	12.4
	Monitoring event 13	01/29/03	--	--	--	--	--	--	--	--	400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 14	07/16/03	--	--	--	--	--	--	--	--	620	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 15	09/22/03	--	--	--	--	--	--	--	--	30,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 16	01/06/04	--	--	--	--	--	--	--	--	5,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 17	03/08/04	--	--	--	--	--	--	--	--	6,600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 18	06/01/04	--	--	--	--	--	--	--	--	12,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
IW-3	Baseline	12/20/01	135.00	63.46	2,200	<20	<20	<20	<10	<20	5.9	--	--	--	--	--	--	--	--	--	9.89	1.68	200	0.761	23.00	13.9
	Monitoring event 1	01/02/02	--	--	--	--	--	--	--	--	3,600	--	--	--	--	--	--	--	--	--	6.75	0.28	-477	2.354	--	12.0
	Monitoring event 2	01/16/02	--	--	--	--	--	--	--	--	10,000	--	--	--	--	--	--	--	--	--	4.85	0.00	-440	4.247	--	12.1
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	6,000	--	--	--	--	--	--	--	--	--	4.68	0.00	-478	3.077	--	12.1
	Monitoring event 4	02/13/02	--	64.06	--	--	--	--	--	--	3,200	--	--	--	--	--	--	--	--	--	4.35	0.34	-472	2.556	--	12.2
	Monitoring event 5	03/12/02	--	64.32	--	--	--	--	--	--	11,000	--	--	--	--	--	--	--	--	--	4.36	0.83	-268	5.203	--	12.3
	Monitoring event 6	04/02/02	--	--	--	--	--	--	--	--	6,600	--	--	--	--	--	--	--	--	--	4.70	--	-426	2.637	--	12.1
	Monitoring event 7	04/18/02	--	62.88	--	--	--	--	--	--	980	--	140	0.13/1.6J*	140	76	2.6	--	--	--	5.34	5.38	-383	1.845	53.40	20.0
	Monitoring event 8	05/15/02	--	63.48	--	--	--	--	--	--	6,300	--	--	--	--	--	--	--	--	--	4.65	2.13	-474	4.641	--	12.4
	Monitoring event 9	06/25/02	--	62.99	--	--	--	--	--	--	10,000	--	--	--	--	--	--	--	--	--	4.56	1.27	-435	6.099	--	12.4
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 12	10/28/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 13	01/29/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 14	07/16/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 15	09/22/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 16	01/06/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 17	03/08/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 18	06/01/04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

Well ID	Event	Date	TD (feet)	DTW (feet)	PCE (µg/L)	TCE (µg/L)	c-1,2-DCE (µg/L)	t-1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (Fe^{2+}) (mg/L)	Dissolved Manganese (mg/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (µg/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
IW-4	Baseline	12/20/01	135.00	63.58	860J	2J	1.6J	<2	<1	<2	4.6	–	–	–	–	–	–	–	–	–	6.24	1.07	141	0.455	185.00	14.5
	Monitoring event 1	01/02/02	–	–	–	–	–	–	–	–	8,000	–	–	–	–	–	–	–	–	–	5.98	0.34	-468	3.214	–	11.9
	Monitoring event 2	01/16/02	–	–	–	–	–	–	–	–	17,000	–	–	–	–	–	–	–	–	–	4.90	0.00	-429	4.436	–	12.0
	Monitoring event 3	01/30/02	–	–	–	–	–	–	–	–	5,800	–	–	–	–	–	–	–	–	–	4.69	0.00	-473	3.418	–	12.0
	Monitoring event 4	02/13/02	–	63.46	–	–	–	–	–	–	7,400	–	–	–	–	–	–	–	–	–	4.23	0.56	-457	3.686	–	12.1
	Monitoring event 5	03/12/02	–	64.24	–	–	–	–	–	–	10,000	–	–	–	–	–	–	–	–	–	4.11	0.41	-282	4.484	–	12.1
	Monitoring event 6	04/02/02	–	–	–	–	–	–	–	–	13,000	–	–	–	–	–	–	–	–	–	4.24	–	-209	3.617	–	12.1
	Monitoring event 7	04/16/02	–	63.20	–	–	–	–	–	–	2,800	–	240	0.108/<2*	180	87	2.2	–	–	–	4.49	0.08	-225	2.148	70.70	17.8
	Monitoring event 8	05/15/02	–	63.32	–	–	–	–	–	–	4,400	–	–	–	–	–	–	–	–	–	4.38	1.86	-453	3.092	–	12.1
	Monitoring event 9	06/25/02	–	62.86	–	–	–	–	–	–	7,000	–	–	–	–	–	–	–	–	–	4.07	1.52	-20	4.191	–	12.3
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	2,200	–	–	–	–	–	–	–	–	–	4.03	0.69	-298	4.225	–	12.1
	Monitoring event 11	08/28/02	–	–	–	–	–	–	–	–	7,300	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 12	10/28/02	–	–	–	–	–	–	–	–	2,000	–	–	–	–	–	–	–	–	–	3.99	0.81	70	3.861	–	12.4
	Monitoring event 13	01/29/03	–	–	–	–	–	–	–	–	450	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	3,800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	24,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	7,700	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/05/04	–	–	–	–	–	–	–	–	7,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	06/01/04	–	–	–	–	–	–	–	–	12000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
IW-5	Baseline	12/20/01	135.00	63.08	25J	1.4J	5.8J	<2	<1	<2	7.8	–	–	–	–	–	–	–	–	–	6.56	1.05	193	0.472	29.00	12.6
	Monitoring event 1	01/02/02	–	–	–	–	–	–	–	–	4,400	–	–	–	–	–	–	–	–	–	5.38	0.38	-469	1.885	–	11.7
	Monitoring event 2	01/16/02	–	–	–	–	–	–	–	–	18000	–	–	–	–	–	–	–	–	–	4.54	0.00	-329	5.522	–	11.7
	Monitoring event 3	01/30/02	–	–	–	–	–	–	–	–	7,800	–	–	–	–	–	–	–	–	–	4.47	0.00	-411	3.603	–	11.8
	Monitoring event 4	02/13/02	–	63.94	–	–	–	–	–	–	8,500	–	–	–	–	–	–	–	–	–	3.91	0.96	-429	3.509	–	11.9
	Monitoring event 5	03/12/02	–	63.41	–	–	–	–	–	–	3,900	–	–	–	–	–	–	–	–	–	4.08	0.26	-240	2.428	–	12.0
	Monitoring event 6	04/02/02	–	–	–	–	–	–	–	–	3,500	–	–	–	–	–	–	–	–	–	4.24	–	-402	1.467	–	11.8
	Monitoring event 7	04/18/02	–	62.51	–	–	–	–	–	–	1,400	–	–	0.052*	–	–	–	–	–	–	4.14	3.25	-422	1.227	–	12.1
	Monitoring event 8	05/15/02	–	62.97	–	–	–	–	–	–	4,300	–	–	–	–	–	–	–	–	–	4.17	1.82	-450	2.761	–	12.0
	Monitoring event 9	06/25/02	–	62.38	–	–	–	–	–	–	6,200	–	–	–	–	–	–	–	–	–	4.06	1.60	-240	3.205	–	12.1
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 11	08/28/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 12	10/28/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 13	01/29/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/08/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	06/01/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MW-1	Baseline	12/19/01	136.00	64.68	6200J	9.9J	3J	<2	<1	<2	<1.9	–	17	–	–	–	–	–	–	–	5.81	0.5	199	0.569	62.10	12.4
	Monitoring event 1	01/02/02	–	64.74	–	–	–	–	–	–	<5	–	–	–	2.2J	<1	–	50	180	6.3	6.52	1.38	89	0.204	6.09	11.7
	Monitoring event 2	01/16/02	–	65.10	5,400	5.6	0.66J	<2	<1	<2	16	–	23	–	<5	<1	–	33	400	11	6.05	2.32	81.6	0.719	19.00	9.1
	Monitoring event 3	01/30/02	–	–	–	–	–	–	–	–	63	–	–	–	–	–	–	–	–	–	5.02	0.00	-492	0.836	–	12.0
	Monitoring event 4	02/13/02	–	64.79	7,500	13	1.8J	<2	<1	<2	110	–	42	<2	5.2	3.2	5.8	27	68	21	5.34	0.99	-209	0.884	11.00	13.3
	Monitoring event 5	03/12/02	–	64.57	6,700	200	210	<2	<1	<2	22	–	18	<2	49	9.6	4.9	110	170	21	6.46	0.74	-44	0.813	0.75	11.1
	Monitoring event 6	04/02/02	–	–	4,300	380	760	<2	2.2	<2	79	–	–	–	–	–	–	–	–	–	6.31	5.64	-243	0.733	5.12	13.1
	Monitoring event 7	04/16/02	–	63.69	3,900	240	540	<2	1.5	<2	57	–	13J	0.273/1.3J*	110	56	13	110	170	100	6.44	4.44/0.55*	-157	0.822	7.38	17.5
	Monitoring event 8	05/16/02	–	63.74	2,700	340	560	<2	1.1	<2	67	–	33	<2	110J	30	21	120	260	330	6.75	0.35	-171	1.136	6.75	13.7
	Monitoring event 9	06/25/02	–	63.30	3,900	550	1,600	<2	4.4	<2	110	–	13J	<2	180J	57	26	30	43	370	6.39	0.46	-65	1.211	6.70	15.2
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	43	–	–	–	–	–	–	–	–	–	6.10	0.07	-233	1.003	–	12.2
	Monitoring event 11	08/28/02	–	64.54	4,300	84	1,500	<2	4.5	<2	84	–	–	–	140	–	–	35	120	4,600	5.77	0.45	-51	0.351	5.04	17.6
	Monitoring event 12	10/28/02	–	64.71	4,400	55	2,100	<2	5.9	<2	64	140	–	<2	170	62	10	14	120	6,400	6.21	0.63	-85	0.942	4.80	14.7
	Monitoring event 13	01/29/03	–	63.46	2,200	160	2,200	<2	7.8J	<2	200	310	9.9	–	330	190J	–	20	100	10000J	5.90	0.43	-59	1.235	2.03	8.8
	Monitoring event 14	07/16/03	–	62.45	3,700	300	1,500	<2	6.2	<2	75	190	<12	<2	540	110	–	<5	<5	10,000	6.55	0.65	-69	0.679	4.65	17.0
	Monitoring event 15	09/22/03	–	62.71	4,000	230	1,400	<2	4.7	<2	69	–	–	–	320	68	3.2	<5	7.2	7,100	4.91	0.00	-38	0.925	2.30	16.2
	Monitoring event 16	01/08/04	–	62.07	2,400	120	1,200	<2	3.5	<2	230	280	12J	<2	280	140J	5.3	<5	<5	16,000	5.95	1.12	-113	0.806	14.90	13.2
	Monitoring event 17	03/09/04	–	63.22	2,400	190	1,800	<2	3.6	<2	170	240	13	2	330	65	3.1	<5	32	24,000	5.79	0.41	-97	0.502	2.10	10.2
	Monitoring event 18	06/04/04	–	61.82	84	33	2,000	<2	7.1	<2	460	650	16	3.5	310	250J	6.7	<5	190	23,000	5.84	1.13	-23	1.313	45.10	15.6

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Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

Well ID	Event	Date	TD (feet)	DTW (feet)	Laboratory Parameters: PCE (µg/L)	TCE (µg/L)	c-1,2-DCE (µg/L)	t- 1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (Fe^{2+}) (mg/L)	Dissolved Manganese (mg/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (ug/L)	Field Parameters: pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
MW-2	Baseline	12/19/01	138.04	64.52	6,800	11J	<20	<20	<10	<20	<2.1	--	17	--	--	--	--	--	--	--	5.96	0.35	124	0.607	3.29	13.1
	Monitoring event 1	01/02/02	--	64.56	--	--	--	--	--	--	<5	--	--	--	<5	<1	--	63	290	4.7	6.59	0.89	20	0.209	10.20	12.8
	Monitoring event 2	01/16/02	--	64.95	6,200	5.6	0.82J	<2	<1	<2	<5	--	20	--	<5	<1	--	25	150	8.1	5.89	4.57	-63	0.744	9.70	12.0
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	11	--	--	--	--	--	--	--	--	--	6.06	0.00	-271	0.694	--	11.9
	Monitoring event 4	02/13/02	--	64.53	7,100	6.2	0.78J	<2	<1	<2	2.2J	--	21	1.3J	<5	<1	1.5	79	250	9.4	6.01	1.97	-126	0.732	14.00	11.0
	Monitoring event 5	03/12/02	--	64.41	6,100	790	26	0.78J	<1	<2	56	--	17	<2	30	7.3	4.8	150	110	29	6.45	2.07	-272	0.911	10.55	12.4
	Monitoring event 6	04/02/02	--	--	2,900	930	570	2.1	1.8	<2	210	--	--	--	--	--	--	--	--	--	6.43	3.72	-109	1.061	10.82	11.8
	Monitoring event 7	04/18/02	--	63.73	910	380	980	1.8J	2.7	<2	330	--	5.3J	0.112/2.2*	280	310	24	280	310	220	6.46	8.95/0.44*	-82	1.725	7.41	18.7
	Monitoring event 8	05/15/02	--	63.58	1,700	890	1,200	3	2.8	<2	150	--	7.6	<2	550	93	17	78	220	150	6.61	0.21	-126	1.505	2.42	14.3
	Monitoring event 9	06/25/02	--	63.10	2,400	1,000	1,600	4.4	4.6	<2	110	--	8.6J	<2	420	90	19	35	89	650	6.64	1.30	-115	2.341	15.00	16.6
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	64.39	2,300	230	2,200	<2	5.2	<2	62	--	--	--	270	--	--	65	190	1,100	6.64	0.16	-98	1.095	8.88	16.8
	Monitoring event 12	10/28/02	--	64.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 13	01/29/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 14	07/16/03	--	62.45	170	140	2,900	<2	8.9	<2	57	290	<5.8	24	370	200	--	<5	<5	24,000	6.43	0.76	-97	1,562	22.00	16.0
	Monitoring event 15	09/22/03	--	62.60	1,800	540	1,900	<2	7	<2	14	--	--	--	340	86	7.6	<5	<5	34,000	6.01	10.09	-115	1.109	12.30	16.7
	Monitoring event 16	01/13/04	--	61.99	950	240	2,000	<2	6.8	<2	140	420	3.4	<2	450	220J	9.6	<5	<5	33,000	6.56	0.83	-121	1.180	2.30	13.4
	Monitoring event 17	03/09/04	--	63.06	770	310	2,200	<2	6.9	<2	15	170	5	<2	430	100	6.8	<5	<5	32,000	6.65	2.99	-140	0.684	3.80	13.4
	Monitoring event 18	06/03/04	--	61.67	92	37	1,800	<2	4.8	<2	290	610	2.6	13	520	350J	13	<5	<5	23,000	6.66	10.22	-119	1.736	7.50	14.3
MW-3	Baseline	12/19/01	136.00	64.16	26	4,000	2,200	<20	6.5J	<20	92	--	0.43J	--	--	--	--	--	--	--	6.28	0.43	-46	0.912	7.28	14.4
	Monitoring event 1	01/02/02	--	64.25	--	--	--	--	--	--	44	--	--	--	180	30	--	63	210	18	4.77	1.33	-48	2.795	4.40	13.4
	Monitoring event 2	01/16/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	38	--	--	--	--	--	--	--	--	--	6.64	0.00	-293	0.999	--	12.0
	Monitoring event 4	02/13/02	--	64.27	4,400	1,700	1,600	1.6J	3.7	<2	15	--	14	1J	190	20	6.3	79	290	53	6.65	0.75	-71	0.893	1.30	12.0
	Monitoring event 5	03/12/02	--	64.05	5,200	640	1,400	1	2.8	<2	7.3	--	15	<2	180	16	6.4	93	370	66	6.72	0.25	-75	0.795	1.04	13.7
	Monitoring event 6	04/02/02	--	--	3,100	1,000	1,700	2.2	4.0	<2	3.3J	--	--	--	--	--	--	--	--	--	6.74	4.28	-120	0.634	2.08	13.8
	Monitoring event 7	04/18/02	--	63.35	1,200	1,300	1,800	1.2J	3.4	<2	6	--	7.8J	0.323/1.6J*	240	37	17	25	87	54	6.60	4.39/0.7*	-102	0.771	0.81	17.0
	Monitoring event 8	05/15/02	--	63.21	31	23	2,600	3.5	6.7	<2	96	--	3.9	<2	260	42	18	52	240	560	6.66	0.31	-124	1.460	1.68	13.7
	Monitoring event 9	06/25/02	--	62.22	<200	<200	1,800J	<200	<1	<200	270	--	4.4J	<2	490J	140	37	21	62	3,900	6.70	1.84	-107	3.604	2.90	17.0
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	31	--	--	--	--	--	--	--	--	--	6.76	0.15	-225	1.606	--	12.2
	Monitoring event 11	08/28/02	--	64.10	990	640	580	2.1	4.4	<2	30	--	--	--	270	--	--	53	160	14,000	6.63	0.15	-138	1.285	6.50	16.3
	Monitoring event 12	10/28/02	--	64.00	1,900	820	1,700	3.9	4.2	<2	6.3	190	--	<2	330	39	9.7	300	230	6,300	6.70	0.40	-129	1.129	5.01	14.5
	Monitoring event 13	01/29/03	--	62.92	3	<2	2,900	<2	7.1	<2	180	580	<1	--	330	120	--	<5	260	28,000	6.84	0.30	-159	1.322	8.70	10.5
	Monitoring event 14	07/16/03	--	62.25	2.4	<2	2,700	<2	7.5	2.5	17	450	<4	<2	520	170	--	<5	100	23,000	7.02	1.09	-138	1.464	39.20	16.3
	Monitoring event 15	09/22/03	--	62.40	670	1,100	1,900	2.4	6.9	<2	5.9	--	--	--	460	69	7.9	<5	12	22,000	6.10	9.17	-138	1.222	18.90	16.8
	Monitoring event 16	01/09/04	--	61.61	9.7	64	2,000	<2	5.6	<2	130	500J	<1	<2	530	200J	15	<5	<5	45,000	6.73	0.40	-195	1.347	14.80	12.7
	Monitoring event 17	03/11/04	--	62.68	680	620	4,700	<2	7.6	<2	6.1	200	4.4	<2	420	11	6.4	<5	<5	27,000	6.58	0.62	-161	0.972	4.30	12.4
	Monitoring event 18	06/02/04	--	61.27	<2	<2	1,800	<2	4.5	<2	290	610	0.96J	<2	670	150J	23	<5	14	31,000	6.95	0.10	-149	1.905	38.70	14.6
MW-4	Baseline	12/19/01	136.00	64.58	11000J	4.6J	<2	<2	<1	<2	<0.5	--	17	--	--	--	--	--	--	--	6.19	0.58	206	0.814	--	14.8
	Monitoring event 1	01/02/02	--	64.67	--	--	--	--	--	--	<5	--	--	--	2.7J	<1	--	70	210	1.9	6.28	0.7	126	0.760	9.90	11.1
	Monitoring event 2	01/16/02	--	65.05	11,000	3.9	<2	<2	<1	<2	<5	--	21	--	<5	<1	--	35J	33J	10J	6.26	1.54	128	0.745	17.00	13.2
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	11	--	--	--	--	--	--	--	--	--	6.18	0.00	-256	0.651	--	12.0
	Monitoring event 4	02/13/02	--	64.70	14,000	7.9	0.56J	<2	<1	<2	36	--	21	0.3J	<5	1.6	2.1	38	81	0.83	6.16	0.62	-411	0.765	17.60	11.7
	Monitoring event 5	03/12/02	--	64.46	14,000	68	5	0.75J	<1	<2	63	--	19	<2	35	21	7.6	170	560	1.8	6.35	1.89	-438	0.890	17.80	12.6
	Monitoring event 6	04/02/02	--	--	15,000	300	68	0.59J	1.0	<2	120	--	--	--	--	--	--	--	--	--	6.08	4.30	-425	0.748	1.90	14.1
	Monitoring event 7	04/18/02	--	63.79	10,000	560	1,100	0.75J	3.2	<2	76	--	13J	0.21/<2*	86	1.93/56*	13	110	170	100	6.36	1.71/0.47*	-339	0.757	2.77	16.9
	Monitoring event 8	05/15/02	--	63.64	11,000	540	2,500	0.62	5.9	<2	160	--	12	3.2	110	61	15	260	430	7.6	6.03	0.20	-347	1.198	4.12	14.3
	Monitoring event 9	06/25/02	--	63.22	8,300	380	4,100	<200	<100	<200	230	--	14J	<2	160J	100	22	64	78	24	5.94	0.88	-50	2.214	9.20	16.3
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	50	--	--	--	--	--	--	--	--	--	5.98	0.01	-222	0.968	--	12.3
	Monitoring event 11	08/28/02	--	64.45	4,500	280	6000J	<2	12	<2	780	--	--	--	200	--	--	98	120	46	5.33	0.10	-64	1.737	7.31	16.2
	Monitoring event 12	10/28/02	--	64.44	4,100	280	2,400	<2	5.6	<2	1,700	1,100	--	<2	110	450	39	210	160J	36	4.91	0.35	-23	2.784	16.70	14.5
	Monitoring event 13	01/28/03	--	63.35	6,000	200	6,100	<2	12	<2	980	910	31	--	160	490J	--	73	170	1,900	4.85	0.20	12	2.328	11.60	13.9
	Monitoring event 14	07/16/03	--	62.45	1,300	230	7,700	<2	18	<2	300	370	6.9	<2	190	210J	--	<5	52	16,000	6.13	0.25	-60	1.162	4.40	16.3
	Monitoring event 15	09/22/03	--	62.80	2,500	360	6,600	<2	17	<2	510	--	--	--	170	340	6.4	<5	33	23,000	4.57	0.53	-15	1.635	25.60	17.2
	Monitoring event 16	01/09/04	--	62.08	5,100	400	4,600	<2	14	<2	110	240J	7.1	<2	260	130J	4.8	<5	37	17,000	6.59	0.69	-134	0.848	171.60	13.3
	Monitoring event 17	03/08/04	--	63.11	2,500	230	6,300	<2	18	<2	260	420	8.1	2	270	110	5.9	<5	<5	26,000	6.49	0.36	-129	1.069	0.30	13.3
	Monitoring event 18	06/04/04	--	62.35	250	53	6,900	<2	17	<2	71	260	1.4	1.9J	250	160J	5.4	<5	13	29,000	6.25	2.41	-120	1.148	0.76	15.5

Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

Well ID	Event	Date	TD (feet)	DTW (feet)	PCE (µg/L)	TCE (µg/L)	c-1,2-DCE (µg/L)	t-1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (Fe^{2+}) (mg/L)	Dissolved Manganese (mg/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (ug/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
			Laboratory Parameters																		Field Parameters					
MW-5	Baseline	12/18/01	140.95	63.66	1,200	810	260	<2	0.82J	<2	15	--	4.5	--	--	--	--	--	--	--	6.15	0.56	-78	0.894	4.76	12.1
	Monitoring event 1	01/02/02	--	64.08	--	--	--	--	--	--	9.5	--	--	--	130	21	--	240	250	520	6.51	1.31	-85	0.972	5.26	10.1
	Monitoring event 2	01/16/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	5.4	--	--	--	--	--	--	--	--	--	6.83	0.00	-299	0.877	--	11.9
	Monitoring event 4	02/13/02	--	64.04	--	--	--	--	--	--	<5	--	--	--	160	--	--	--	--	--	6.55	1.20	-67	0.976	3.20	12.3
	Monitoring event 5	03/12/02	--	63.75	2,000	470	280	<2	0.85J	<2	1.8	--	35J	<2	170	17J	6.4	39	120	630J	6.60	2.32	-58	0.910	2.75	14.2
	Monitoring event 6	04/02/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 7	04/16/02	--	63.20	1,900	440	160	<2	<1	<2	<5	--	11J	0.013/2.6*	180	32	5.2	36	180	470	6.52	0.15/0.76*	-47	0.725	5.07	16.5
	Monitoring event 8	05/15/02	--	63.04	2,100	510	170	<2	<1	<2	<5	--	13	<2	250	12	4.9	51	210	550	6.61	0.30	-57	0.737	3.09	14.2
	Monitoring event 9	06/25/02	--	62.63	3,100	780	390	0.54J	1.9	<2	8.8	--	11J	2.2	200	19	7.1	32	91	590	6.68	0.08	-73	1.467	4.89	16.2
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 12	10/28/02	--	--	290	32	830	<2	2.5	<2	350	630	--	2.6	480	270	24	<5	<5	32,000	6.58	3.69	-131	2.133	3.53	15.7
	Monitoring event 13	01/29/03	--	62.78	1,400	160	640	<2	1.5	<2	170	420	11	--	380	240	--	<5	38	29,000	6.61	0.83	-122	1.445	4.17	10.0
	Monitoring event 14	07/16/03	--	61.75	800	85	690	<2	1.7	<2	60	350	<8.8	<2	490	190	--	<5	<5	28,000	6.74	0.60	-136	1.573	32.00	16.4
	Monitoring event 15	09/22/03	--	62.30	960	73	530	<2	2.7	3	26	--	--	--	360	150	4.4	<5	<5	33,000	6.33	0.32	-101	1.334	9.90	15.7
	Monitoring event 16	01/07/04	--	61.16	270	35	1,000	<2	3.8	<2	56	350	2.8J	<2	450J	210J	6.5	<5	<5	31,000	6.62	0.75	-152	1.232	227.60	13.0
	Monitoring event 17	03/11/04	--	62.56	<2	<2	910	<2	2.9	<2	310	730	5.7	<2	510	130	6.6	<5	<5	37,000	6.19	0.96	-140	1.895	89.60	13.5
	Monitoring event 18	06/02/04	--	61.16	13	9.6	790	<2	2.5	<2	180	340	1.4	<2	580	250J	6.7	<5	13	27,000	6.84	0.06	-116	1.575	130.50	15.7
MW-6	Baseline	12/20/01	135.00	63.48	450	<20	<20	<20	<10	<20	<1.4	--	15	--	--	--	--	--	--	--	6.44	1.17	214	0.462	7.00	14.6
	Monitoring event 1	01/02/02	--	63.71	--	--	--	--	--	--	<5	--	--	--	2.2J	<1	--	40	180	0.8	6.93	1.73	109	0.177	12.40	12.4
	Monitoring event 2	01/16/02	--	63.92	300	0.79J	1.1J	<2	<1	<2	880	--	74	--	<5	<1	--	19	130	1.1	5.60	3.99	-263	1.008	15.00	13.0
	Monitoring event 3	01/30/02	--	--	--	--	--	--	--	--	210	--	--	--	--	--	--	--	--	--	5.33	0.00	-498	0.832	--	11.9
	Monitoring event 4	02/13/02	--	63.59	330	0.96J	1J	<2	<1	<2	1,100	--	86	1.9J	14	18	23	96	280	2	4.54	0.48	-413	1.300	33.00	11.4
	Monitoring event 5	03/12/02	--	63.42	270	4.2	2.3	<2	<1	<2	510	--	54J	<2	43	44J	11	110	240	1.4J	4.72	0.40	-180	1.167	16.80	12.9
	Monitoring event 6	04/02/02	--	--	200	4.3	2.8	<2	<1	<2	340	--	--	--	--	--	--	--	--	--	5.09	--	-325	0.766	10.39	13.8
	Monitoring event 7	04/16/02	--	62.74	130	3.1	2.8	<2	<1	<2	200	--	16J	0.174/<2*	64	96	8.3	170	690	2.9	5.46	6.04/1.4*	-182	0.803	22.80	19.1
	Monitoring event 8	05/15/02	--	62.81	150	3	3.7	<2	<1	<2	380	--	14	3.2	150J	90	14	130	520	4.6	5.27	0.25	-15	1.265	14.00	14.7
	Monitoring event 9	06/25/02	--	62.49	280J	<200J	<200J	<200J	<1J	<200J	610	--	33J	<2	220J	160	13	61	170	6.1	5.50	3.15	-27	2.817	31.00	18.6
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	63.75	260	14	26	<2	<1	<2	1,400	--	--	--	320	--	--	170	490	12	5.05	0.09	3	1.937	20.10	17.6
	Monitoring event 12	10/28/02	--	64.04	160	6.5	23	<2	<1	<2	1,900	610	--	<2	630	250	3.2	460	720	200	4.74	1.69	19	2.008	26.00	13.7
	Monitoring event 13	01/29/03	--	62.25	75	4.1	19	<2	<1	<2	900	400	35	--	430	150	--	130	820	2,100	4.40	1.97	73	1.476	25.10	7.5
	Monitoring event 14	07/16/03	--	61.20	45	3.5	25	<2	<1	<2	840	420	38	<2	180	130	--	<5	1,000	4,200	4.50	0.89	113	1.384	39.80	18.5
	Monitoring event 15	09/22/03	--	61.70	15	2.7	51	<2	<1	<2	480	--	--	--	190	140	2.9	<5	670	7,300	4.12	0.85	52	1.182	33.10	16.0
	Monitoring event 16	01/06/04	--	60.65	20	3.3	50	<2	<1	<2	1,600	490	70	<4	260	160J	2.9	<5	380	10,000	4.61	0.01	-5	1.322	10.10	IF
	Monitoring event 17	03/10/04	--	62.03	19	3.8	62	<2	<1	<2	1,600	690	110	2.5	240	170	3.6	18	120	8,200	4.43	3.69	-311	1.616	2103.60	14.1
	Monitoring event 18	06/03/04	--	60.92	23	5.5	72	<2	<1	<2	2,300	750	240	16	170	240J	3.5	<5	79	6,600	4.10	0.36	51	2.497	17.00	16.1
MW-7 (Background)	Baseline	12/20/01	Well Installed Week Ending 2/8/02																							
	Monitoring event 1	01/02/02																								
	Monitoring event 2	01/16/02																								
	Monitoring event 3	01/30/02																								
	Monitoring event 4	02/13/02	135.00	63.41	5,900	4.5	<2	<2	<1	<2	<5	--	20	0.6J	<5	<1	0.17J	120	80	8.4	6.12	1.56	104	0.787	90.00	13.6
	Monitoring event 5	03/12/02	--	63.27	5,700	4.2	<2	<2	<1	<2	2J	--	22J	<2	<5	<1	<1	64	180	5.9J	6.12	2.29	203	0.808	8.85	13.9
	Monitoring event 6	04/02/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 7	04/16/02	--	62.52	4,200	2.9	<2	<2	<1	<2	<5	--	18J	<0.039/1.6J*	2.3J	0.59/<1*	<1	72	200	6	6.11	0.5/1.0*	145	0.656	19.50	18.8
	Monitoring event 8	05/15/02	--	62.38	5,700	4.3	<2	<2	<1	<2	<5	--	18J	<2J	<5	<1	<1	97	200	9	6.05	0.21	185	0.759	23.90	15.7
	Monitoring event 9	06/25/02	--	62.70	5,300	<200J	<200J	<200J	<1J	<200J	<5	--	19J	<2	<5	<1	<1	--	--	--	6.13	0.73	163	1.196	100.00	18.2
	Monitoring event 10	07/31/02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 11	08/28/02	--	63.11	4,700	3.5	<2	<2	<1	<2	<5	--	--	--	<5	--	--	--	--	--	6.13	0.29	136	0.832	1.86	16.1
	Monitoring event 12	10/28/02	--	63.10	5,400	2.7	<2	<2	<1	<2	<5	23	16	<2	<5	<1	<1	47	180	20	6.05	0.37	66	0.779	3.63	15.3
	Monitoring event 13	01/29/03	--	61.98	4,700	3.1	<2	<2	<1	<2	<5	19	16	--	<5	<1	--	44	75	23	5.60	2.20	171	0.773	1.08	13.9
	Monitoring event 14	07/16/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Monitoring event 15	09/22/03	--	61.30	4,200	3.3	<2	<2	<1	<2	<5	--	--	--	<5	<1	<1	15	27	58	3.40	1.43	522	0.691	0.30	15.7
	Monitoring event 16	01/08/04	--	61.41	4,300	2.8	<2	<2	<1	<2	<5	27	14J	<2	<5	<1	0.13	11	26	25	6.02	IF	198	0.481	15.00	11.1
	Monitoring event 17	03/12/04	--	61.60	3,100	2.7	<2	<2	<1	<2	<1	24	15M	<2	<5	<1	0.12	20	280	6.3	6.04	0.47	162	0.556	1.00	13.9
	Monitoring event 18	06/01/04	--	60.65	2,900	2.6	<2	<2	<1	<2	<5	24	15	<2	<5	<1	0.11	12	34	34	5.96	0.31	205	0.560	1.92	14.4

Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

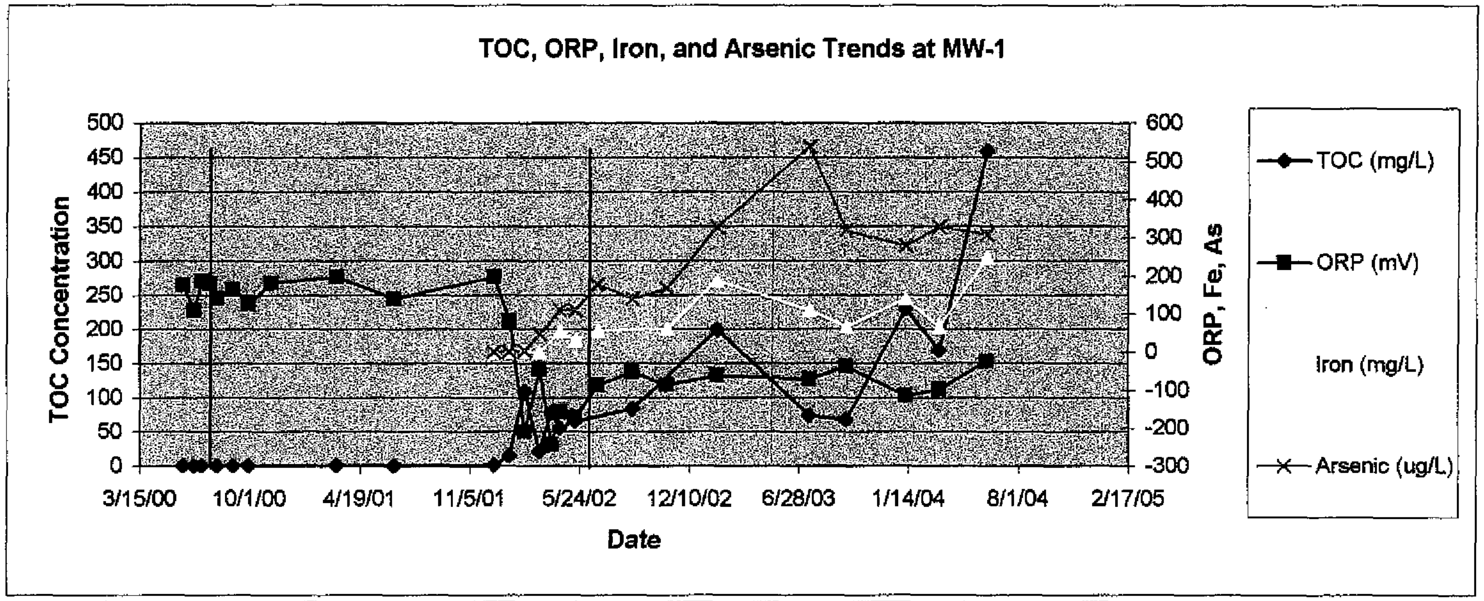
Well ID	Event	Date	TD (feet)	DTW (feet)	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC	TOC	Alkalinity	Sulfate	Sulfide	Dissolved Arsenic	Dissolved Iron (Fe^{2+})	Dissolved Manganese	Ethane	Ethene	Methane	pH	DO	ORP	SpC	Turbidity	Temp
					Laboratory Parameters																Field Parameters					
					(µg/L)						(mg/L)				(µg/L)	(mg/L)		(ng/L)		(ug/L)	(SU)	(mg/L)	(mV)	(mS)	(NTUs)	°C
GSM-97-29X	Baseline	12/18/01	193.20	64.74	<2	<2	<2	<2	<1	<2	<2.4	–	12	–	–	–	–	–	–	–	6.21	4.63	265	0.310	10.07	10.1
(100 feet	Monitoring event 1	01/02/02	–	65.09	–	–	–	–	–	–	<5	–	–	–	<5	<1	–	26	110	4	6.16	6.15	182	0.328	8.20	12.3
downgradient of	Monitoring event 2	01/16/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
injection line	Monitoring event 3	01/30/02	–	–	–	–	–	–	–	–	<5	–	–	–	–	–	–	–	–	–	6.26	2.678	141	0.282	–	11.4
east of plume	Monitoring event 4	02/13/02	–	64.66	<2.3	<2	<2	<2	<1	<2	<5	–	–	–	<5	–	–	–	–	–	4.04	4.52	77	0.310	4.04	12.8
centerline)	Monitoring event 5	03/12/02	–	64.61	–	–	–	–	–	–	0.8J	–	–	–	<5	–	–	–	–	–	6.18	4.84	216	0.300	2.57	13.2
	Monitoring event 6	04/02/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 7	04/16/02	–	63.91	1.4J	<2	<2	<2	<1	<2	<5	–	13J	2.2	<5	<1	<1	<5	<5	0.49	6.07	4.5/4.5*	257	0.251	0.60	16.6
	Monitoring event 8	05/15/02	–	63.53	0.67J	<2	<2	<2	<1	<2	<5	–	13J	<2J	<5	<1	<1	18	71	0.13	6.19	4.62	-134	0.298	1.61	14.6
	Monitoring event 9	06/25/02	–	63.53	<1.4	<2	<2	<2	<1	<2	<5	–	12J	2.9	<5	<1	<1	–	–	–	6.28	5.07	187	0.188	16.00	16.6
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 11	08/28/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 12	10/28/02	–	–	–	–	–	–	–	–	–	–	7.2	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 13	01/29/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/08/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	06/01/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
GSM-98-32X	Baseline	12/18/01	134.80	64.79	<2	0.94J	0.96J	<2	<1	<2	<1.8	–	14	–	–	–	–	–	–	–	5.88	0.52	251	0.864	1.30	13.3
(100 feet	Monitoring event 1	01/02/02	–	65.00	–	–	–	–	–	–	<5	–	–	–	<5	<1	–	760	120	140	5.92	0.54	124	1.018	4.15	13.5
downgradient of	Monitoring event 2	01/16/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
injection line	Monitoring event 3	01/30/02	–	–	–	–	–	–	–	–	<5	–	–	–	–	–	–	–	–	–	5.96	0.00	-30	0.977	–	11.6
east of plume	Monitoring event 4	02/13/02	–	64.97	2,600	1.2J	<2	<2	<1	<2	<5	–	–	–	<5	–	–	–	–	–	5.96	0.47	59	0.927	16.90	12.4
centerline)	Monitoring event 5	03/12/02	–	64.67	–	–	–	–	–	–	0.6J	–	–	–	<5	–	–	–	–	–	5.96	0.36	31	0.946	0.00	13.9
	Monitoring event 6	04/02/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 7	04/18/02	–	63.99	2,100	1J	<2	<2	<1	<2	<5	–	16J	<0.035/3.2*	<5	<1	<1	8.7	13	38	5.81	7.05/2.0*	197	0.601	0.10	17.0
	Monitoring event 8	05/15/02	–	63.84	2,100	0.91J	<2	<2	<1	<2	<5	–	15J	<2J	<5	<1	<1	17	46	24	5.91	0.29	200	0.912	0.41	15.7
	Monitoring event 9	06/25/02	–	63.45	3,900	71	<2	<2	<1	<2	<5	–	17J	2.2	<5	<1	<1	–	–	–	5.90	2.79	215	0.907	14.00	15.5
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 11	08/28/02	–	63.70	1,600	340	<2	<2	<1	<2	<5	–	–	–	16	–	–	–	–	–	6.43	0.36	60	0.369	0.47	16.0
	Monitoring event 12	10/28/02	–	64.63	470	190	650	2.6	1.4	<2	19	430	–	2.3	41	3.6	6	–	–	–	6.80	1.93	-58	1.321	2.67	17.5
	Monitoring event 13	01/20/03	–	63.27	180	42	640	3.1	1.6	<2	14	450	6.5	–	38	4.6J	–	23	270	460	6.48	5.06	-23	1.352	0.25	11.0
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	<5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/08/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	06/04/04	–	62.05	220	16	1,500	<2	2.4	2.1	78	450	4.7	1.9J	390	93	16	<5	72	32,000	6.24	0.08	-127	1.571	1.50	13.9
GSM-02-10X	Baseline	12/20/01	Well Installed Week Ending 5/3/02																							
(100 feet	Monitoring event 1	01/02/02																								
downgradient of	Monitoring event 2	01/16/02																								
injection line	Monitoring event 3	01/30/02																								
along plume	Monitoring event 4	02/13/02																								
centerline)	Monitoring event 5	03/12/02																								
	Monitoring event 6	04/02/02																								
	Monitoring event 7	04/16/02																								
	Monitoring event 8	05/16/02	135.00	63.23	800	730	440	0.62 J	1.3	<2	–	–	–	–	190J	–	–	–	–	–	6.70	0.55	-175	1.225	5.25	16.5
	Monitoring event 9	06/25/02	–	62.82	2,500	620	660	<2	1.7	<2	8.5	–	–	–	130	–	–	–	–	–	6.90	0.03	-74	2.173	5.38	15.2
	Monitoring event 10	07/31/02	–	–	–	–	–	–	–	–	20	–	–	–	–	–	–	–	–	–	6.29	0.19	-156	0.980	–	12.1
	Monitoring event 11	08/28/02	–	64.12	260	710	530	<2	1.6	<2	12	–	–	–	95	–	–	65	150	47	6.43	0.33	-41	0.385	5.41	17.7
	Monitoring event 12	10/28/02	–	64.06	170	130	540	<2	<1	<2	21	360	7.2	2.6	130	25	12	21	200	360	6.64	2.67	-52	1.450	6.92	14.9
	Monitoring event 13	01/29/03	–	63.00	39	22	790	<2	2.3	<2	70	310	<1	–	150	34	–	64	270	350	6.71	2.75	-88	1.625	3.30	11.0
	Monitoring event 14	07/18/03	–	61.99	87	38	560	<2	4.2	<2	130	460	<4.9	<2	270	100	–	<5	110	18,000	6.70	0.63	-151	1.709	9.90	17.8
	Monitoring event 15	09/22/03	–	62.47	<2	<2	720	<2	2.5	<2	200	–	–	–	490	180	31	<5	400	28,000	6.56	0.87	-156	2.238	3.60	15.0
	Monitoring event 16	01/07/04	–	61.36	<2	<2	730	<2	2.6	<2	180	740	1.6J	<2	680J	270J	27	<5	<5	41,000	6.86	0.61	-188	1.683	27.70	12.9
	Monitoring event 17	03/08/04	–	62.75	5.7	<2	720	<2	2.1	<2	61	430	3	2	710	<10	16	<5	<5	40,000	6.83	0.19	-141	1.429	5.30	12.5
	Monitoring event 18	06/04/04	–	61.45	<2	<2	990	<2	2.8	<2	51	460	1.3	2.9	700	230J	14	<5	37	36000	6.31	2.88	-174	1.655	0.18	13.9

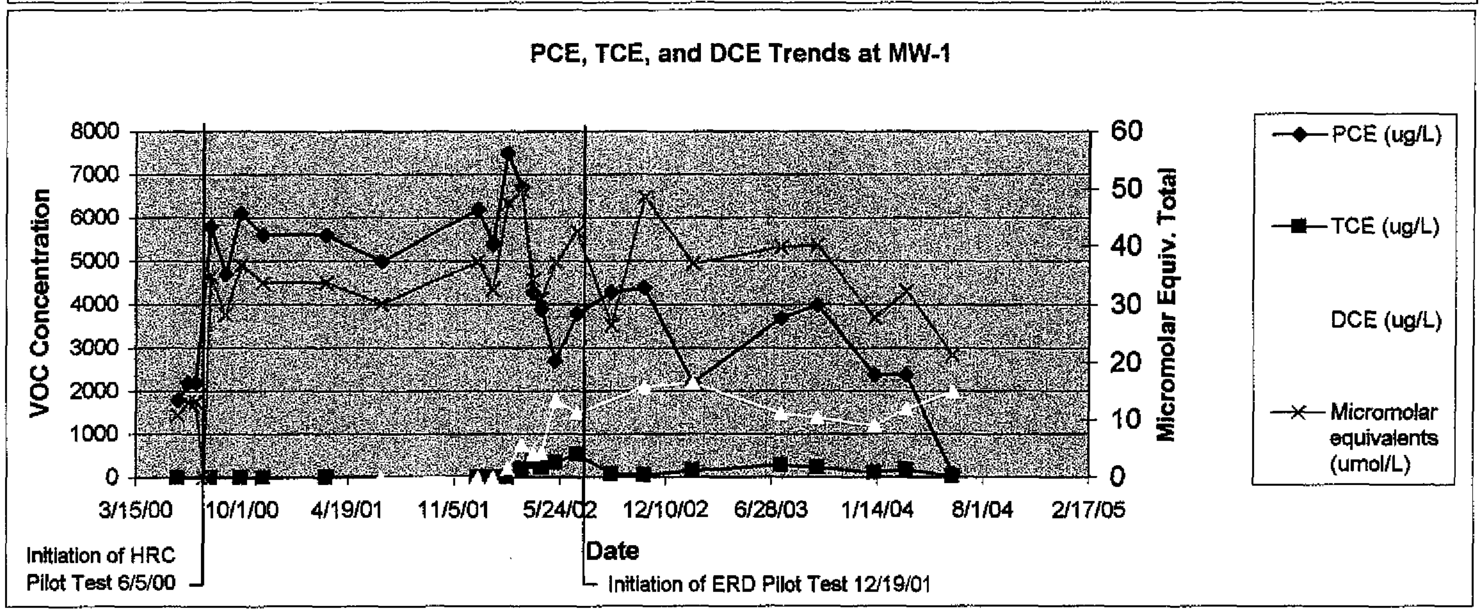
Table 8. Summary of Key Analytical Results and Field Parameter Measurements, ERD Application, AOC 50, Devens, Massachusetts

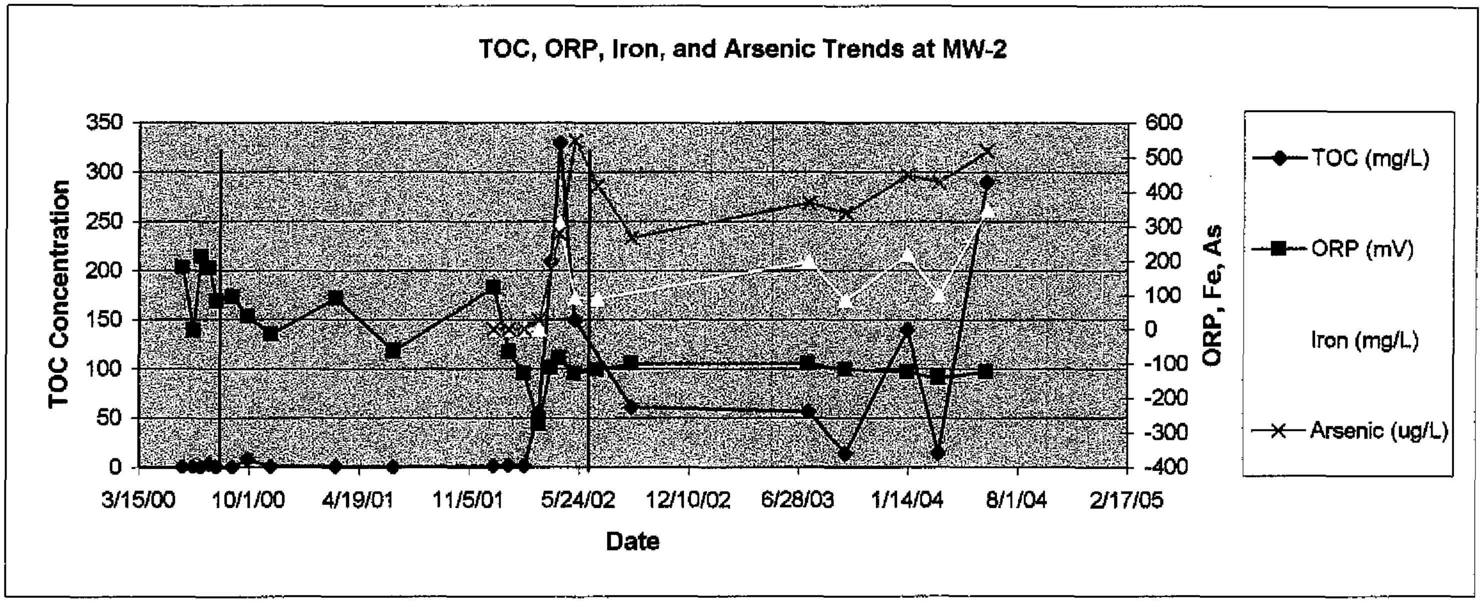
Well ID	Event	Date	TD (feet)	DTW (feet)	PCE (µg/L)	TCE (µg/L)	c-1,2-DCE (µg/L)	t-1,2-DCE (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	TOC (mg/L)	Alkalinity (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Dissolved Arsenic (µg/L)	Dissolved Iron (Fe^{2+}) (mg/L)	Dissolved Manganese (mg/L)	Ethane (ng/L)	Ethene (ng/L)	Methane (ug/L)	pH (SU)	DO (mg/L)	ORP (mV)	SpC (mS)	Turbidity (NTUs)	Temp °C
GSM-02-11X (200 feet downgradient of injection line along plume centerline)	Baseline	12/20/01	Well Installed Week Ending 7/26/02																							
	Monitoring event 1	01/02/02																								
	Monitoring event 2	01/16/02																								
	Monitoring event 3	01/30/02																								
	Monitoring event 4	02/13/02																								
	Monitoring event 5	03/12/02																								
	Monitoring event 6	04/02/02																								
	Monitoring event 7	04/18/02																								
	Monitoring event 8	05/15/02																								
	Monitoring event 9	06/25/02																								
	Monitoring event 10	07/31/02	135.00	–	450	2.8	<2	<2	<1	<2	–	–	–	–	<5	–	–	–	–	–	6.01	0.46	184	0.984	8.13	16.6
	Monitoring event 11	08/28/02	–	62.44	540	<2	<2	<2	<1	<2	<5	–	–	–	<5	–	–	–	–	–	6.05	0.51	173	0.905	6.49	15.0
	Monitoring event 12	10/28/02	–	82.30	970	22	3	<2	<1	<2	–	51	17	–	<5	–	–	–	–	–	6.02	0.49	51	0.920	5.04	12.1
	Monitoring event 13	01/29/03	–	61.46	710	22	<2	<2	<1	<2	<5	65	–	–	<5	<1	–	–	–	–	6.22	0.71	178	0.971	12.70	9.8
	Monitoring event 14	07/16/03	–	60.33	530	54	33	<2	<1	<2	<5	120	<16	<2	<5	<1	–	<5	14	460	6.31	0.86	168	0.813	11.90	15.4
	Monitoring event 15	09/22/03	–	60.55	590	31	37	<2	<1	<2	19	–	–	–	<5	<1	1.7	<5	<5	1200	6.60	0.41	146	0.921	7.20	13.9
	Monitoring event 16	01/08/04	–	59.61	300	15	49	<2	<1	<2	<5	150	12J	<2	<5	<1	1.9	<5	9.3	2300	6.20	IF	104	0.729	0.60	10.7
	Monitoring event 17	03/10/04		61.00	160	11	53	<2	<1	<2	1.8	130	9.6	<2	<5	<1	2.2	<5	68	14,000	6.39	0.82	103	0.847	7.50	13.2
	Monitoring event 18	05/04/04	–	59.79	440	23	54	<2	<1	<2	<5	110	12	1.9J	<5	<1	1.9	<5	10	2,300	6.72	12.13	55	0.807	21.30	14.1
GSM-02-12X (300 feet downgradient of injection line along plume centerline)	Baseline	12/20/01	Well Installed Week Ending 7/26/02																							
	Monitoring event 1	01/02/02																								
	Monitoring event 2	01/16/02																								
	Monitoring event 3	01/30/02																								
	Monitoring event 4	02/13/02																								
	Monitoring event 5	03/12/02																								
	Monitoring event 6	04/02/02																								
	Monitoring event 7	04/18/02																								
	Monitoring event 8	05/15/02																								
	Monitoring event 9	06/25/02																								
	Monitoring event 10	07/31/02	135.00	–	330	1.7J	<2	<2	<1	<2	–	–	–	–	<5	–	–	–	–	–	6.24	0.64	19	0.924	37.60	18.2
	Monitoring event 11	08/28/02	–	61.14	520	6.5	<2	<2	<1	<2	<5	–	–	–	<5	–	–	–	–	–	6.15	0.19	156	0.868	2.96	14.2
	Monitoring event 12	10/28/02	–	60.08	790	10	<2	<2	<1	<2	–	40	–	–	<5	–	–	–	–	–	6.14	0.27	68	0.927	2.08	13.5
	Monitoring event 13	01/29/03	–	59.97	580	4	<2	<2	<1	<2	<5	52	–	–	<5	<1	–	–	–	–	6.04	–	78	0.947	5.06	12.8
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	<5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/08/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	06/01/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
GSM-02-13X (270 feet upgradient of injection line along plume centerline)	Baseline	12/20/01	Well Installed Week Ending 7/26/02																							
	Monitoring event 1	01/02/02																								
	Monitoring event 2	01/16/02																								
	Monitoring event 3	01/30/02																								
	Monitoring event 4	02/13/02																								
	Monitoring event 5	03/12/02																								
	Monitoring event 6	04/02/02																								
	Monitoring event 7	04/18/02																								
	Monitoring event 8	05/15/02																								
	Monitoring event 9	06/25/02																								
	Monitoring event 10	07/31/02	120.00	–	4600	4	1.9J	<2	<1	<2	–	–	–	–	<5	–	–	–	–	–	6.17	0.54	141	0.665	7.62	19.7
	Monitoring event 11	08/28/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 12	10/28/02	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 13	01/29/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 14	07/16/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 15	09/22/03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 16	01/06/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 17	03/08/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Monitoring event 18	05/01/04	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Notes:

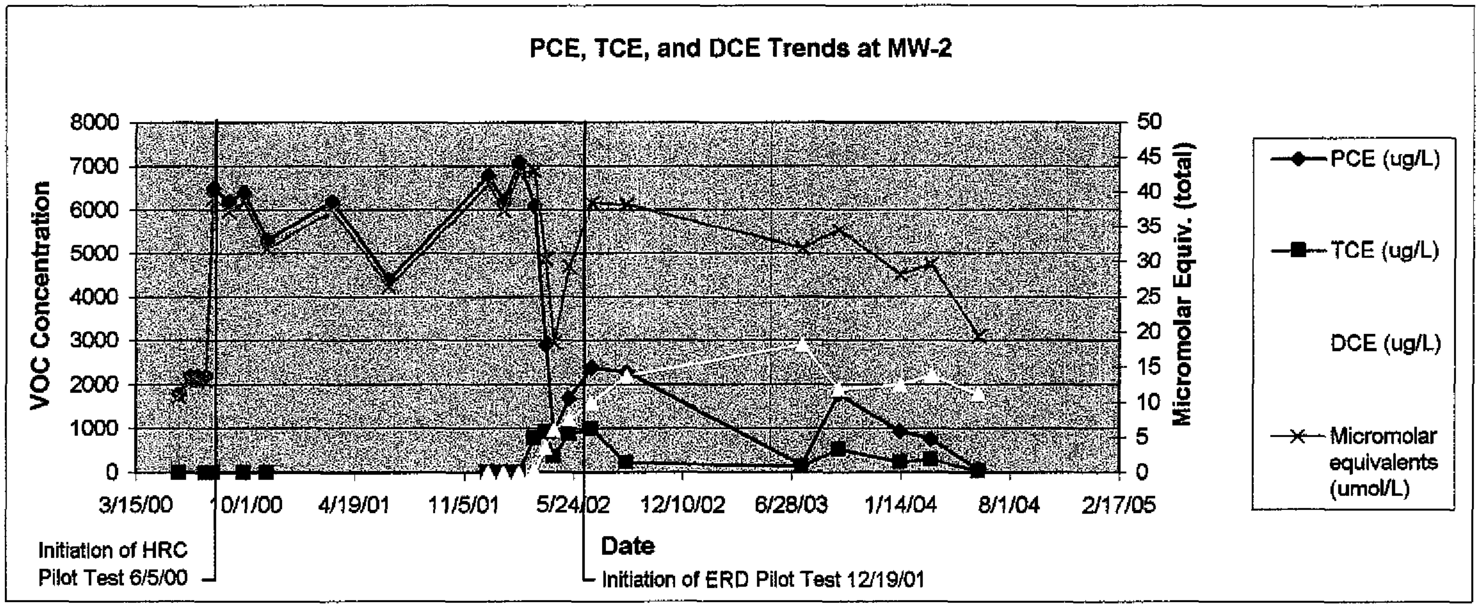
– Indicates parameter was not measured or analyzed
mg/L Milligrams per liter, equivalent to parts per million
ug/L Micrograms per liter, equivalent to parts per billion
n/L Nanograms per liter, equivalent to parts per trillion
SU Standard Unit
mV Millivolts
mS Milli Siemens
°C Degrees Celcius
IF Indicates instrument failure
* Indicates field data collected with Hach spectrophotometer followed by (/) laboratory analytical data


TOC, ORP, Iron, and Arsenic Trends at MW-1
TOC Concentration
ORP, Fe, As
Date
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05

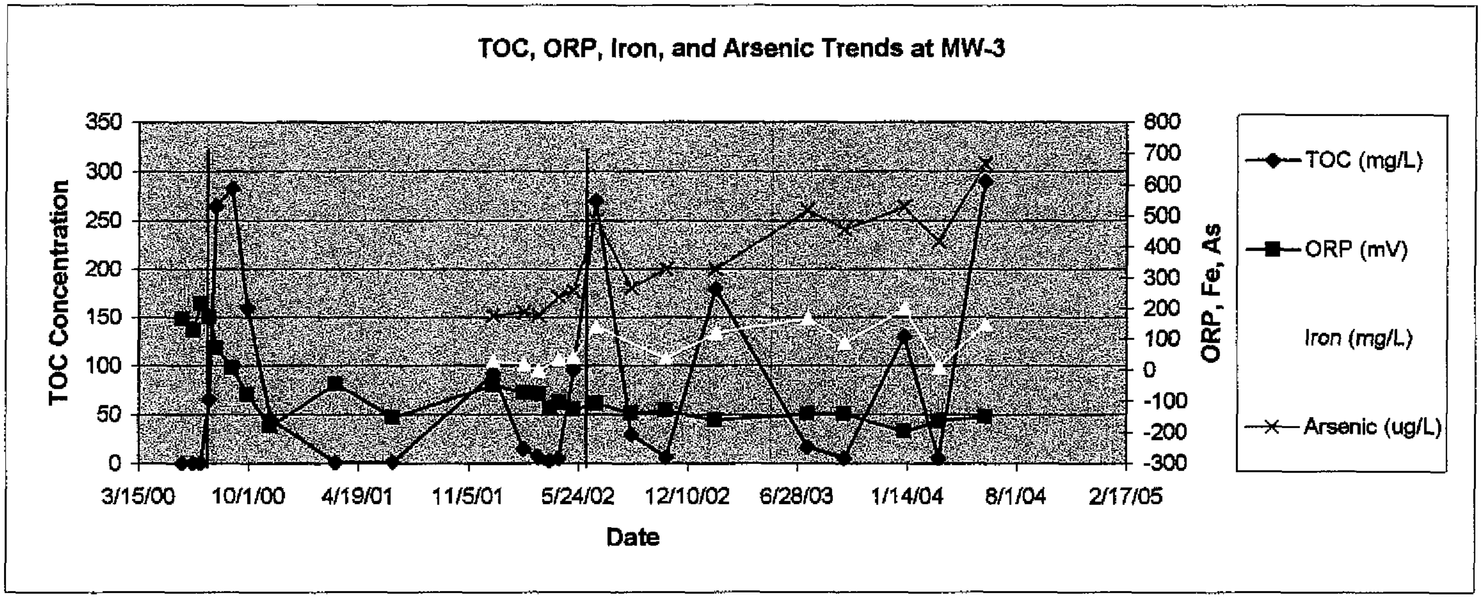

PCE, TCE, and DCE Trends at MW-1
VOC Concentration
Micromolar Equiv. Total
Date
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)
Initiation of HRC Pilot Test 6/5/00
Initiation of ERD Pilot Test 12/19/01

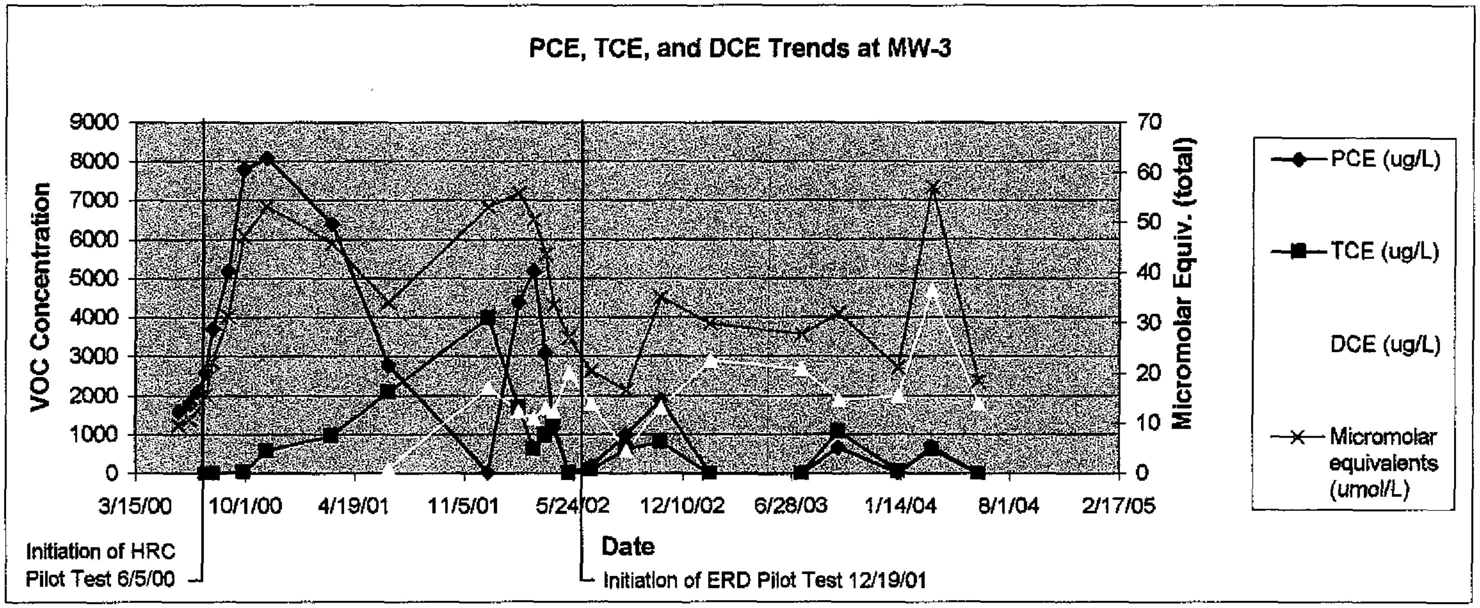


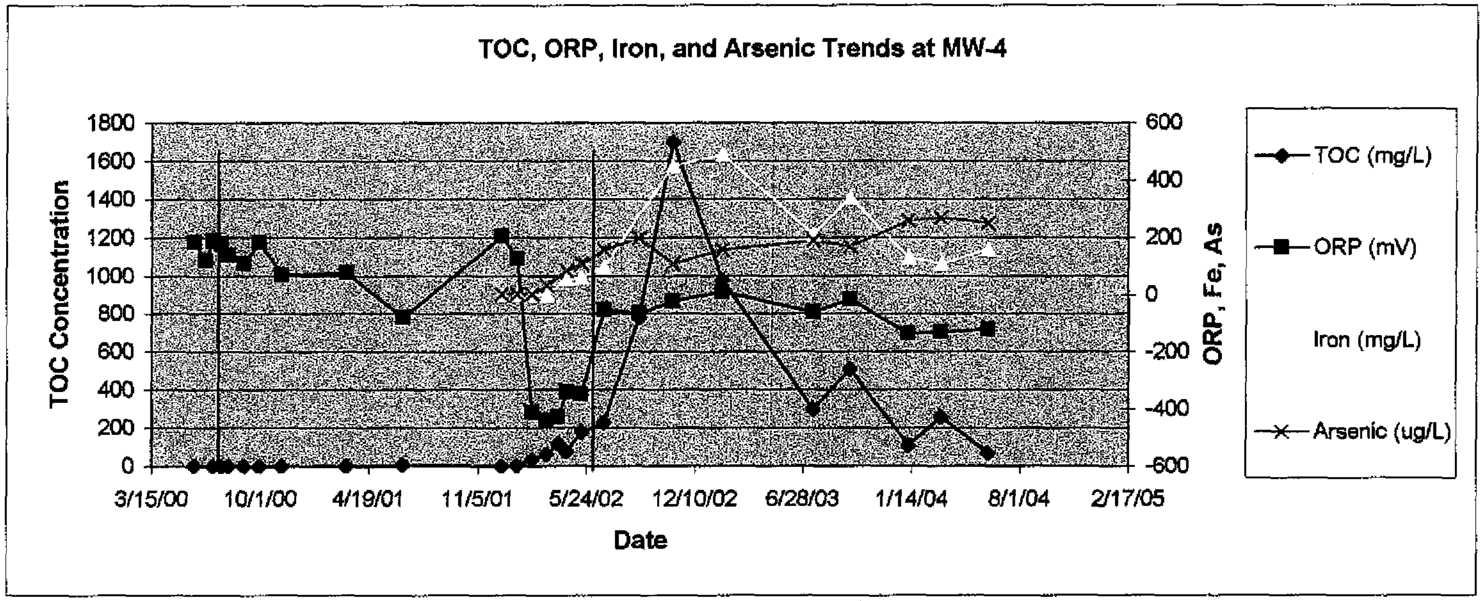
TOC, ORP, Iron, and Arsenic Trends at MW-2
TOC Concentration
ORP, Fe, As
Date
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)
350
300
250
200
150
100
50
0
600
500
400
300
200
100
0
-100
-200
-300
-400
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05



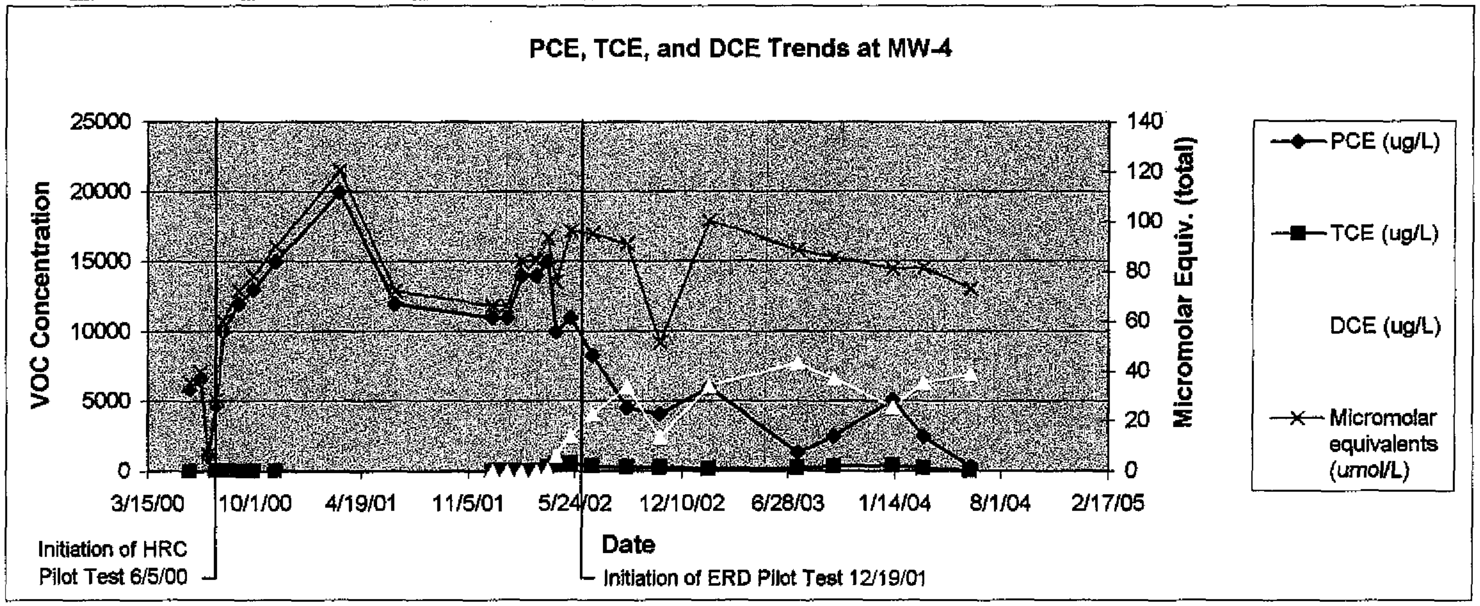
PCE, TCE, and DCE Trends at MW-2
VOC Concentration
Micromolar Equiv. (total)
Date
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
50
45
40
35
30
25
20
15
10
5
0
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05
Initiation of HRC Pilot Test 6/5/00
Initiation of ERD Pilot Test 12/19/01


TOC, ORP, Iron, and Arsenic Trends at MW-3
TOC Concentration
ORP, Fe, As
Date
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)
350
300
250
200
150
100
50
0
800
700
600
500
400
300
200
100
0
-100
-200
-300
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05

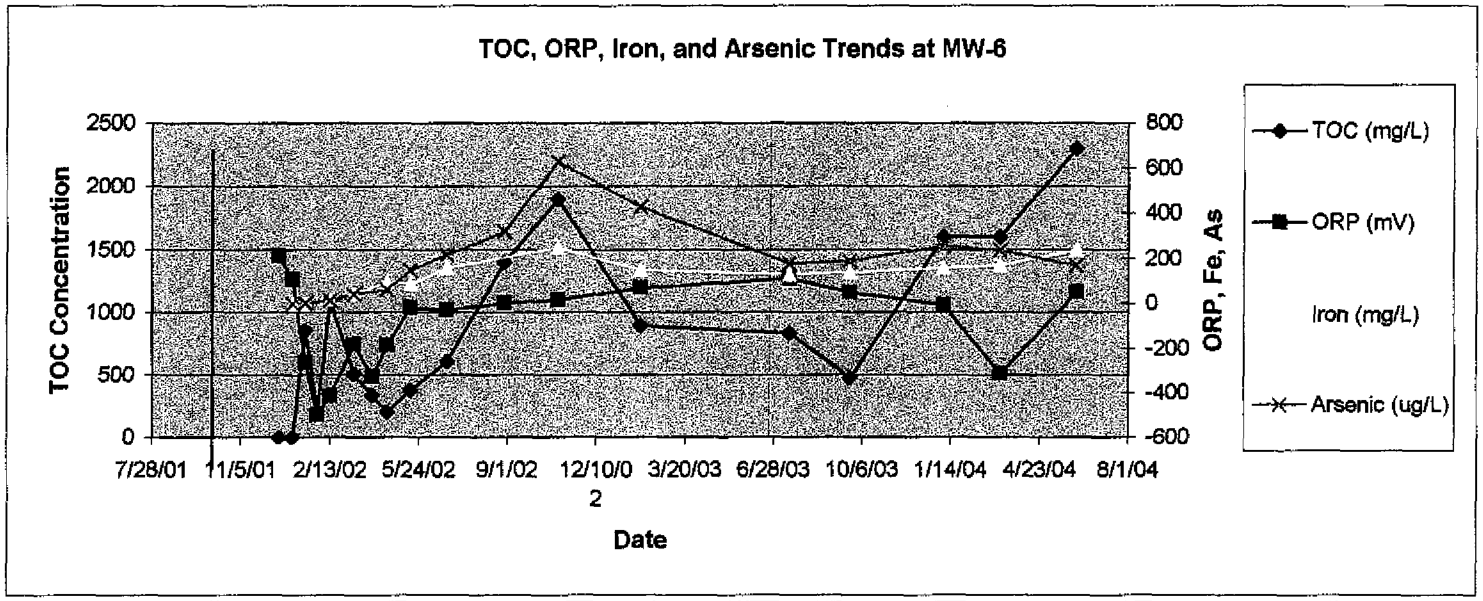

PCE, TCE, and DCE Trends at MW-3
VOC Concentration
Micromolar Equiv. (total)
Date
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
70
60
50
40
30
20
10
0
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05
Initiation of HRC Pilot Test 6/5/00
Initiation of ERD Pilot Test 12/19/01

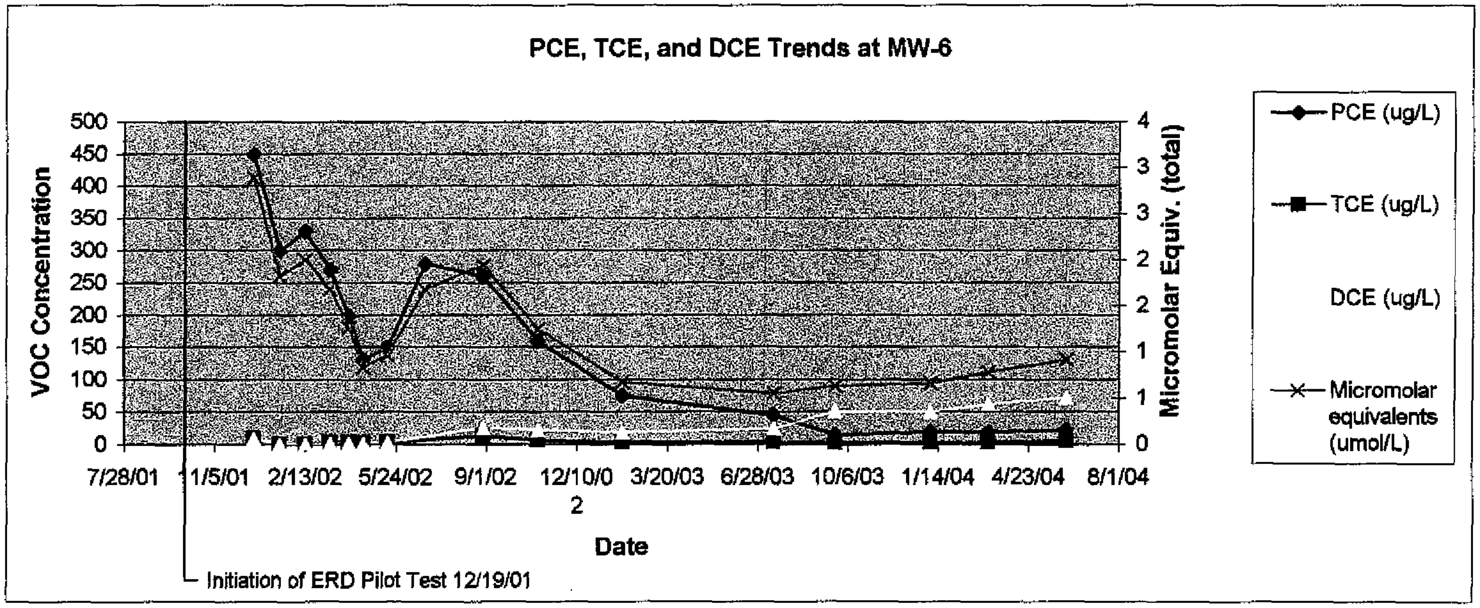


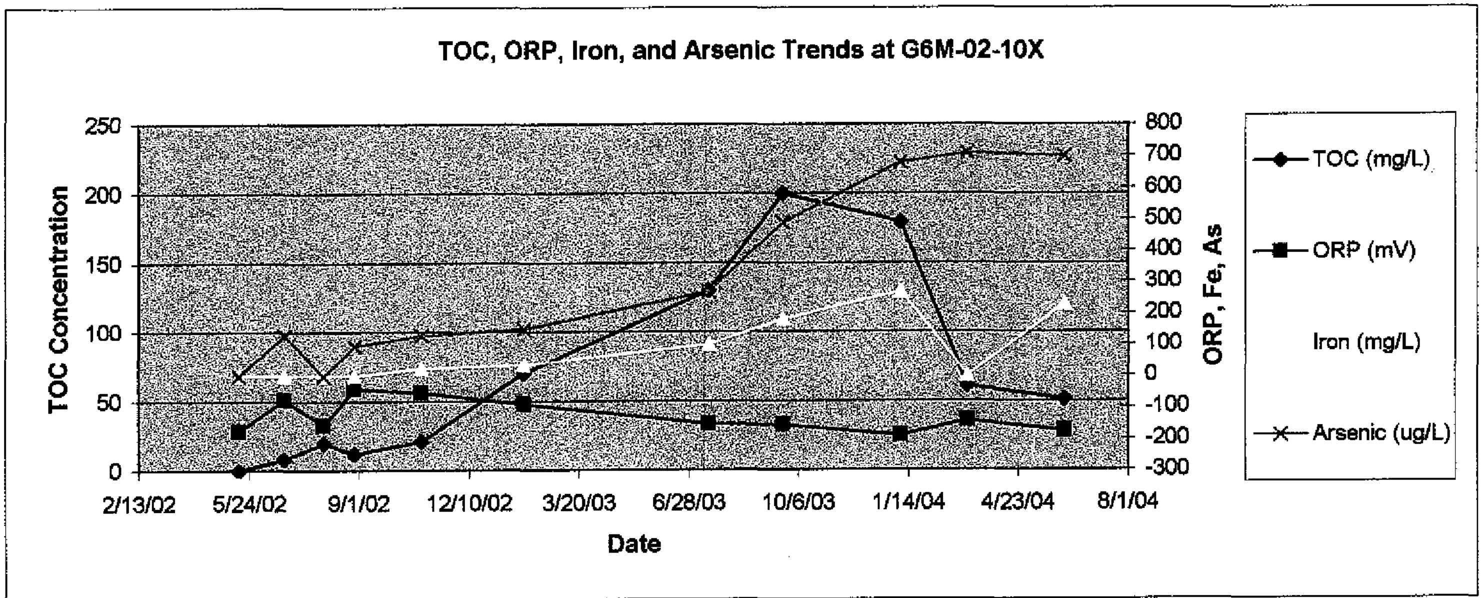
TOC, ORP, Iron, and Arsenic Trends at MW-4
TOC Concentration
ORP, Fe, As
Date
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)
1800
1600
1400
1200
1000
800
600
400
200
0
600
400
200
0
-200
-400
-600
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05



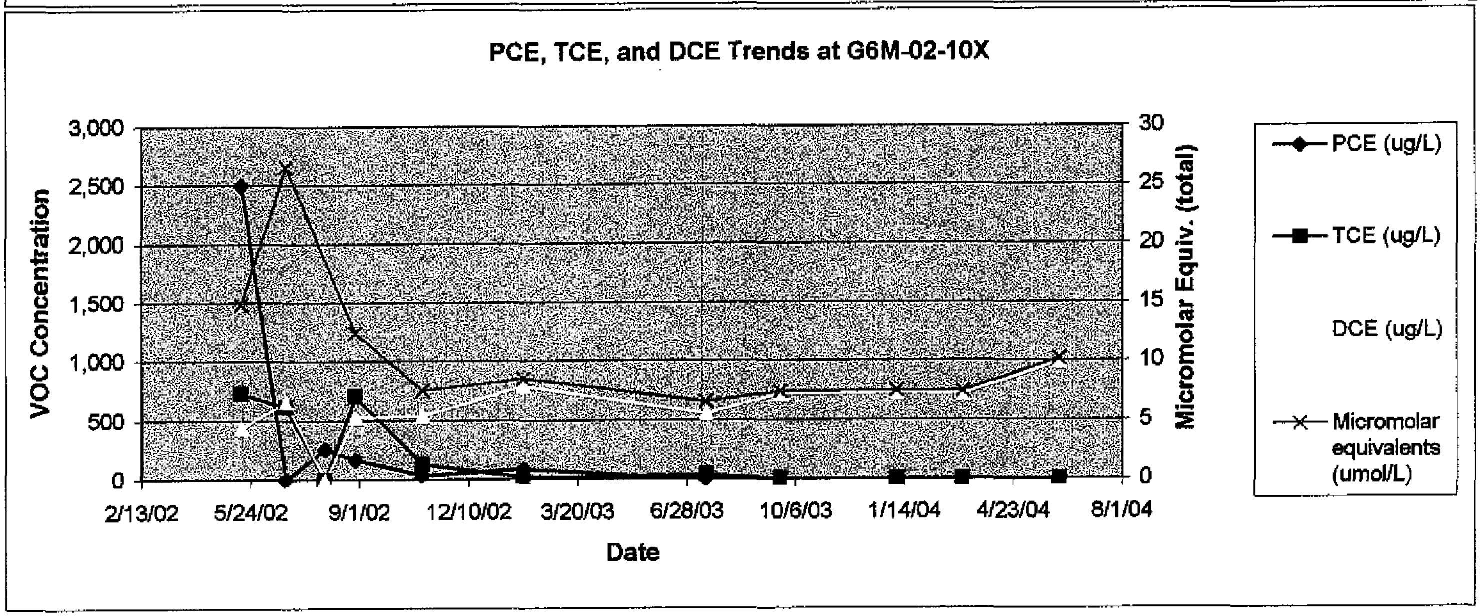
PCE, TCE, and DCE Trends at MW-4
VOC Concentration
Micromolar Equiv. (total)
Date
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)
25000
20000
15000
10000
5000
0
140
120
100
80
60
40
20
0
3/15/00
10/1/00
4/19/01
11/5/01
5/24/02
12/10/02
6/28/03
1/14/04
8/1/04
2/17/05
Initiation of HRC Pilot Test 6/5/00
Initiation of ERD Pilot Test 12/19/01


TOC, ORP, Iron, and Arsenic Trends at MW-6
TOC Concentration
ORP, Fe, As
2500
2000
1500
1000
500
0
800
600
400
200
0
-200
-400
-600
7/28/01
11/5/01
2/13/02
5/24/02
9/1/02
12/10/02
3/20/03
6/28/03
10/6/03
1/14/04
4/23/04
8/1/04
Date
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)


PCE, TCE, and DCE Trends at MW-6
VOC Concentration
Micromolar Equiv. (total)
500
450
400
350
300
250
200
150
100
50
0
4
3
3
2
2
1
1
0
7/28/01
11/5/01
2/13/02
5/24/02
9/1/02
12/10/02
3/20/03
6/28/03
10/6/03
1/14/04
4/23/04
8/1/04
Date
Initiation of ERD Pilot Test 12/19/01
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)



TOC, ORP, Iron, and Arsenic Trends at G6M-02-10X
TOC Concentration
250
200
150
100
50
0
2/13/02
5/24/02
9/1/02
12/10/02
3/20/03
6/28/03
10/6/03
1/14/04
4/23/04
8/1/04
Date
ORP, Fe, As
800
700
600
500
400
300
200
100
0
-100
-200
-300
TOC (mg/L)
ORP (mV)
Iron (mg/L)
Arsenic (ug/L)



PCE, TCE, and DCE Trends at G6M-02-10X
VOC Concentration
3,000
2,500
2,000
1,500
1,000
500
0
2/13/02
5/24/02
9/1/02
12/10/02
3/20/03
6/28/03
10/6/03
1/14/04
4/23/04
8/1/04
Date
Micromolar Equiv. (total)
30
25
20
15
10
5
0
PCE (ug/L)
TCE (ug/L)
DCE (ug/L)
Micromolar equivalents (umol/L)

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.

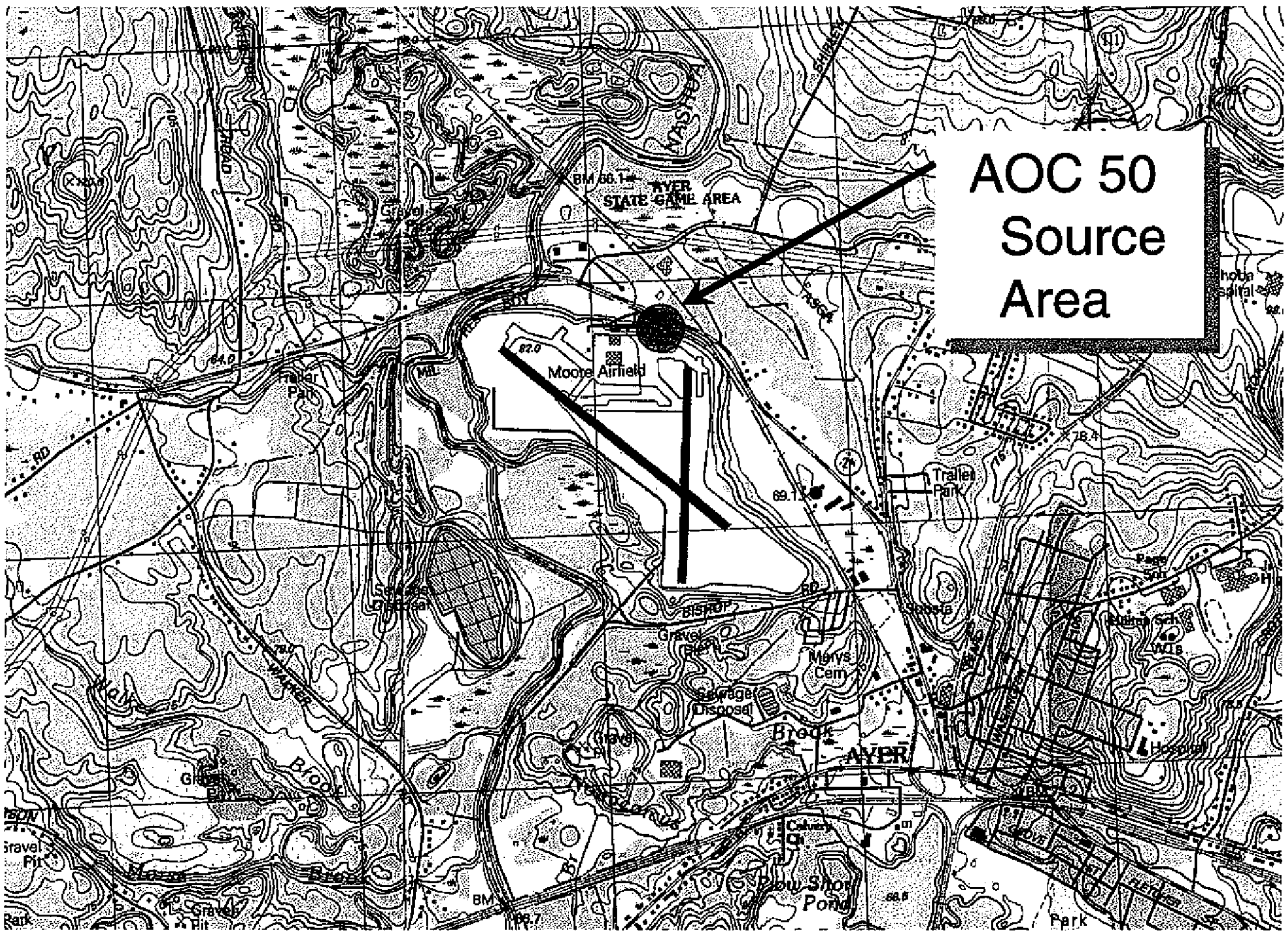
Notes:
ARARs = Applicable, Relevant and Appropriate Regulations
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
COC= Chemical of Concern
CWA = Clean Water Act
IDW = Investigation derived waste
MCL = 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

AOC 50
Moore Army Airfield
Devens, Massachusetts
Project Update

2 December 2004

ARCADIS

Site Map



ARCADIS

Portions of the Shirley and Ayer, MA, 7.5 minute Quadrangles

Agenda

- Review of Full-Scale Remedy in Place
- September 2004 LTM and O&M Activities
- Status of RAWP/LTMP/LUCP

ARCADIS

Full-Scale Remedy in Place

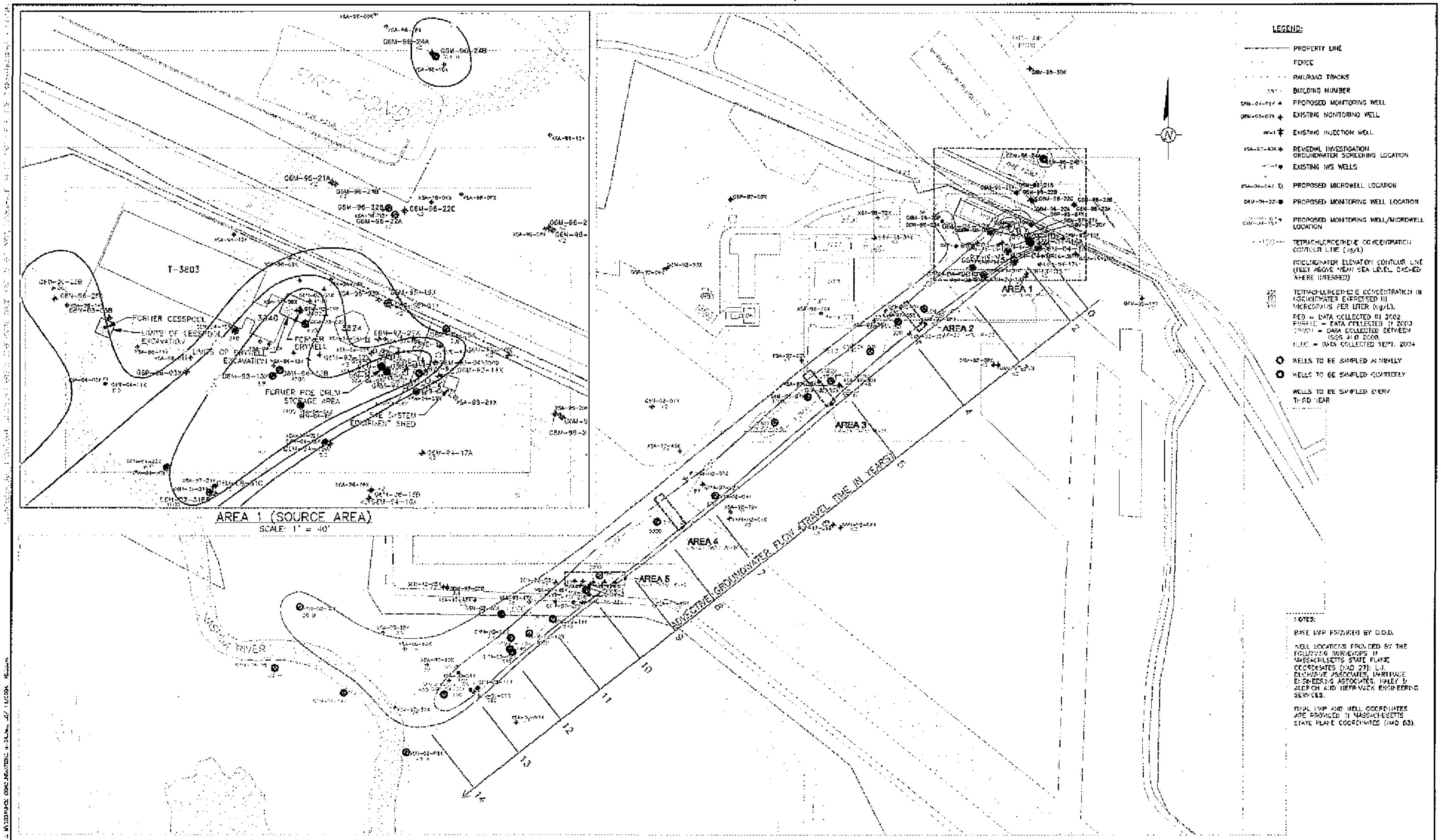
- Installed 35 New ERD Injection Wells (July/August 2004)
- Sequential Groundwater Sampling at 12 Locations
- Installed 18 New Long-Term Monitoring Wells (July/August 2004)
- Started IWS System (May 28, 2004)
- Started SVE System (September 30, 2004)
- Started ERD System (September 30, 2004)

September LTM and O&M Activities

- Base-line Groundwater Sampling September 20-24, 2004
- Sampled 42 Long-Term Monitoring Wells and One Additional New Monitoring Well
- Remedial System O&M

September Groundwater Sampling

- Groundwater Flow to the Southwest to Nashua River
- PCE to 7,400 ug/L with Highest Levels in Source Area and along Plume Axis
- Low Levels PCE in North Plume (7.4 ug/L) and along River (26 ug/L)
- Degradation of PCE with Low Levels VC in Former Pilot Test Area
- Arsenic Remains Less than 200 ft Downgradient of ERD IRZ



0 200

SCALE IN FEET

ARCADIS

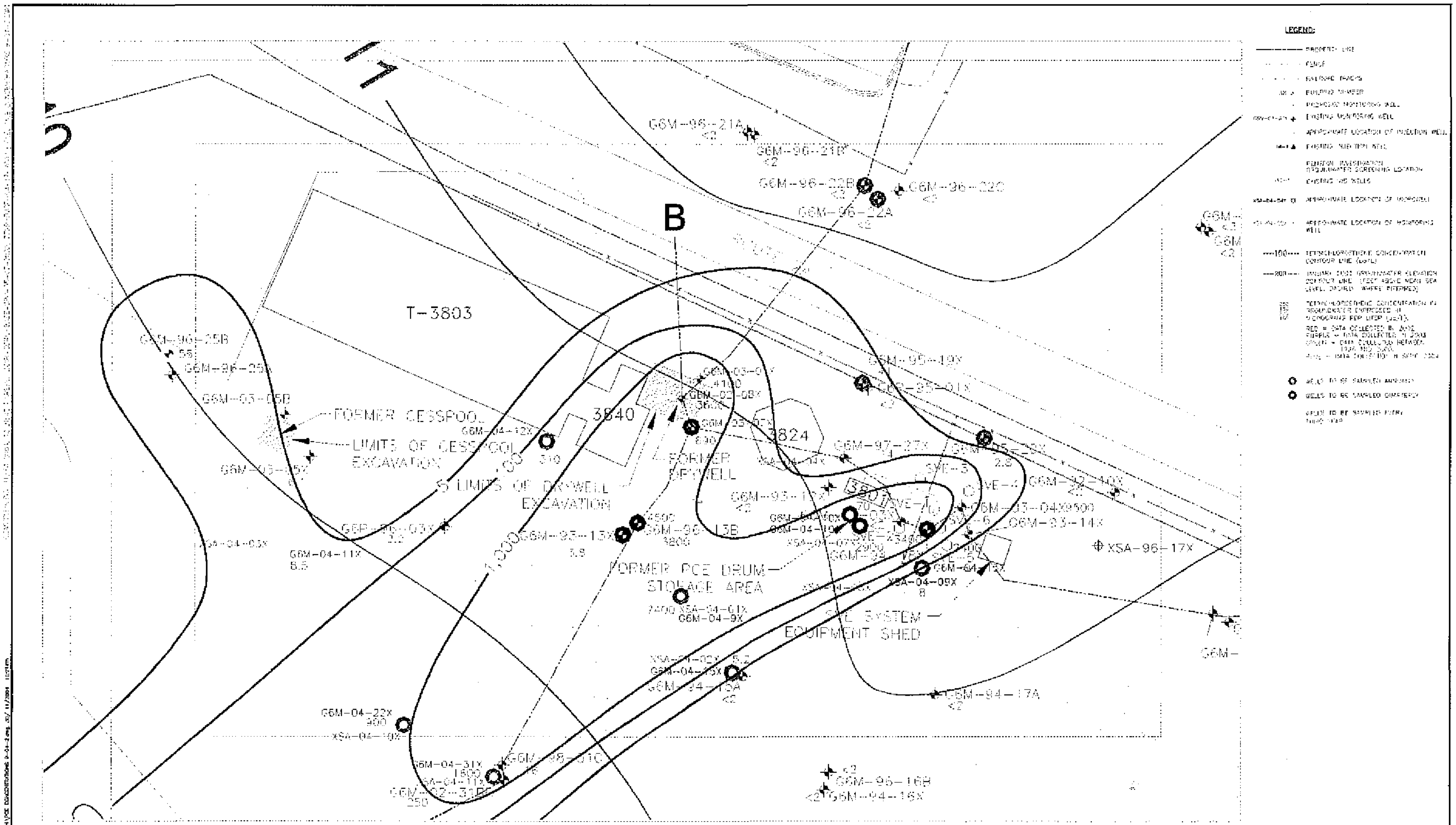
Wannalancit Office and Technology Center, Suite 400
175 Cabot Street
Lowell, Massachusetts 01854
Tel: 978/937-9999 Fax: 978/937-7555

PCE CONCENTRATIONS DETECTED IN GROUNDWATER

SEPTEMBER 2004

AOC 50
DEVENS, MASSACHUSETTS

PROJECT MANAGER	DRAWING NUMBER
CHECKED BY	PROJECT NUMBER
DRAWN BY	FIGURE NUMBER
DATE DRAWN	6



AREA 1 (SOURCE AREA)

ARCADIS

Marlborough Office and Technology Center, Suite 400
175 Cabot Street
Lowell, Massachusetts 01854
Tel: 978/937-9999 Fax: 978/937-7555

PCE CONCENTRATION DETECTED IN GROUNDWATER SEPTEMBER 2004

AOC 50
DEVENS, MASSACHUSETTS

PROJECT MANAGER
CHECKED BY
DRAWN BY
DATE DRAWN
DRAWING NUMBER
PROJECT NUMBER
FIGURE NUMBER

Standard Low-Flow vs. Modified Low-Flow Groundwater Data, September 2004, Devens, MA

Well ID	Low Flow Time	PCE ug/L	TCE ug/L	Cis- 1,2-DCE ug/L		Manganese ug/L	Arsenic ug/L	Lead ug/L	Alkalinity mg/L
G6M-02-11X	1 hr. 50 min.	540	50	140		2400	<5	<5	100
G6M-02-11XH	1 hr.	440	48	140		2400	<5	<5	13
G6M-02-12X	2 hrs.35 min.	1000	43	110		450	<5	<5	84
G6M-02-12XH	1 hr.	1100	38	100		520	<5	<5	84
G6M-04-15X	2 hrs. 5 min.	5.2	<2	5.3		8100	18	<5	
G6M-04-15XH	1 hr.	4.1	<2	4		8200	18	<5	
G6M-04-31X	2 hrs. 30 min	1600	<2	4.2		190	<5	<5	
G6M-04-31XH	1 hr.	1600	<2	3.8		200	<5	<5	

September O&M

- Performed First Site-Wide ERD Injection in 40 Wells
- Collected System Samples from IWS System (PCE Influent 220 ug/L, Effluent 25 ug/L)
- Collected System Samples from SVE System (SVE-6 PCE 2 ppmv dropped to 0.062 ppmv in 4 days)


CONLEY

Status of RAWP/LTMP/LUCP

- Draft Final RAWP/LTMP/LUCP Submitted to BCT on September 10, 2004
- Submitted Responses to EPA Comments on October 5, 2004

Near-Term Plan

- Continue Quarterly Groundwater Sampling and System O&M
- Finalize RAWP/LTMP/LUCP
- Present Results of ERD Transducer Study
- Submit O&M Manual
- Work Toward OPS Certification
- Implement North Plume Contingency Ahead of Schedule

APPENDIX J

CURRENT SITE STATUS

TABLE J
SITE STATUS TABLE

FIVE YEAR REVIEW
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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
1	SA	Cutler Army Hospital Incinerator	NFA	Master Environmental Plan Update, April 1993
2	SA	Veterinary Clinic Incinerator	NFA	Master Environmental Plan Update, April 1993
3	SA	Intelligence School Incinerator	NFA	Master Environmental Plan Update, April 1993
4	AOC	Sanitary Landfill Incinerator	Remedial Design	Final ROD, September 1995 Groundwater Model Update, March 1996 Final Close-Out Report, March 1996 Long Term Monitoring & Maintenance Plan, May 1996 Final Monitoring Well Installation Work Plan, May 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan), December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996 Jan 97 Draft Groundwater Pumping Test Report, March 1997 Addendum to Long Term Monitoring/Maintenance Plan, Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report, Apr 97 30% Concept Design Extraction/Discharge System, July 1997 Semi-Annual Groundwater Analytical Rpt., Spring (July) 97 Landfill Cap Improvement Report, October 1997 60% Design Extraction /Discharge System, November 1997 Semi-Annual Groundwater Analytical Rpt., Fall (Dec) 1997 Groundwater Pumping Test Report, January 1998 Draft Five Year Review Long Term Monitoring, Feb 98 Semi-Annual Groundwater Analytical Rpt., Spring (Jul) 1998 Final Five Year Review Long Term Monitoring, Aug 1998 Final Work Plan Supplemental Groundwater Investigation, Feb 1999 1999 Annual Report, LTMM, March 2000. Draft Suppl Groundwater Investigation, Jul 2000. Semi-Annual Groundwater Analytical Rpt., Spring 2000, Sep 2000. Final First Five-Year Review Devens RFTA, September 2000. 2001 Annual Report LTMM, Apr 2002 Semi-Annual Groundwater Analytical Rpt Spring 2002, August. 2002. 2002 Annual Report LTMM, Mar 2003. Revised Draft Suppl Groundwater Investigation, May 2003. PMP GW Extraction, Discharge & Treatment System, Oct 2003. Remedial Design & Remedial Action WP 60% Submittal, Dec 12, 2003 Explanation of Significant Differences, Feb. 2004

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4 cont.				Draft 2003 Annual Report, SHLF LTMM, June 2004 Remedial Design & Remedial Action Work Plan Draft Final 60% & Draft 100% September 2004 Draft 2004 Annual Report, July 2005 Groundwater Extraction, Treatment, and Discharge Contingency Remedy, August 2005
5	AOC	Landfill No. 1, Shepley's Hill	Remedial Design	Final Remedial Investigation Group 1A Sites, April 1993 Final Remedial Investigation Addendum Report Group 1A Sites, December 1993 Final Feasibility Study, February 1995 Final ROD, September 1995 Groundwater Model Update, March 1996 Final Close-Out Report, March 1996 Long Term Monitoring & Maintenance Plan, May 1996 Final Monitoring Well Installation Work Plan, May 1996 Well Logs, Boring Logs, Quality Reports & Field Notes, Nov 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan), December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996, Jan 97 Addendum to Long Term Monitoring/Maintenance Plan,. Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report, Apr 97 30% Concept Design Extraction/Discharge System, July 1997 Semi-Annual Groundwater Analytical Rpt., Spring (July) 97 Landfill Cap Improvement Report, October 1997 60% Design Extraction /Discharge System, November 1997 Semi-Annual Groundwater Analytical Rpt., Fall (Dec) 1997 Groundwater Pumping Test Report, January 1998 Semi-Annual Groundwater Analytical Rpt., Spring (Jul) 1998 Final Five Year Review Long Term Monitoring, Aug 1998 Final Work Plan Supplemental Groundwater Investigation, Feb 1999. 1998 Annual Report Long Term Monitoring & Maintenance, Mar 1999. Semi-Annual GW Analytical Report, Spring 1999 1999 Annual Report, L T M & Maintenance, March 2000. Draft Suppl Groundwater Investigation, Jul 2000 Semi-Annual Groundwater Analytical Rpt Spring 2000, September 2000. Final First Five-Year Review Devens RFTA, September 2000.

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5 cont.				2000 Annual Report, Long Term Monitoring & Maintenance, May 2001. Semi-Annual Groundwater Analytical Rpt Spring 2001, August. 2001. .Benthic Community Survey Nonacoicus Brook, 11/01 Rev Draft Suppl Groundwater Investigation, Vol I, Feb 2002. Rev Draft Suppl Groundwater Investigation, Vol II, Feb 2002 2001 Annual Report LTMM, Apr 2002. Semi-Annual Groundwater Analytical Rpt Spring 2002, August. 2002 2002 Annual Report Long Term Monitoring & Maintenance, Mar 2003. Revised Draft Suppl Groundwater Investigation, May 2003. PMP GW Extraction, Discharge & Treatment System, Oct 2003 Remedial Design & Remedial Action WP 60% Submittal, Dec 12, 2003 Draft 2003 Annual Report, SHLF LTMM, June 2004
6	SA	Landfill No. 2, South Post Area 7b / Household Dump	NFA	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Preliminary Draft Proposed Plan for LFC, July 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation, June 1999 Final Record of Decision for Landfill Remediation, July 1999 The selected remedy component for SA 6 is No Further Action under CERCLA. This site is being managed in conformance with Massachusetts Solid Waste Regulations. Final First Five-Year Review Devens RFTA, September 2000
7	SA	Landfill No. 3, South Post Area (West of EOD) / Household Dump	NFA	Master Environmental Plan Update April 1993. BCT meeting 21 August 1995 site GB
8	SA	Landfill No. 4, South Post Area 8a / Household Dump	NFA	Master Environmental Plan Update April 1993. BCT meeting 21 August 1995 site ED

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9	AOC	Landfill No. 5, North Post Landfill (WWTP) CNST Debris Landfill	ROD Remedial Design / Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Preliminary Draft Proposed Plan for LFC, July 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation, June 1999 Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Landfill Consolidation, October 99 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000 Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000 Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Draft Remedial Action Closure Report, Sept 2003
10	SA	Landfill No. 6 (Shirley Gate) / CNST Debris Landfill	NFA	NFA DD signed by BCT January 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
11	AOC	Landfill No. 7 / CNST Debris Landfill	ROD Remedial Design / Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Preliminary Draft Proposed Plan for LFC, July 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation, June 1999 Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Landfill Consolidation, October 99 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000 Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000 Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Draft Remedial Action Closure Report, Sept 2003

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12	SA	Landfill No. 8, Combat Pistol Range / CNST Debris Landfill	ROD Remedial Design / Remedial Action	Landfill Remediation Feasibility Study, January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41, April 97 Draft Final Proposed Plan, September 1997 Preliminary Final Proposed Plan, October 1997 Proposed Plan, December 1997 Proposed Plan for LFC Preliminary Draft Proposed Plan for LFC, July 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation, June 1999 Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Landfill Consolidation, October 99 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000 Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000 Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Remedial Action Closure Report SA 12 & AOC 41, Landfill Remediation Project, March 2003. Draft Remedial Action Closure Report, Sept 2003 Draft

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13	SA	Landfill No. 9, Lake George St. Landfill / Open CNST Debris Landfill	ROD Remedial Design / Remedial Action	Landfill Remediation Feasibility Study, January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41, April 97 Draft Final Proposed Plan, September 1997 Preliminary Final Proposed Plan, October 1997 Proposed Plan, December 1997 Proposed Plan for LFC Preliminary Draft Proposed Plan for LFC, July 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation, June 1999 Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Landfill Consolidation, October 99 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000 Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000 Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Draft Remedial Action Closure Report, Sept 2003
14	SA	Landfill No. 10 / Abandoned Quarry	NFA	NFA DD signed by BCT, January 1995
15	SA	Landfill No. 11, Helipad / Old Disposal Pit	NFA	NFA DD signed by BCT, September 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
16	SA	Landfill No. 12, Shoppette Landfill	NFA	NFA DD signed by BCT, January 1995
17	SA	Landfill No. 13, Little Mirror Lake	NFA	NFA DD signed by BCT, 12 March 1997

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18	AOC	Asbestos Cell, Shepley's Hill Landfill, Landfill No 1	ROD Remedial Design	Final ROD, September 1995 Groundwater Model Update, March 1996 Final Close-Out Report, March 1996 Long Term Monitoring & Maintenance Plan, May 1996 Final Monitoring Well Installation Work Plan, May 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan), December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996 Jan 97 Draft Groundwater Pumping Test Report, March 1997 Addendum to Long Term Monitoring/Maintenance Plan, Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report, Apr 97 30% Concept Design Extraction/Discharge System, July 1997 Semi-Annual Groundwater Analytical Rpt., Spring (July) 97 Landfill Cap Improvement Report, October 1997 60% Design Extraction /Discharge System, November 1997 Semi-Annual Groundwater Analytical Rpt., Fall (Dec) 1997 Groundwater Pumping Test Report, January 1998 Draft Five Year Review Long Term Monitoring, Feb 98 . Semi-Annual Groundwater Analytical Rpt., Jul 98. Final Five Year Review Long Term Monitoring, Aug 1998 Draft Work Plan Supplemental Groundwater Investigation, Oct 1998. Final Work Plan Supplemental Groundwater Investigation, Feb 1999 1999 Annual Report, Long Term Monitoring & Maintenance, March 2000. Draft Suppl Groundwater Investigation, July 2000 Semi-Annual Groundwater Analytical Rpt Spring 2000, September 2000. 2001 Annual Report Long Term Monitoring & Maintenance, April 2002 2002 Annual Report Long Term Monitoring & Maintenance, Mar 2003. Revised Draft Suppl Groundwater Investigation, May 2003. PMP GW Extraction, Discharge & Treatment System, Oct 2003 Remedial Design & Remedial Action WP 60% Submittal, Dec 12, 2003 Draft 2003 Annual Report, SHLF LTMM, June 2004 Remedial Design & Remedial Action Work Plan Draft Final 60% & Draft 100% September 2004 Draft 2004 Annual Report, July 2005 Groundwater Extraction, Treatment, and Discharge Contingency Remedy, August 2005 Explanation of Significant Differences, Feb. 2004

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
18 cont.				Draft 2003 Annual Report, SHLF LTMM, June 2004 Remedial Design & Remedial Action Work Plan Draft Final 60% & Draft 100% September 2004 Draft 2004 Annual Report, July 2005 Groundwater Extraction, Treatment, and Discharge Contingency Remedy, August 2005
19	SA	Wastewater Treatment Plant / Imhoff Tank	NFA	NFA DD signed by BCT 2 November 1995 Hydrogeologic Evaluation for Groundwater Discharge Permit, November 1998
20	SA	Rapid Infiltration Beds, WWTP	NFA	NFA DD signed by BCT 2, November 1995
21	SA	Sludge Drying Beds, WWTP	NFA	NFA DD signed by BCT 2, November 1995
22	SA	Hazardous Waste Storage Facility	NFA, RCRA closure	Master Environmental Plan, April 1992
23	SA	Paper Recycling Center	NFA	Master Environmental Plan, April 1992
24	SA	Waste Explosive Storage Bunker	NFA	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 NFA DD signed by Army and EPA, March 1993
25	AOC	EOD Range	ROD LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 (BRAC 9606-26 UXO) Final Record of Decision, July 1996 Final LTMP, May 1997 Final Well Installation Work Plan, May 1997. 1997 GW Analytical Report, SPIA, 2/98 1997 Annual Report-SPIA Long Term Monitoring, August 1998. Ecological Sampling Work Plan SPIA, October 1998 Final Ecological Sampling Work Plan SPIA, March 1999 Final Integrated Natural Resources Management Plan 1998-1002, April 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999. Annual Report 1999 SPIA Long Term Monitoring, July 2000.

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25 cont.				Final First Five-Year Review Devens RFTA, September 2000. Annual Report 2000 SPIA Long Term Monitoring, August 2001 Annual Report 2001 SPIA Long Term Monitoring, March 2002 2002 Annual Report Long Term Groundwater Monitoring, Mar 2003 Draft 2003 Annual Report, Mar 2004 Draft 2004 Annual Report, August 2005
26	AOC	Zulu I and II Ranges	ROD LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final Record of Decision, July 1996 Final LTMP, May 1997 Final Well Installation Work Plan, May 1997. 1997 GW Analytical Report, SPIA, Feb. 1998 1997 Annual Report-SPIA Long Term Monitoring, August 1998 Ecological Sampling Work Plan SPIA, October 1998 Final Ecological Sampling Work Plan SPIA, March 1999 Final Integrated Natural Resources Management Plan 1998-1002, April 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999. Annual Report 1999 SPIA Long Term Monitoring, July 2000. Final First Five-Year Review Devens RFTA, September 2000 Annual Report 2000 SPIA Long Term Monitoring, August 2001 2002 Annual Report Long Term Groundwater Monitoring, Mar 2003 Draft 2003 Annual Report, Mar 2004 Draft 2004 Annual Report, August 2005
27	AOC	Hotel Range	ROD LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final Record of Decision, July 1996 Final LTMP, May 1997 Final Well Installation Work Plan, May 1997. 1997 GW Analytical Report, SPIA, Feb. 1998 1997 Annual Report-SPIA Long Term Monitoring, August 1998 Ecological Sampling Work Plan SPIA, October 1998

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27 cont.				Final Ecological Sampling Work Plan SPIA, March 1999 Final Integrated Natural Resources Management Plan 1998-1002, April 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999. Annual Report 1999 SPIA Long Term Monitoring, July 2000. Final First Five-Year Review Devens RFTA, September 2000 Annual Report 2000 SPIA Long Term Monitoring, August 2001. 2002 Annual Report Long Term Groundwater Monitoring, Mar 2003 Draft 2003 Annual Report, Mar 2004 Draft 2004 Annual Report, August 2005
28	SA	Training Area 14	NFA	NFA DD signed by BCT, August 1994
29	SA	Transformer Storage Area	NFA	NFA DD signed by BCT,15 January 1995
30	SA	Drum Storage Areas	NFA	NFA DD signed by BCT, 9/11/95. Mass DEP withdrew original document for further review
31	SA	Fire-Fighting Training Area	NFA	NFA DD signed by BCT, 15 January 1995
32	AOC	DRMO Yard	ROD GW Monitoring in Progress	Final Radiological Survey & Remediation Report, Nov 1996 Final Feasibility Study Report (Rev. 2), January 1997 Proposed Plan, January 1997 Preliminary Draft Record of Decision, January 1997 Draft Record of Decision, February 1997 Proposed Plan, June 1997 Final Record of Decision, February 1998 (signed) Draft WP Monitoring Natural Attenuation Assessment AOCs 32 and 43A, July 1998 Contaminated Soil Removal Phase II-Soil, Asphalt & Debris Removal-Final Remedial Action Work Plan, July 1998. Final WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 Nov 1998 GW Sampling Data Report Round 1, 1 Mar 99 GW Sampling Data Report Round 2, June 1999 Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999 Groundwater Sampling Data Report Round 3-Sep 99 Draft Soils Remedial Action Completion Report, Soil, Asphalt, and Debris Removal, Oct 99. Groundwater Sampling Data Report-Round 4, 1 Dec 99

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32 cont.				Draft Groundwater Sampling Annual Report 2002, Jan 2003. Summary of Groundwater Elevation Results, 1stQtr 2003, Summary of Groundwater Elevation Results, 2nd Qtr 2003 Summary of Groundwater Elevation Results, 3rd Qtr 2003 Summary of Groundwater Elevation Results, 4thQtr 2003. Draft Work in Progress GW Sampling Summary Report Jan 2002 to Dec 2003, Feb 2004 Draft 2003 Annual Report, July 2004 Spring 2004 Semi-Annual Report Long Term Monitoring, Feb 2005 Draft 2004 Annual Report, July 2005
33	SA	DEH Entomology Shop	NFA	NFA DD signed by BCT 18 March 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
34	SA	Former DEH Entomology Shop	NFA	NFA DD signed by BCT 5 September 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
35	SA	Former DEH Entomology Shop	NFA	NFA DD signed 1 November 1995 DCC: RAM Plan for Entomology Complex 27 December 1996
36	SA	Former DEH Entomology Shop	NFA	NFA DD signed by BCT 18 March 1996
37	SA	Golf Course Entomology Shop	NFA	NFA DD signed by BCT 18 March 1996
38	SA	Battery Repair Area	NFA	NFA DD signed by BCT 11 September 1995
39	SA	Transformer	NFA	NFA DD signed by BCT 2 October 1996

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40	AOC	Cold Spring Brook Landfill	ROD Remedial Design/Remedial Action	Landfill Remediation Feasibility Study, January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41, April 97 Draft Final Proposed Plan, September 1997 Preliminary Final Proposed Plan, October 1997 Proposed Plan, December 1997 Proposed Plan Preliminary Draft Proposed Plan for LFC, July 1998 Supplemental Sampling at Monitoring Well CSB-01, July 1998 Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Landfill Consolidation, October 1999 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999 Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000. Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000 Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Draft Remedial Action Closure Report, Sept 2003

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41	AOC	Unauthorized Dumping Area, Site A Groundwater is an Operable Unit Under SPIA ROD for Sites 25, 26, 27, and 41 Surface Debris Under Site 41 is a landfill.	ROD	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final ROD (SPIA) GW July 1996 Landfill Remediation Feasibility Study January 1997 Final LTMP May 1997 Final Well Installation Work Plan May 1997 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997. 1997 Annual Report-SPIA Long Term Monitoring, August 1998 Preliminary Draft Proposed Plan for LFC, July 1998 Ecological Sampling Work Plan SPIA, October 1998 Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Landfill Remediation Feasibility Study Addendum Report, Nov 1998 Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999 Final Ecological Sampling Work Plan SPIA ,March 1999 Final Integrated Natural Resources Management Plan 1998-1002, April 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision for Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999 Design Analysis Report for Landfill Consolidation, October 99 Final Design Technical Specifications for Landfill Consolidation, October 1999. Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report-On-Site Versus Off-Site Disposal Options- Landfill Remediation Project, March 2000.

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41 Cont.	AOC	Unauthorized Dumping Area, Site A Groundwater is an Operable Unit Under SPIA ROD for Sites 25, 26, 27, and 41 Surface Debris Under Site 41 is a landfill.	ROD	Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Aug 2000. Site Safety & Health Plan, LF Remediation Project, Aug 2000. Contractor QC Plan, LF Remediation Project, Aug 2000. Final First Five-Year Review Devens RFTA, September 2000 Wetlands & Upland Habitat Restoration Plan, Landfill Remediation Project, Nov 2000. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Aug 2001. Annual Report 2000 SPIA Long Term Monitoring, August 2001. Wetland & Upland Habitat Restoration Plan, Landfill Remediation Project, Jan 2002. Draft Remedial Action Closure Report SA 12 & AOC 41, Landfill Remediation Project, March 2003. Remedial Action Closure Report SA 12 & AOC 41, Landfill Remediation Project, March 2003. 2002 Annual Report Long Term Groundwater Monitoring ,Mar 2003 Draft Remedial Action Closure Report, Sept 2003 Draft 2003 Annual Report, Mar 2004
42	SA	Popping Furnace (O Range)	NFA	NFA signed by BCT 5 September 1996

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
43A	AOC	POL Storage Site	ROD	Final Feasibility Study Report (Rev. 2) January 1997 Proposed Plan January 1997 Proposed Plan June 1997 Final Record of Decision February 1998 (signed) Final WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 Nov 1998 GW Sampling Data Report Round 1, 1 Mar 99 GW Sampling Data Report Round 2, June 1999 Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999 Groundwater Sampling Data Report Round 3-Sep 99. Groundwater Sampling Data Report-Round 4, 1 Dec 99. Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL,Feb 2000. Final First Five-Year Review Devens RFTA, September 2000 Final Monitoring Natural Attenuation Assessment Report Vol I & II, AOC 43A, Dec 2000. Final Monitoring Natural Attenuation Assessment Report Vol II Appendix E, AOC 43A, April 2001. GW Extraction & Treatment Effectiveness Review of Current GW Monitoring Programs, Mar 2002 Summary of Groundwater Results 1st Qtr 2002, May 2002 Draft Final Data Report, Replacement GW Monitoring Wells and Piezometers, AOC 32/43A, May 2002. Summary of Analytical Results and Groundwater Elevation July 2002. Summary of Groundwater Elevation Results 3rd Qtr 2002 July 02. Summary of Groundwater Elevation Results 4th Qtr 2002 Draft Groundwater Sampling Annual Report 2002, Jan 2003. Summary of Groundwater Elevation Results, 1stQtr 2003, Summary of Groundwater Elevation Results, 2ndQtr 2003 Summary of Groundwater Elevation Results, 3rdQtr 2003 Summary of Groundwater Elevation Results, 4thQtr 2003 Draft Work in Progress GW Sampling Summary Report Jan 2002 to Dec 2003, Feb 2004 Draft 2003 Annual Report, July 2004 Spring 2004 Semi-Annual Report Long Term Monitoring, Feb 2005 Draft 2004 Annual Report, July 2005
43B	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43C	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43D	SA	Historic Gas Station Patch Road	NFA	NFA DD signed by BCT 23 July 1996

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43E	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43F	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43G	AOC	Historic Gas Station <u>Area 1</u> Historic Gas Station site <u>Area 2</u> AAFES Gas Station 2008 (2) 10,000-gallon USTs and (1) 15,000-gallon UST, removed <u>Area 3</u> AAFES Gas Station 2008 Sand and gas trap 1,000-gallon fuel oil UST 500-gal. waste oil UST, removed	Remedial Design/ Remedial Action	Final Record of Decision October 17, 1996 Final Work Plan Intrinsic Remediation Assessment April 97 AOC 43G Area 2 Soil and Free Product Assessment Data Report, and Intrinsic Remediation Assessment April 10, 1997 Prelim. Groundwater Data-Sampling/Field Analysis May 97 Memorandum Modeling Work Plan, IRA May 1997 Initial Groundwater Sampling Data Report June 1997 Proposed Sampling and Laboratory Analysis Schedule for Groundwater Sampling Round 1, IRA, June 1997 Removal Action Report Area 2 and Area 3, June 1997 Draft Baseline Intrinsic Remed. Assessment Report July 97 Groundwater Sampling Data Report - Round 1 August 1997 Groundwater Sampling Data Report – Round 2 Nov 97 Groundwater Sampling Data Report-Round 3 Feb 98 1997 Annual Report 1 Feb 98 Groundwater Sampling Data Report-Round 4 4 May 98 Groundwater Sampling Data Report-Round 5 1 Aug 98 Groundwater Sampling Data Report-Round 6 Oct 1998. Groundwater Sampling Data Report-Round 7 Feb 1999 Draft Intrinsic Remediation Assessment Report June 1999 Final Intrinsic Remediation Assessment Report Vol III of III App P, Nov 1999 Final Intrinsic Remediation Assessment Report Vol I of III Report, Nov 1999. Final Intrinsic Remediation Assessment Report Vol I of III, Report, Nov 1999. Final First Five-Year Review Devens RFTA, September 2000 1999 Annual Report, Long Term Monitoring, Oct 2000 2000 Annual Report, Long Term Monitoring, Aug 2001. GW Extraction & Treatment Effectiveness Review of Current GW Monitoring Programs, Mar 2002 2001 Annual Report AOCs 43G and 43J LTM, May 2002. 2002 Annual Report AOCs 43G and 43J LTM, Jun 2003 Draft 2003 Annual Report AOCs 43G and 43J LTM, Apr 2004
43H	SA	Historic Gas Station Queenstown St Spill	NFA	NFA DD signed by BCT 5 September 1996

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
43I	SA	Historic Gas Station Queenstown St Spill	NFA	NFA DD signed by BCT 5 September 1996
43J	AOC	Historic Gas Station	Remedial Design/ Remedial Action Removal Action: Work complete, Closeout report underway	Final Record of Decision October 17, 1996 Final Work Plan Intrinsic Remediation Assessment April 97 Prelim. Groundwater Data-Sampling/Field Analysis May 97 Memorandum Modeling Work Plan, IRA May 1997 Initial Groundwater Sampling Data Report June 1997 Proposed Sampling and Laboratory Analysis Schedule for Groundwater Sampling Round 1, IRA, June 1997 Draft Baseline Intrinsic Remed. Assessment Report July 97 Groundwater Sampling Data Report - Round 1 August 1997 Groundwater Sampling Data Report – Round 2 Nov 97 Groundwater Sampling Data Report-Round 3 Feb 98 1997 Annual Report 1 Feb 98 Groundwater Sampling Data Report-Round 4 4 May 98 Groundwater Sampling Data Report-Round 5 1 Aug 98 Groundwater Sampling Data Report-Round 6 Oct 1998 Groundwater Sampling Data Report-Round 7 Feb 1999 Draft Intrinsic Assessment Remediation Report, June 1999. Final Intrinsic Remediation Assessment Report Vol III of III App P, Nov 1999. Final Intrinsic Remediation Assessment Report Vol I of III Report, Nov 1999. Final Intrinsic Remediation Assessment Report Vol II of III, Report, Nov 1999. Final First Five-Year Review Devens RFTA, September 2000 1999 Annual Report, Long Term Monitoring, Oct 2000 2000 Annual Report, Long Term Monitoring, Aug 2001. GW Extraction & Treatment Effectiveness Review of Current GW Monitoring Programs, Mar 2002 2001 Annual Report AOCs 43G and 43J LTM, May 2002. 2002 Annual Report AOCs 43G and 43J LTM, Jun 2003 Draft 2003 Annual Report AOCs 43G and 43J LTM, Apr 2004
43K	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43L	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43M	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43N	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43O	SA	Historic Gas Station	NFA	NFA DD signed by BCT 25 June 1996
43P	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
43Q	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43R	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
43S	SA	Historic Gas Station	NFA	NFA DD signed by BCT 18 January 1995
44	AOC	Cannibalization Yard Barnum Road	ROD Groundwater Monitoring in progress	Record of Decision, AOCs 44 & 52, Mar 95 Remedial Action Completion Report June 1996 Work Plan and Field Sampling Analysis Plan Groundwater Monitoring for AOCs 44 & 52 March 1997 Work Plan and Field Sampling and Analysis Plan, Groundwater Monitoring for AOCs 44 & 52, April 1998 Annual Groundwater Sampling Report 1998, October 1998 Annual Groundwater Sampling Report 1999, October 1999. Final First Five-Year Review Devens RFTA, September 2000 Draft 2003 GW Monitoring Report, May 2004 Draft Remedial Action Report AOC 44/52, May 2004
45	SA	Wash Rack, Lake George Street	NFA	NFA in MEP Update 1993, requiring removal. Closure Report June 1994 GAS Environmental
46	SA	Training Area 6d	NFA	Master Environmental Plan Update April 1993
47	SA	LUST Site	NFA	NFA DD signed by Army and EPA 20 June 1994
48	SA	LUST Site / Building 202 UST	NFA (Additional work regarding groundwater : see 61Z)	NFA DD signed by BCT 18 January 1995
49	SA	LUST Site	NFA	NFA DD signed by BCT 2 October 1996

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
50	AOC	WWII Fuel Points	RI/FS (GW/Soil) COE to operate soil vapor extraction system.	Final RI Work Plan June 1996 Summary Report SVE Monitoring November 1996 Summary of Remedial Investigation Findings 7/97 Revised Risk Assessment Approach Plan July 1997 Removal Action Report September 1997 Draft Remedial Investigation Report October 1997. Final WP Supplemental RI Activities at AOC 50, March 1999. Final Remedial Investigation Report Vol I of III, Jan 2000 Final Remedial Investigation Report Vol II of III, Jan 2000 Final Remedial Investigation Report Vol III of III, Jan 2000. Draft Findings Report Benzene & Ethylene Dibromide Assessments, AOC 50, Mar 2000. Final Work Plan Pilot-Scale Evaluation of Hydrogen Release Compound for Enhanced In-Situ Bioremediation at AOC 50, Apr 2000 Draft WP Supplemental Ground Water Sampling, Jul 2000. Draft Feasibility Study Report, Vol I, December 2000 Draft Feasibility Study Report, Vol II, December 2000 Final WP for Enhanced Reductive Dechlorination Pilot Test, Dec 2001. Project Management Plan, AOC50, December 2001. Draft 2001 GW Sampling Report, Jan 2002. Draft Sampling and Analysis Plan, Jan 22, 2002 WP for Additional Remedial Investigation Activities, Jan 2002 Final Pilot-Scale Eval of HRC for Enhanced In-Situ Bioremediation, Feb 2002. Revised Draft Feasibility Study Report, Mar 2002. Draft Groundwater Flow & Solute Transport Model, Apr 2002 Final Feasibility AOC 50, May 9, 2002. Final Sampling and Analysis Plan, May 24, 2002. Supplemental Investigation Report, June 14, 2002. WP for Additional GW Monitoring Wells, July 10, 2002 Project Management Plan Revision 1 Final, July 9, 2002 Draft Quality Assurance Management Plan, August 2002. Final Feasibility Study Dec 16, 2002 Draft Proposed Plan, Dec 20, 2002. Data Management Plan, Jan 15, 2003. Draft Waste Management Plan, March 6, 2003. Workplan for Pre-Design Activities, March 5, 2003.

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
50 cont.				Final Pre-Design Implementation WP, In Well Stripping, Apr03 Project Management Plan Rev 4 &5, June 2, 2003 Draft O&M & GW Monitoring Report Apr-Jul03, Sep 03 Draft Final Record of Decision, Sept 22, 2003. O&M & GW Monitoring Report Jul-Sep 03, Nov 03 QA Management Plan Dec 2003 Draft Remedial Action Work Plan, Dec 8, 2003 Final Record of Decision, Jan 22, 2004 O&M and GW Monitoring Report, Jan to Mar 04, May 2004 Draft Health and Safety Plan for RD & ops Maint., Jun 2004 Draft Final 100% Remedial Design, Jun 28, 2004 O&M and GW Monitoring Report, June, 2004 O&M and GW Monitoring Report, Dec 2004 O&M and GW Monitoring Report, Feb 2005
51	SA	O'Neil Building Spill Site	NFA	NFA DD signed by BCT 11 September 1995
52	AOC	TDA Maintenance Yard Barnum Road	ROD Groundwater Monitoring in progress	Record of Decision, AOCs 44 & 52, March 1995 Remedial Action Completion Report June 1996 Work Plan and Field Sampling Analysis Plan Groundwater Monitoring for AOCs 44 & 52 March 1997 Work Plan and Field Sampling and Analysis Plan, Groundwater Monitoring for AOCs 44 & 52, April 1998 Annual Groundwater Sampling Report 1998, October 1998. Annual Groundwater Sampling Report 1999, October 1999. Final First Five-Year Review Devens RFTA, September 2000 Draft 2003 GW Monitoring Report, May 2004 Draft Remedial Action Report AOC 44/52, May 2004
53	SA	POL Spill Areas	NFA	Master Environmental Plan Update April 1993 NOTE: Lenox Conference agreed to delete this SA from the MEP by documentation in yearly addendum.
54	SA	Historic Gas Station	same as 43O which is NFA	NFA DD signed by BCT 6 June 1996 (SA 43O)
55	SA	Shirley Housing Area Trailer Park Fuel Tanks	NFA (EMO tank removal complete)	Master Environmental Plan Update April 1993, requiring removal; Closure Report August 1995 OHM.
56	SA	LUST Site	NFA	NFA DD signed by BCT 2 October 1996

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
57	AOC	Area 1 - Fuel Oil Spill Site Area 2 - Area 3 - Off Barnum Road	RI/FS Wetlands Removal Action; Contractor preparing cost proposal-Area 3	Final RI Work Plan Addendum August 1996 Storm Drain System No. 6 Outfall Action Memo. and Field Sampling and Analysis Plan Addendum October 96 Draft Remedial Investigation Report March 1997 Draft RI/FS Suppl Workplan Areas 2 and 3 12 Mar 98 Contaminated Soil Removal-Phase II Removal Action Report Storm Drain System No. 6 Outfall, Jul 98 Action Memorandum, January 1999 Action Memorandum February 1999. Draft Final Remedial Investigation Report , October 1999 Final RI/FS Letter Work Plan, AOC 57, Area 3,Jun 2000 Final Remedial Investigation Report, Vol I of III, June 2000. Final Remedial Investigation Report, Vol II of III, June 2000. Final Remedial Investigation Report, Vol III of III, June 2000. Draft Focused Feasibility Study, June 2000. Final Focused Feasibility Study, November 2000. Preliminary Draft Proposed Plan, December 2000 Draft Proposed Plan, February 2001. Final Proposed Plan, February 2001 Final Record of Decision, September 2001 Draft WP Remedial Action AOC 57, Dec 2001. WP for Remedial Action AOC 57, Jan 2002. Rev Site Safety and Health Plan, AOC 57 Remedial Action, January 2002. Draft Tech Memo Suppl Soil Sampling & Delineation, Area 2, October 2002. Draft WP Amendment Monitoring Well Installation/Soil Sampling at Area 2, Nov 2002 Sediment Sampling Final Analysis Report, Jan 2003 Final WP Amendment Monitoring Well Installation/Soil Sampling at Area 2, Jan 2003. Draft Tech Memo, Soil Sampling & Test Data & Recommendations for Further Removal Action, Apr 2003 Draft WP Amendment for Additional Soil Removal, May 2003. Draft Tech Memo Proposed Storm water Detention, June 2003 Draft Explanation of Significant Differences, Sept. 2003 Draft LTM Plan, March 2004 Draft Explanation of Significant Differences, March 2004 Final Interim Remedial Action Completion Report Vol. I&II, Sept. 2004 Draft 2003 Annual Report, October 2004 Draft 2004 Semi-Annual Report Long Term Monitoring, Dec 2004
58	SA	LUST Sites	NFA	NFA DD signed by BCT 2 November 1995
59	SA	Bridge 526	NFA	NFA DD signed by BCT 18 January 1995
60	AREE	Training Areas & Ranges	NFA	NFA Remains in DRFTA Operation

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
61.A	AREE	MWAA, Former Motor Pool	NFA	DCC: RAM Plan for Entomology Complex 27 December 1996 NFA DD signed by BCT 28 January 1997
61.B	AREE	MWAA, Motor Pool	NFA	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan Nov 96 AREE 61B Action Memorandum November 1997 Draft NFADD Various Removal Actions Phase II Apr 1998 Final NFADD Various Removal Actions Phase II Jun 1998
61.C	AREE	MWAA, Former Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61.D	AREE	MWAA, Motor Pool, Satellite Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61.E	AREE	MWAA, Motor Pool	NFA (UIS Closure)	NFA DD signed by BCT 17 October 1995
61.F	AREE	MWAA, Motor Pool	NFA (UIS Closure)	NFA DD signed by BCT 17 October 1995
61.G	AREE	MWAA, Motor Pool	Area surrounding building referred to AOC 43G	Final Report September 1995
61.H	AREE	MWAA, Motor Pool	NFA (UIS Closure)	NFA DD signed 1 November 1995
61.I	AREE	MWAA, Motor Pool	NFA (Referred to 43 H&I)	Final Report September 1995
61.J	AREE	MWAA, Motor Pool	NFA (MADEP has requested survey of GW elevation of monitoring wells and resampling of GW in the fall)	NFA DD signed by BCT 17 October 1995 MADEP Letter re: RAO, for Bldg 613, August 1998

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
61.K	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 2 November 1995
61.L	AREE	MWAA, Motor Pool -Across from cemetery	NFA (Deleted)	AREE 61 Draft Report November 1993 ADL
61.M	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 5 September 1996
61.N	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61.O	AREE	MWAA, Motor Pool	Referred to 43K and 63AX	Final Report September 1995
61.P	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 2 October 1996
61.Q	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61.R	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 1 November 1995
61.S	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 2 October 1996
61.T	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61.U	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 1 November 1995
61.V	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 5 June 1997
61.W	AREE	MWAA, Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61.X	AREE	MWAA, TDA Waste Accumulation Area	Building and unpaved area referred to AOCs 44&52, SEA floor drain study; tanks to 63BJ and 63BK (now NFA)	Final Report September 1995
61.Y	AREE	MWAA, Satellite Waste Accumulation Areas	NFA	NFA DD signed by BCT 17 October 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
61.Z	AOC	MWAA, Waste Accumulation Area	NFA	Remed. Investigation/Feasibility Study Final Work Plan June 96 Draft UPPL Removal Site Evaluation Work Plan November 96 Risk Assessment Approach Plan 10 February 1997 Draft (Groundwater) Site Investigation Report March 1997 Final UST Closure Report Building 202 - 61Z April 1997 Revised Risk Assessment Approach Plan (for 50) July 1997 Final Site Investigation Report January 1998(with Consensus Statement Changing Groundwater from AOC to SA) Draft No Further Action Decision July 1999 Draft Final No Further Action Decision October 1999 Draft Final No Further Action Decision Document December 1999. Final No Further Action Decision Document signed Jan 26, 2000.
61AA	AREE	MWAA, Commissary Parking Lot	NFA	NFA DD signed by BCT 17 October 1995
61AB	AREE	MWAA, DEH Roads and Railroads Maintenance Shop; Triangular Area	NFA	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan November 96 Various Removal Actions Phase II Action Memorandum Nov 98 Draft No Further Action Decision Document, Feb 99. Final No Further Action Decision Document, Apr 99.
61AC	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AD	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AE	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AF	AREE	MWAA, Waste Accumulation Area	NFA pending regulatory decision	Final Report September 1995 BCT Meeting Notes 2 November 1995
61AG	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AH	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AI	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AJ	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AK	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AL	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AM	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AN	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AO	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AP	AREE	MWAA, Waste Accumulation Area	NFA, Deleted, 61D duplic.	Final Report September 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
61AQ	AREE	MWAA, Waste Accumulation Area	NFA, UIS remains in place	NFA DD signed by BCT 17 October 1995
61AR	AREE	MWAA, Waste Accumulation Area	NFA, UIS remains in place	NFA DD signed by BCT 17 October 1995
61AS	AREE	MWAA, Waste Accumulation Area	NFA	NFA DD signed by BCT 17 October 1995
61AT	AREE	MWAA, Historic Motor Pool	NFA	NFA DD signed by BCT 17 October 1995
61AU	AREE	MWAA, General Maintenance Facilities	RA; UPPL Evaluation; to remediate soil prior to transfer to DCC – soil removed; samples pending	Draft UPPL Removal Site Evaluation Work Plan November 96 Soil Sampling Work Plan January 1997 (Weston for COE) Final Work Plan - Barnum Rd. Parking Lot Soil Sampling Mar 97 AREE 61AU Action Memorandum November 1997 Final NFADD Various Removal Actions Phase II Jun 1998
61AV	AREE	MWAA, Maintenance and POL	NFA	NFA DD signed by BCT 17 October 1995
61AW	AREE	MWAA, General Administrative, Fire Dept	NFA	NFA DD signed by BCT 17 October 1995
61AX	AREE	MWAA, Motor Park	NFA	NFA DD signed by BCT 17 October 1995
61AY	AREE	MWAA, Maintenance and POL	NFA	NFA DD signed by BCT 17 October 1995
61AZ	AREE	MWAA, Maintenance and POL	NFA	NFA DD signed by BCT 17 October 1995
61BA	AREE	MWAA, Storage of Hospital Equipment	NFA	NFA DD signed by BCT 17 October 1995
61BB	AREE	MWAA, O'Neil Building,	NFA	NFA DD signed by BCT 17 October 1995
61BC	AREE	MWAA, Intel School	NFA	NFA DD signed by BCT 17 October 1995
61BD	AREE	MWAA, General Storage / Disposal Area	NFA	NFA DD signed by BCT 17 October 1995
61BE	AREE	MWAA, Motor Park	NFA	NFA DD signed by BCT 17 October 1995
61BF	AREE	MWAA, Intel School, Electronic Equipment Training Site	NFA	NFA DD signed by BCT 17 October 1995
61BG	AREE	MWAA, General Storage / Disposal Area	NFA	NFA DD signed by BCT 17 October 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
62	AREE	Existing Underground Storage Tanks UST	Ongoing Program	USAR Tank Management Plan, DCC Tank Removals
63.A	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 4 January 1996
63.B	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 4 January 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
63.C	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.D	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.E	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 20 August 1996 DCC: Work Plan Groundwater Monitoring March 1997
63.F	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.G	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.H	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.I	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.J	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.K	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.L	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.M	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.N	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.O	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.P	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.Q	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 2 October 1996
63.R	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.S	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.T	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.U	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.V	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.W	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.X	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.Y	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63.Z	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AA	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AB	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AC	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 1 November 1995 DCC: Response Action Outcome for Bldg 2602 March 1997
63AD	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
63AE	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AF	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AG	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AH	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AI	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AJ	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AK	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AL	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AM	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 1 November 1995
63AN	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 1 November 1995
63AO	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 1 November 1995
63AP	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AQ	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AR	AREE	Previously Removed UST (63AR and 63AS are North and South sides of same site)	NFA	NFA DD signed by BCT 17 October 1995
63AS	AREE	Previously Removed UST (63AR and 63AS are North and South sides of same site)	NFA	NFA DD signed by BCT 17 October 1995
63AT	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AU	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AV	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AW	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AX	AOC	Previously Removed UST	ROD	Record of Decision October 1997. Final First Five-Year Review Devens RFTA, September 2000
63AY	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63AZ	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63BA	AREE	Previously Removed UST	NFA	NFA DD signed by BCT 17 October 1995
63BB	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BC	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 5 September 1996
63BD	AREE	14 Former UST Sites	NFA	Consensus Statement NFA signed 28 January 1997 NFA DD signed by BCT 28 January 1997 DCC: Work Plan Groundwater Monitoring March 1997
63BE	AREE	14 Former UST Sites	NFA	Draft Phase III Site Investigation Report May 1996 Final No Further Action Decision Document May 1998

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
63BF	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BG	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BH	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BI	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BJ	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BK	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BL	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
63BM	AREE	Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BN	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BO	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BP	AREE	14 Former UST Sites	NFA	NFA DD signed by BCT 4 January 1996
63BQ	AREE	Removed UST, LUST	NFA	NFA DD signed by BCT 7 August 1997
64	AREE	Above Ground Storage Tanks (ASTs)	Ongoing Program	USAR Tank Management Plan, DCC Tank Removals
65	AREE	Asbestos		Final Report May 1995
66A	AREE	Transformer #641425	NFA	NFA DD signed by BCT 1 May 1997
66B	AREE	Transformer # Not Recorded	NFA	Final NFA DD (April 96) NFA DD Addendum April 1997
66C	AREE	Transformer #7671845 P-3657 Golf Course	NFA	NFA DD signed by BCT 7 December 1995
66D	AREE	Transformer #6573226, P-3575, Red Cross	NFA	NFA DD signed by BCT 1 November 1995
66E	AREE	Transformer #70b11472 & 3344617	NFA	NFA DD signed by BCT 1 November 1995
66F	AREE	Transformer #6287290, P-2025	NFA	NFA DD signed by BCT 6 June 1996
66G	AREE	Verbeck Substation	NFA	NFA DD signed by BCT 1 May 1997
67	AREE	Radon		Final Report May 1995
68	AREE	Lead Paint		Final Report October 1995
69.A	AREE	Past Spill Site	NFA	NFA DD signed by BCT 20 August 1996
69.B	AREE	Past Spill Site	NFA	NFA DD signed by BCT 2 October 1996 DCC: Response Action Outcome for Bldg 2602 March 1997
69.C	AREE	Past Spill Site	NFA (Referred to 56)	Final Report September 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
69.D	AREE	Past Spill Site	Referred to AOC 32	Final Report September 1995
69.E	AREE	Past Spill Site	NFA (Referred to 59)	Final Report September 1995
69.F	AREE	Past Spill Site	NFA (Referred to 51)	Final Report September 1995
69.G	AREE	Past Spill Site	NFA (Deleted)	Final Report September 1995
69.H	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.I	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.J	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.K	AREE	Past Spill Site	NFA	NFA DD signed by BCT 20 August 1996
69.L	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.M	AREE	Past Spill Site	Referred to Main Post SI	Final Report September 1995
69.N	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.O	AREE	Past Spill Site	NFA (Referred to 61E)	Final Report September 1995
69.P	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.Q	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.R	AREE	Past Spill Site	NFA (Referred to 66D)	Final Report September 1995
69.S	AREE	Past Spill Site	NFA (Referred to 29)	Final Report September 1995
69.T	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.U	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.V	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
69.W	AOC	Past Spill Site - Elementary School	ROD LTM IC	Final RI Work Plan Addendum August 1996 Risk Assess. Approach Plan for Remedial Invest. Report Jan 97 Draft Remedial Investigation Report May 1997 Final RI/FS Workplan Adden. for Sup. Air Sampling Oct 97 Final Action Memorandum Contaminated Soil Removal Dec 97 Analytical Approach for Groundwater Sampling Nov 97 Draft Supplemental Air Sampling Report December 1997 Removal Action Report Contaminated Soil Phase II- May 98 Final Remedial Investigation Report Vol I of II Aug 98 Final Remedial Investigation Report Vol II of II Aug 98 Draft Proposed Plan September 1998 Draft Proposed Plan, November 1998. Draft Proposed Plan, February 1999. Final Proposed Plan, April 1999. Record of Decision (unsigned); June 8, 1999 Final Record of Decision, June 24, 1999 Draft Long Term Monitoring Plan, October 1999. Final Long Term Monitoring Plan, March 2000 Semi-Annual Groundwater Analytical Data Report May 2000. Final First Five-Year Review Devens RFTA, September 2000 2000 Annual Report, LongTerm Groundwater Monitoring, April 2001. Semi-Annual Groundwater Analytical Report May 2001, August. 2001 2001 Annual Report Long Term GW Monitoring, Apr 2002. Semi-Annual GW Analytical Data Report-May 2002 Sampling Event, Jul 2002. 2002 Annual Report Long Term Groundwater Monitoring ,Apr 2003 Semi-Annual GW Analytical Data Report, May 2003 Sampling Event ,Jul 2003 Draft 2003 Annual Report Long Term Monitoring, Mar 2004 2004 Semi Annual Report Long Term Monitoring, Jan 2005
69.X	AREE	Past Spill Site	Referred to 70.10	Final Report September 1995
69.Y	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69.Z	AREE	Past Spill Site	NFA (Referred to 63AW)	Final Report September 1995
69AA	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AB	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
69AC	AREE	Past Spill Site	NFA	NFA DD signed by BCT 1 November 1995
69AD	AREE	Past Spill Site	NFA	NFA DD signed by BCT 5 June 1997
69AE	AREE	Past Spill Site	UPPL Evaluation submitted	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan November 96 Draft NFADD, July 2002. Revised Draft NFADD, June 2003. Final Signed NFADD, Jan 2004
69AF	AREE	Past Spill Site	NFA	NFA DD signed by BCT 5 June 1997
69AG	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AH	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AI	AREE	Past Spill Site, 9-12 Apr 1988, 6-7 Feb 84	Referred to 61Z & 48	Final Report September 1995
69AJ	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AK	AREE	Past Spill Site	NFA	NFA DD signed by BCT 1 November 1995
69AL	AREE	Past Spill Site	NFA	NFA DD signed by BCT 20 August 1996
69AM	AREE	Past Spill Site	NFA (Referred to 61P)	Final Report September 1995
69AN	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AO	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AP	AREE	Past Spill Site - AAFES Gas Station	Referred to 43G	Final Report September 1995
69AQ	AREE	Past Spill Site	NFA	NFA DD signed by BCT 17 October 1995
69AR	AREE	Past Spill Site	Referred to 72	Final Report September 1995
69AS	AREE	Past Spill Site	Referred to 57, including AREE 70.6	Final Report September 1995
69AT	AREE	Past Spill Site	Referred to 57, including AREE 70.6	Final Report September 1995

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
69AU	AREE	Past Spill Site	Referred to AOC 44 and AOC 52	Final Report September 1995
69AV	AREE	Past Spill Site	NFA	NFA DD signed by BCT 5 June 1997
70.01	AREE	Storm Sewer System 1	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.02	AREE	Storm Sewer System 2	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.03	AREE	Storm Sewer System 3	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.04	AREE	Storm Sewer System 4	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.05	AREE	Storm Sewer System 5	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.06	AREE	Storm Sewer System 6	FA (see SA 73); Removal action; sampling comparison in progress	Lower Cold Spring Brook SI Report December 1995
70.07	AREE	Storm Sewer System 7	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.08	AREE	Storm Sewer System 8	NFA Pending	Final Report June 1994
70.09	AREE	Storm Sewer System 9	NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event November 1995
70.10	AREE	Storm Sewer System 10	NFA Pending	Final Report June 1994
70.11	AREE	Storm Sewer System 11	NFA Pending	Final Report June 1994
70.12	AREE	Storm Sewer System 12	NFA Pending	Final Report June 1994
70.13	AREE	Storm Sewer System 13	NFA (Deleted, system 12)	Final Report June 1994

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
70.14	AREE	Storm Sewer System 14	NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event November 95
70.15	AREE	Storm Sewer System 15	NFA Pending	Final Report June 1994
70.16	AREE	Storm Sewer System 16	NFA Pending	Final Report June 1994
70.17	AREE	Storm Sewer System 17	NFA Pending	Final Report June 1994
70.18	AREE	Storm Sewer System 18	NFA Pending	Final Report June 1994
70.19	AREE	Storm Sewer System 19	NFA Pending	Final Report June 1994
70.20	AREE	Storm Sewer System 20	NFA Pending	Final Report June 1994
70.21	AREE	Storm Sewer System 21	NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event Nov 95
70.22	AREE	Storm Sewer System 22	NFA Pending	Final Report June 1994
70.23	AREE	Storm Sewer System 23	NFA Pending	Final Report June 1994
70.24	AREE	Storm Sewer System 24	NFA Pending	Final Report June 1994
70.25	AREE	Storm Sewer System 25	NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event Nov 95
70.26	AREE	Storm Sewer System 26	NFA Pending	Final Report June 1994
70.27	AREE	Storm Sewer System 27	NFA Pending	Final Report June 1994
70.28	AREE	Storm Sewer System 28	NFA Pending	Final Report June 1994
70.29	AREE	Storm Sewer System 29	NFA Pending	Final Report June 1994
70.30	AREE	Storm Sewer System 30	NFA Pending	Final Report June 1994

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
70.31	AREE	Storm Sewer System 31	NFA Pending	Final Report June 1994
70.32	AREE	Storm Sewer System 32	NFA Pending	Final Report June 1994
70.33	AREE	Storm Sewer System 33	NFA Pending	Final Report June 1994
70.34	AREE	Storm Sewer System 34	NFA Pending	Final Report June 1994
70.35	AREE	Storm Sewer System 35	NFA Pending	Final Report June 1994
70.36	AREE	Storm Sewer System 36	NFA Pending	Final Report June 1994
70.37	AREE	Storm Sewer System 37	NFA Pending	Final Report June 1994
70.38	AREE	Storm Sewer System 38	NFA Pending	Final Report June 1994
70.39	AREE	Storm Sewer System 39	NFA Pending	Final Report June 1994
70.40	AREE	Storm Sewer System 40	NFA Pending	Final Report June 1994
70.41	AREE	Storm Sewer System 41	NFA Pending	Final Report June 1994
70.42	AREE	Storm Sewer System 42	NFA Pending	Final Report June 1994
70.43	AREE	Storm Sewer System 43	NFA Pending	Final Report June 1994
70.44	AREE	Storm Sewer System 44	NFA Pending	Final Report June 1994
70.45	AREE	Storm Sewer System 45	NFA Pending	Final Report June 1994
70.46	AREE	Storm Sewer System 46	NFA Pending	Final Report June 1994
70.47	AREE	Storm Sewer System 47	NFA Pending	Final Report June 1994

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DEVENS RESERVE FORCES TRAINING AREA
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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
70.48	AREE	Storm Sewer System 48	NFA Pending	Final Report June 1994
70.49	AREE	Storm Sewer System 49	NFA Pending	Final Report June 1994
70.50	AREE	Storm Sewer System 50	NFA Pending	Final Report June 1994
70.51	AREE	Storm Sewer System 51	NFA Pending	Final Report June 1994
70.52	AREE	Storm Sewer System 52	NFA Pending	Final Report June 1994
70.53	AREE	Storm Sewer System 53	NFA Pending	Final Report June 1994
70.54	AREE	Storm Sewer System 54	NFA Pending	Final Report June 1994
70.55	AREE	Storm Sewer System 55	NFA Pending	Final Report June 1994
71	SA	Railroad Roundhouse	NFA Pending	Railroad Roundhouse SSI September 1995 Revisions to Scope of Work; Action Memo & Design Dec 1996 Action Memorandum, 1 November 1999. Draft Closure Report-Various Removal Actions Phase II- 1 Aug 2000. Final Closure Report-Various Removal Actions Phase II, Jan 2001. Draft No Further Action Decision Document, Jan 2002. Draft SOW for EE/CA, Dec 2003 Draft Sampling and Analysis Plan, June 2004

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Site #	Type	Site Description	Status	Source Document(s) about Site's Current Status
72	AOC	Plow Shop Pond and Grove Pond	Removal Action Awaiting legal decision	Draft Plow Shop Pond and Grove Pond Sediment Evaluation October 1995 Screening-Level Ecological Risk Assessment, April 1998 FWS Study of Trace Elements in Freshwater Mussels from Plow Shop Pond and Grove Pond-May 1998 TRC Sediment Sampling Results Grove Pond May 1998 Health Consultation-Eval of Health Concerns Associated with Drinking Water from Grove Pond Wells, July 1998 Surface Water and Sediment Sampling, Grove Pond & Plow Shop Pond, November 1998 Final Health Consultation-Eval of Health Concerns Associated with Grove Pond and Plow Shop Pond, Dec 1998. Draft Phase I Interim Data Report Grove Pond Arsenic Investigation, April 1999 Final Phase I Work Plan Grove Pond Arsenic Investigation May 1999 Final Phase II Work Plan Grove Pond Arsenic Investigation Sep 1999 Benthic Community Survey Nonacoicus Brook, Nov 2001 Final Report Grove Pond Arsenic Investigation, Oct 2002
73	SA	Lower Cold Spring Brook	SI	Lower Cold Spring Brook SI Data Package, April 1995 Lower Cold Spring Brook Site Investigation Report, December 1995 Draft NFADD, August 2003.

APPENDIX K

COMMUNITY PARTICIPATION

Five-Year Reviews

Five-Year Reviews generally are required by CERCLA or program policy when hazardous substances remain on site above levels which permit unrestricted use and unlimited exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. Generally, reviews are performed five years following the initiation of a CERCLA response action, and are repeated every succeeding five years so long as future uses remain restricted. Five-year reviews can be performed by EPA or the lead agency for a site, but EPA retains responsibility for determining the protectiveness of the remedy.

You will need Adobe Acrobat Reader, available as a free download, to view some of the files on this page. See EPA's PDF page to learn more about PDF, and for a link to the free Acrobat Reader.

National Contingency Plan (NCP) guidelines on Five-Year Reviews
(40 CFR Part 300.430(f)(4)(ii)) [PDF: 51 KB, 2 pages]

"Five Year Review Process in the Superfund Program" (April 2003)
OSWER 9355.7-08FS, EPA 540-F-02-004 [PDF: 733 KB, 8 pages]

"Superfund Today: Focus on Five-Year Reviews and Involving the Community" (December 2002)
OSWER 9200.2-42FS, EPA 540-F-01-011 [PDF: 493 KB, 2 pages]

"Comprehensive Five-Year Review Guidance" (June 2001)
OSWER 9355.7-03B-P, EPA 540-R-01-007

"Five-Year Review Program Initiatives" (August 2001)
OSWER 9355.7-07 [PDF: 2 M, 6 pages]

"Five-Year Review – Questions & Answers" (December 2004)
[PDF: 85 KB, 7 pages]

Search for Five-Year Reviews Online This tool allows you to search by state, site name or EPA ID, region, keyword, or fiscal year across all available Five-Year Reviews.

Five Year Review Reports Available On-line

- EPA Region 3 Sites (PA, DE, DC, MD, VA, WV)
- EPA Region 4 Sites (AL, FL, GA, KY, MS, NC, SC, TN)
- EPA Region 5 Sites (IL, IN, MI, MN, OH, WI)

QuickLinks
Acronyms
Topics
FAQs
Publications
Key to the Site
Search Hints

- EPA Region 6 Sites (AR, LA, NM, OK, TX)
- EPA Region 7 Sites (IA, KS, MO, NE)
- EPA Region 8 Sites (CO, MT, ND, SD, UT, WY)
- EPA Region 10 Sites (AK, ID, OR, WA)

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Last updated on Thursday, December 9th, 2004
URL: http://www.epa.gov/superfund/action/postconstruction/5yr.htm

The Five-Year Review:
Continuing to Protect You and the Environment

Step 1: Develop Plan

To plan a five-year review, the site manager forms a review team, which may include an EPA Community Involvement Coordinator, scientists, engineers, and others. The team members decide what they will do at the site and when they will do it. The Community Involvement Coordinator is the member of the team who works with your community during the review.

***Your role:** EPA will announce the start of the review, probably through a notice in a newspaper or a flyer. Review the notice to see when the review will start.*

Step 2: Collect Information

The review team members collect information about site cleanup activities. They talk with people who have been working at the site over the past five years, as well as local officials, to see if changes in local policy or zoning might affect the original cleanup plan. The team usually visits the site to see if the cleanup equipment is working properly, to take new samples, and to review records of activities during the past five years. They may give you a call or meet with you in person.

***Your role:** If you know anything about unusual site activities at or around the site, such as trespassing or odors, or have any other concerns, call the Community Involvement Coordinator at once.*

Step 3: Ensure Safety, Announce Findings, and Publish Report

The review team uses the information collected to decide if your community and the environment are still safe from the contaminated material left at the site. If the cleanup activities are keeping people and the environment safe, the team calls them "protective." When cleanup goals are not being met, or when problems come up, the review team will call the cleanup activities "non-protective." When the team finishes the five-year review, it writes a report about the information that includes background on the site and cleanup activities, describes the review, and explains the results. The review team also writes a summary and announces that the review is finished. They tell your community (via public notices, flyers, etc.) where to find copies of the report and summary—at a central place called the site repository—for anyone to see.

***Your role:** Read about the site and learn about the cleanup methods being reviewed. Review the report. Ask the Community Involvement Coordinator any questions you have about the site.*

What Happens After The Review?

As long as contaminated materials at the site stop people from freely using the land, EPA will do a review every five years. EPA also regularly monitors the site based on an operations and maintenance plan it develops. For example, the site manager may visit the site and read reports about activities at the site. Also, the site workers may visit the site to cut the grass, take samples, or make sure equipment is working. If you see any problems or things that concern you—don't wait for the five-year review—let EPA know right away.

U.S. EPA
Office of Solid Waste and Emergency Response
5204G

EPA 540-F-01-011
9200.2-42FS
December 2002

EPA

Superfund Today

FOCUS ON FIVE-YEAR REVIEWS INVOLVING THE COMMUNITY

Checking Up On Superfund Sites:
The Five-Year Review

The U.S. Environmental Protection Agency (EPA) conducts regular checkups, called five-year reviews, on certain Superfund sites. EPA looks at sites where cleanup left wastes that limit site use. For example, EPA will look at a landfill to make sure the protective cover is not damaged and is working properly. EPA will also review sites with cleanup activity still in progress after five years.

In both cases, EPA checks the site to make sure the cleanup continues to protect people and the environment. The EPA review team conducts the review and writes a report on its findings. At some sites, other federal agencies, a state agency, or an Indian tribe may do the review, but EPA stays in the process and approves the report.

The Five-Year Review is:

- a regular EPA checkup on a Superfund site that has been cleaned up—with waste left behind—to make sure the site is still safe;
- a way to make sure the cleanup continues to protect people and the environment; and
- a chance for you to tell EPA about site conditions and any concerns you have.

During the review, EPA studies information on the site, including the cleanup and the laws that apply, and inspects the site to make sure it continues to be safe. EPA needs information from people who are familiar with the site. As someone living close to the site, you may know about things that can help the review team decide if it is still safe.

Here are some examples of things to tell EPA about:

- Broken fences, unusual odors, dead plants, materials leaving the site, or other problems
- Buildings or land around the site being used in new ways
- Any unusual activities at the site, such as dumping, vandalism, or trespassing
- Ways the cleanup at the site has helped the neighborhood.

For More Information ...

... about a Superfund site in your neighborhood, please call the toll-free Superfund/RCRA Hotline at 1-800-424-9346 or the Community Involvement Coordinator in the EPA regional office for your state. Your local EPA office can tell you where you can go to review files on every Superfund site in your area. Often, EPA holds community meetings to let people who live near a site know about site activities. You also may find useful information on the Superfund home page (www.epa.gov/superfund). For more information on the review process, see "Comprehensive Five Year Review Guidance," EPA 540-R-01-007, OSWER 9355.7-03B-P, June 2001.

Five-Year Review Process in the Superfund Program

April 2003

EPA as required by statute and, as a matter of policy, reviews the remedies at certain sites every five years. Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site be subject to a Five-Year Review. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) defines this to mean contamination left at levels that do not allow for unlimited use and unrestricted exposure. This fact sheet summarizes the guidance document, *Comprehensive Five-Year Review Guidance (EPA 540-R-01-007)* that EPA issued in June 2001.

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A. Overview

Under CERCLA §121(c), EPA is required to review the remedies at Superfund sites where hazardous substances remain at levels that potentially pose an unacceptable risk. Such reviews must be conducted every five years or may be conducted more frequently if necessary to ensure the protectiveness of the remedy. The Five-Year Review requirement applies to remedial actions selected under CERCLA §121 upon completion of which, hazardous substances, pollutants, or contaminants will remain on site. Five-Year Reviews are also conducted as a matter of policy for other CERCLA actions. Removal actions conducted under CERCLA §104 and Corrective Actions conducted under the Resource Conservation and Recovery Act (RCRA) are not subject to the Five-Year Review requirement; however, Regions may conduct Five-Year Reviews for these or other remedies as a matter of policy or at their discretion. In June 2001, EPA issued the *Comprehensive Five-Year Review Guidance (EPA 540-R-01-007)* to aid Regions and other agencies with responsibilities for conducting Five-Year Reviews. This fact sheet was prepared as a brief summary of that guidance document.

B. When is a Five-Year Review conducted?

A Five-Year Review may be required or appropriate when a remedial action leaves hazardous substances on the site at levels that do not allow for unlimited use and unrestricted exposure. Unlimited use and unrestricted exposure (UU/UE) means that there are no restrictions placed on the potential use of land or other natural resources. In general, if the selected remedy relies on restrictions of land, ground water, or surface water use by humans or if any physical or engineered barrier is part of the remedy, then the use has been limited and a Five-Year Review should be conducted. There are two types of Five-Year Reviews, statutory and policy. Statutory reviews are required by CERCLA at post-SARA remedial actions that upon completion of the action leave hazardous substances, pollutants or contaminants on site. Policy reviews are performed, as a matter of policy, for pre-SARA remedial actions that leave hazardous substances, pollutants or contaminants on site, and at removal-only NPL sites where hazardous substances, pollutants or contaminants were left on site at levels that do not permit unlimited use and unrestricted exposure. Policy reviews are also conducted at other sites, including pre- or post-SARA remedial actions, that will take more than five years to complete.

The initiation, or trigger date, that starts the Five-Year Review period depends upon whether it is a statutory or policy review and if the review is a first or subsequent review. A statutory review is triggered by 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. In cases where there are multiple remedial actions, the earliest remedial action that leaves such substances on site should trigger the initial review, even if it is an interim remedial action.

A policy review is initially triggered by the date that the construction phase for all remedies is completed at a site. The date of construction completion is generally the date of the Preliminary Close Out Report (PCOR) or the date of the Final Close Out Report (FCOR) for sites that do not have a PCOR.

After completion of the first statutory or policy Five-Year Review, the trigger for subsequent reviews is the signature date of the previous Five-Year Review report. Lead agencies may choose to conduct a Five-Year Review earlier or more frequently than every five years to ensure protection of human health and the environment.

Five-Year Reviews continue throughout the life of the site until hazardous substances, pollutants or contaminants no longer remain on site at levels that do not allow for unlimited use and unrestricted exposure. The basis for this finding should be documented in the final Five-Year Review report.

C. Who is responsible for conducting the Five-Year Review?

The lead agency, the agency providing the remedial project manager, has primary responsibility for conducting the Five-Year Review, while the support agency provides information and review support.

EPA also encourages appropriate State and Tribal involvement for Fund-financed and Enforcement-lead remedial actions. Where the State or Tribe is the lead agency, the NCP provides that EPA concurrence is needed on the protectiveness determination contained in the Five-Year Review. At federal facilities, the Federal agency in charge of the facility has the responsibility to conduct the Five-Year Review. EPA should provide concurrence with the protectiveness determinations, or develop its own independent determinations.

D. What are the components of a Five-Year Review?

The Five-Year Review process integrates information taken from decision documents and operational data with the experiences of those responsible for and affected by actions at the site. There are six components to the Five-Year Review process: 1) community involvement and notification, 2) document review, 3) data review and analysis, 4) site inspection, 5) interviews and 6) protectiveness determination as shown in Figure 1. Together, the reviewer uses these components to assess the remedy's performance, and, ultimately, to determine the protectiveness of that remedy.

Community Involvement and Notification

The reviewer begins working with the site's Community Involvement Coordinator (CIC) during the initial planning stages of the Five-Year Review to determine the appropriate level of community involvement and to notify all potentially interested parties that the Five-Year Review will be conducted. This notification may include States, Tribes, appropriate representatives of the community, local officials, potentially responsible parties (PRPs), Federal and/or State Trustees for Natural Resources (Trustees) and appropriate EPA offices. It is recommended that EPA's community involvement activities during the review include notifying the community that the Five-Year Review will be conducted, notifying the community that the Five-Year Review has been completed, and providing the results of the review to the local site repository.

Document Review

A review of documents is an early step in the Five-Year Review process. All relevant documents and data are reviewed to obtain information to assess performance of the response action. The lead agency reviews various documents to obtain the necessary information, including those for remedy decisions (*e.g.*, Records of Decision, Explanation of Significant Differences), enforcement decisions (*e.g.*, Consent Decrees, Administrative Orders on Consent), site investigations, remedial design and construction, and remedy performance.

Data Review and Analysis

The lead agency also reviews sampling and monitoring plans and results from monitoring activities, operation and maintenance (O&M) reports or other documentation of remedy performance, including previous Five-Year Review reports. The data contained in these reports form the primary basis for the technical analyses and for the subsequent protectiveness determination. The type and quality of these data will have a significant impact on findings and conclusions. In some cases, the lead agency may also need to conduct supplemental sampling or collect other data.

Site Inspections

EPA or the lead agency conducts site inspections to gather information about a site's current status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area. The inspection should be recent, and be conducted no more than nine months before the expected signature date of the review. At Federal facility sites, a State and/or EPA representative may wish to be present and/or participate in site inspections.

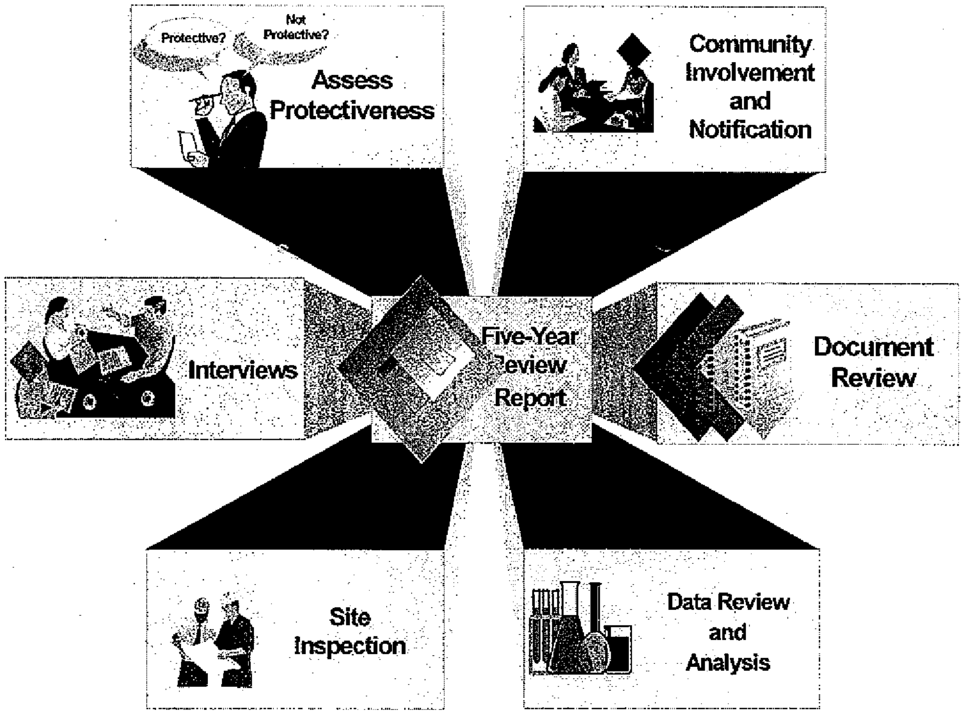


Figure 1: Components of the Five-Year Review Process

Interviews

As necessary, interviews may be conducted to provide additional information about a site's status and/or identify remedy issues. Individuals who may be interviewed include: the site manager; site personnel; Federal, State, and Tribal regulatory authorities; and people who live or work near the site.

E. How does EPA assess the protectiveness of a remedy?

The purpose of a Five-Year Review is to determine whether the remedy at a site is, or upon completion will be, protective of human health and the environment. EPA's technical assessment of a remedy examines the three questions shown in Figure 2. These questions provide a framework for organizing and evaluating data and ensure that all relevant issues are considered when determining the protectiveness of the remedy.

Question A: Is the remedy functioning as intended?

When answering Question A, the reviewer focuses on the technical performance of the remedy, whether that remedy is related to a single Operable Unit (OU) or the entire site. Data on monitoring, system performance and operation and maintenance of the remedy plays an important role in the determinations. In addition, EPA confirms that access and institutional controls (ICs) are in place and successfully prevent exposure. In answering Question A, the reviewer should consider the implementation status of the remedy.

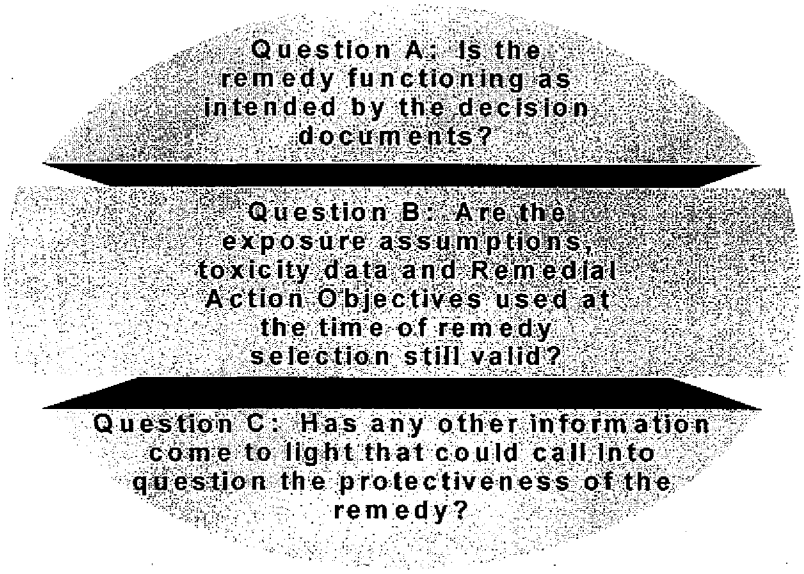


Figure 2: Three Questions for Assessing Protectiveness

When the Remedy is under Construction

The focus of the review is to determine if the remedy is being constructed in accordance with the requirements of the decision documents and design specifications, and if the remedy is expected to be protective when it is completed.

When the Remedy is Operating or Completed

Additional aspects of remedy implementation are addressed. In general, the following will be assessed:

- Remedial action performance,
- System operations/operation and maintenance (O&M),
- Costs of system operations/O&M,
- Implementation of institutional controls and other measures,
- Monitoring activities,
- Opportunities for optimization, and
- Early indicators of potential remedy problems.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives still valid?

In answering Question B, the lead agency should review all the risk parameters on which the original remedy decision was based. This assessment should test the validity of all assumptions that underlie the original risk calculation. To reach its conclusions, the lead agency will generally consider changes in:

- Target populations,
- Exposure routes,
- Site characteristics and land use,
- Reference doses and slope factors,
- Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds (TBCs), and
- Remedial Action Objectives (RAOs).

EPA generally will not reopen remedy selection decisions contained in RODs unless a new or modified requirement calls into question the protectiveness of the selected remedy.

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

The reviewer considers any other information that comes to light that could call into question the protectiveness of the remedy. Situations of interest to EPA may include the following:

- Ecological risks had not been adequately evaluated or addressed at a site, and there is no plan in place to address these risks through a future action;
- The site, although located entirely above the 500-year flood boundary, was partially inundated by a 100-year flood; and
- Land use changes that are being considered by local officials.

F. How does the lead agency formulate its conclusions?

The conclusions of the Five-Year Review should include:

- Identification of issues,
- Recommendations and follow-up actions, and
- A determination of whether the remedy is, or is expected to be, protective of human health and the environment.

The reviewer arrives at these conclusions through a technical assessment of the information collected during the document review, data collection, interviews, site inspection, and other activities.

The reviewer identifies all issues that currently prevent or may prevent the response action from being protective. Examples of issues that may be identified in a Five-Year Review report include the following:

- Inadequate ICs,
- Cleanup levels are not protective due to changes in chemical characteristics, and
- Remedial Action Objectives will not be achieved.

Section 4.4.1 of the Guidance contains additional examples.

The reviewer documents all such issues and follow-up actions needed to ensure the proper management of the remedy in the Five-Year Review report. The reviewer should also identify early indicators of potential remedy problems.

For each issue identified, the reviewer documents and ensures implementation of recommendations to resolve those issues. These recommendations are linked to follow-up actions in the Five-Year Review report. In addition, the reviewer may make additional recommendations that do not directly relate to achieving or maintaining the protectiveness of the remedy, such as activities related to O&M of the remedy and coordination with other public and government authorities. The following are the types of additional recommendations that may be included in the report:

- Provide additional response actions,
- Improve O&M activities,
- Optimize remedy,
- Enforce access controls and ICs, and
- Conduct additional studies or investigations.

After addressing Questions A, B, and C, the reviewer determines the protectiveness of the remedy or remedies at a site and documents the rationale for its determination(s). The reviewer should make a protectiveness determination for each OU. For sites that have reached construction completion, it is recommended the review include an additional, comprehensive site-wide protectiveness statement.

The determination of whether the remedy remains protective of human health and the environment generally will be based on the answers to Questions A, B, and C and the information obtained in the process of answering them. Although protectiveness generally is defined by the risk range and hazard index (HI), the answers to Questions A, B, and C may identify other factors and issues that may impact the protectiveness of a remedy.

At the end of the technical analysis and evaluation, if the answers to Questions A, B, and C are *yes, yes, and no*, respectively, then the remedy normally will be considered protective. However, if the answers to the three questions are other than *yes, yes,, and no,* depending on the elements that affect each question, the remedy may be one of the following:

- Protective,
- Will be protective once the remedy is completed,
- Protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken,
- Not protective, unless the following action(s) are taken in order to ensure protectiveness, or
- Protectiveness cannot be determined until further information is obtained.

If a protectiveness statement cannot be made, a time frame should be provided when a protectiveness determination will be made. This is done through an addendum. If this is the case, the next Five-Year Review is due five years from the date that the report is signed, not from the signature date of the addendum.

Even if there is a need to conduct further actions, it does not mean that the remedy is not protective. Normally, the remedy may be considered not protective when the following occur:

- An immediate threat is present (*e.g.* exposure pathways that could result in unacceptable risks are not being controlled);
- Migration of contaminants is uncontrolled and poses an unacceptable risk to human health or the environment;
- Potential or actual exposure is present or there is evidence of exposure (*e.g.*, institutional controls are not in place or not enforced and exposure is occurring); or
- The remedy cannot meet a new cleanup level and the previous cleanup level is outside of the risk range.

Once the Five-Year Review report is signed and placed in the local site repository, the lead agency should notify community members that the review is complete and the report is available.

As discussed in Section 1.3.3, the date EPA signs the report is the official completion date for the Five-Year Review, and this date becomes the trigger date for subsequent reviews. This date should be entered into WasteLan as soon as possible.

FOR MORE INFORMATION

For additional information on the Five-Year Review process, please contact your Regional or Headquarters Five-Year Review Coordinator.

Office of Solid Waste and Emergency Response
Washington, D.C. 20460

OSWER 9355.7-08FS
EPA 540-F-02-004

January 3, 2003

Benjamin Goff, BRAC Environmental Coordinator
Devens Reserve Forces Training Area
30 Quebec Street, Box 100
Devens, MA 01432
Phone: 978-796-3835

Subject: Community Survey Questionnaire

Dear Resident:

Enclosed please find a Community Survey Questionnaire. The U.S. Army kindly requests that you take a few minutes to complete and return the survey. The information you provide will enable the Army to more effectively address the needs and interests of community members as they relate to the environmental restoration at Devens Reserve Forces Training Area (DRFTA).

As part of the Base Realignment and Closure (BRAC) process, the Army is actively engaged in environmental restoration activities at DRFTA. The BRAC Environmental Coordinator oversees all aspects of restoration, including activities designed to encourage local participation in the decision-making process and public information dissemination. In addition to the monthly Restoration Advisory Board (RAB) Meetings, this survey provides an opportunity for members of the community to express their opinions and participate in the restoration of Devens. Your feedback will be incorporated into the Community Involvement Plan for Devens, which will be updated and reissued in the coming months.

Please complete and return the survey to the BRAC Environmental Coordinator as soon as possible. Information from surveys received by January 31, 2003 will be used to update the Community Involvement Plan. Surveys received after January 31 will be considered, but may not be reflected in the revised Community Involvement Plan. As of January 9, 2003 this survey will also be available online for completion or download at any time, at www.devens.army.mil/staff/brac.

If you have any questions, please contact the Devens BRAC Environmental Office at 978-796-3835.

Sincerely,

Benjamin F. Goff
BRAC Environmental Coordinator

Enclosure

REPLY TO

DEPARTMENT OF THE ARMY
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS
01432-4424

ATTENTION OF:
BRAC Environmental Office, Unit 100, Rm 334, 30 Quebec Street, Devens, MA 01432

Devens Community Involvement Plan Update
Public Survey Questionnaire

Survey participant – general information

1. Contact Information (Optional)

   Name: ________________ Address: ____________________________

   Phone: ______________ Fax: ____________ E-mail: ____________________

2. a) How long have you been a member of this community? ________
   b) In which town do you reside? (if address not provided above) _________

Information Transfer and Communications

3. How do you currently obtain information about environmental issues at Devens?

   Newspapers __ Mailings ___ Radio ___ TV ____Web ___ Public Meetings ____
   Telephone ______ E-mail ____ Word of mouth ___________ Cable______
   Information Repository (town or BRAC library?) _________ Other _______

4. Do you feel you are sufficiently well-informed about environmental investigations and the site clean-up process at Devens? Yes ___ No____ Somewhat _____

5. a) What type of information would you like to receive about environmental issues at Devens? Newsletters __ Meeting Notices ___ Fact Sheets on Specific Topics ___ Other ________________________________
   b) How often would you like to receive this information? ______________________

6. What type of involvement are you most interested in?
   a) document review and comment b) public meeting participation
   c) receipt of general updates on clean-up progress d) other (please specify)

7. What is the most convenient and useful way to provide information to you about environmental issues at Devens?
   Newspapers __ Mailings __ Radio ___ TV ____Web ___ Public Meetings ____
   Telephone ___ E-mail _____ Information Repository (town or BRAC library)? ____
   Word of Mouth ____ Local Cable Access______ Other ____

8. a) How would you rate the community's perception of, and quality of interaction with, the base and regulatory agencies? excellent ___ good ___ fair ____ poor_____
b) Do you feel there are sufficient opportunities for public involvement in the clean-up program and related decision-making process? yes ____ no _____ undecided _____

9. What specific recommendations do you have to improve communications and public involvement in the Devens clean-up/restoration process? ____________________

____

Restoration Advisory Board (RAB) and other public meetings

10. Have you attended any RAB meetings? Yes ____ No ____

11. How effective do you feel the RAB is in meeting your information/involvement needs?
a) very effective____ b) satisfactory ____ c) not effective _____

12. What suggestions do you have to make public meetings more effective? ___________

____

13. How frequently are you interested in attending RAB or other public meetings on Devens environmental issues? a) monthly ___ b) quarterly _____
c) twice per year _____ d) other ____

14. Is Devens a convenient location for you to attend public meetings? Yes ___ No___

15. Please note any other location that would be most convenient for public meetings
a) public library ___ b) school ___ c) municipal building ____ d) other ___

16. What day of week/time of day would you be most likely to attend a public meeting?

Community Issues

17. What are your specific questions or concerns regarding environmental and public health issues related to Devens? ____

____

18. Are there other individuals, groups or organizations you would suggest we contact to solicit their input on environmental issues at Devens? ________________________

19. Would you be interested in participating in a follow-up interview (in person or by phone) to further discuss issues relating to public involvement in environmental investigations and clean-up activities at Devens? Yes ____ No _____

20. Would you be interested in receiving mailings on various clean-up issues?
Yes ____ No _____

ENVIRONMENTAL NEWSLETTER

BRAC Environmental Office
Devens Reserve Forces Training Area

Issue One
Spring 2003

BRAC MISSION

The Devens Base Realignment and Closure (BRAC) Environmental Office oversees cleanup and restoration of environmentally damaged property at the former US Army installations of Fort Devens, Sudbury Training Annex and Hingham Annex.

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, commonly known as Superfund), and in partnership with local governments, redevelopment authorities, state and federal regulatory agencies, and public interest groups, the BRAC Environmental Coordinator (BEC) coordinates all phases of the CERCLA restoration process.

This process involves site investigation, evaluation of cleanup alternatives, and site cleanup, as well as long term monitoring, documentation of actions and decisions, and public outreach. Typically, restored land is transferred to MassDevelopment for reuse.

DEVENS OVERVIEW

The former Fort Devens is located in north-central Massachusetts within the towns of Ayer and Shirley in Middlesex County, and the towns of Harvard and Lancaster in Worcester County. Prior to realignment and closure in 1996, Fort Devens included 9,300 acres divided into North Post, Main Post and South Post. Currently, the Devens Reserve Forces Training Area (DRFTA) consists of about 5,200 acres, primarily on South Post.

The US Environmental Protection Agency (USEPA) placed the former Fort Devens on its National Priorities List on November 21, 1989. As a result of the Defense Base Realignment and Closure Act (BRAC) of 1990, the Secretary of Defense identified most of the North and Main Posts at Fort Devens. The South Post remains in use as a tactical training area for the US Army Reserves.

Overall, 324 CERCLA sites have been identified for environmental investigation at Devens. Of these, 243 sites have received approval for No Further Action (NFA) status, which under CERCLA indicates a site that meets regulatory standards and does not require additional remediation.

DEVENS REMEDIATION SUMMARY:

CERCLA (Superfund)
324 total sites identified for evaluation
243 sites approved for No Further Action (NFA) status
50 sites recommended for NFA status
21 sites undergoing active remediation per Record of Decision (ROD)
7 sites on hold, pending further evaluation
3 sites undergoing site evaluations

Non-CERCLA
150 housing units identified for soil remediation
148 housing units – soil remediation complete
2 housing units – soil remediation ongoing

For more information on Superfund, visit: http://www.epa.gov/superfund/about.htm

REMEDIATION UPDATES

Pesticide Soil Remediation (Grant, Locust and Cavite Housing Areas):

Pesticide remediation was completed in Fall 2002. Approximately 181,385 tons of contaminated soil and 20,007 tons of contaminated concrete were removed from the three housing areas. All of the 150 former housing units have been cleaned of pesticide-contaminated soil. However, polychlorinated biphenyl (PCB) was detected at Buildings 863 and 877 in Grant Housing Area. As a result, a partial completion report will be submitted for the 148 clean buildings, while the two buildings with PCB contamination will remain open for further investigation and remediation. Removal of PCB contaminated soil is planned for Spring/Summer 2003.

Landfill Consolidation Program:

Waste removal activities were completed in October 2002. A total of 367,240 cubic yards of soil and debris were removed from the six waste accumulation areas (AOC 9 on North Post; AOC 11, AOC 40, and SA 13 on Main Post; AOC 41 and SA 12 on South Post). Five of these areas have been fully restored, and restoration of AOC 9 is nearing completion. Approximately 330,000 cubic yards of material were placed in the Consolidation Landfill. Construction of the landfill and installation of the landfill cap were completed in December 2002. Remaining activities include monitoring of restored wetlands and re-seeded areas, completion of closeout reports and touch-up of the landfill cap in Spring 2003.

Consolidation Landfill and detention pond.
(Photo: J. McDowell, Army Corps of Engineers)

Area Of Contamination (AOC) 50 – Moore Army Airfield:

The Final Feasibility Study (FS) for AOC 50 was completed in December 2002. The release of the Final FS was announced at the Restoration Advisory Board Meeting on January 9, 2003 in the Harvard Public Library. In addition, public meetings in which the AOC 50 contractor, Arcadis, presented their Proposed Plan for the remediation of PCE-contaminated groundwater at AOC 50, were held on January 30 and February 19 at the Devens Conference Center. Several community members expressed their comments on the

Proposed Plan during the formal public hearing on February 19. The Record of Decision (ROD) for AOC 50 will be completed in the coming months.

Shepleys Hill Landfill Groundwater:

The 1995 Record of Decision (ROD) for Shepleys Hill Landfill specified a contingency remedy of Groundwater Extraction (a.k.a. Pump and Treat) to prevent the migration of arsenic-contaminated groundwater from Shepley's Hill Landfill to Plow Shop Pond and Nonacoicus Brook. Due to recent evidence of offsite contamination, the Army is currently in the process of awarding a contract for the installation of an interim Pump and Treat system. The Army also continues to pursue an investigation into the nature and extent of offsite contamination.

AOC 57 – Fuel Oil Spill Site:

As per the 2001 Record of Decision (ROD) for AOC 57, excavation activities to remove and dispose of soil impacted by spilled fuel oil near a former motor pool area east of Barnum Road were completed in February 2002. During backfill of Area 2, oily product was observed on the surface of water in an open excavation pit. Initial efforts to soak up the product were deemed insufficient, and as a result a solar-powered belt skimmer was installed and operated until the onset of winter. About 15-20 gallons of oily product were collected by the skimmer. Concurrent with collection of floating oil, the Army undertook an investigation into the source and extent of the oil. Sampling in September 2002 showed no evidence of a source of free-phase oil in the soil, and the approximate extent of visibly stained soil was delineated. In addition to defining the extent of contamination, the Army is developing a long term groundwater monitoring program to evaluate the presence of oil in the water table and to protect the nearby wetland area associated with Cold Spring Brook.

NOTES AND REMINDERS:

Community members can participate in the Devens restoration process by attending the **Restoration Advisory Board (RAB)** meetings. RAB meetings are typically held the second Thursday evening of each month. Please contact us for more information.

Input for this newsletter is provided by the **RAB Community Co-chairs**. Co-chairs are: Bille Ashe (Harvard), Kathy Bourassa (Shirley), Julia Corenzwit (Ayer), Jack Crowley (Devens), Becky Dasilva (MADEP), Jenna Latini (BRAC), Jim Murphy (USEPA), and Takashi Tada (BRAC).

Environmental actions and decisions are documented in the Devens **Administrative Record**. The Administrative Record will soon be accessible to the public on CD-ROM. Please contact us for more details.

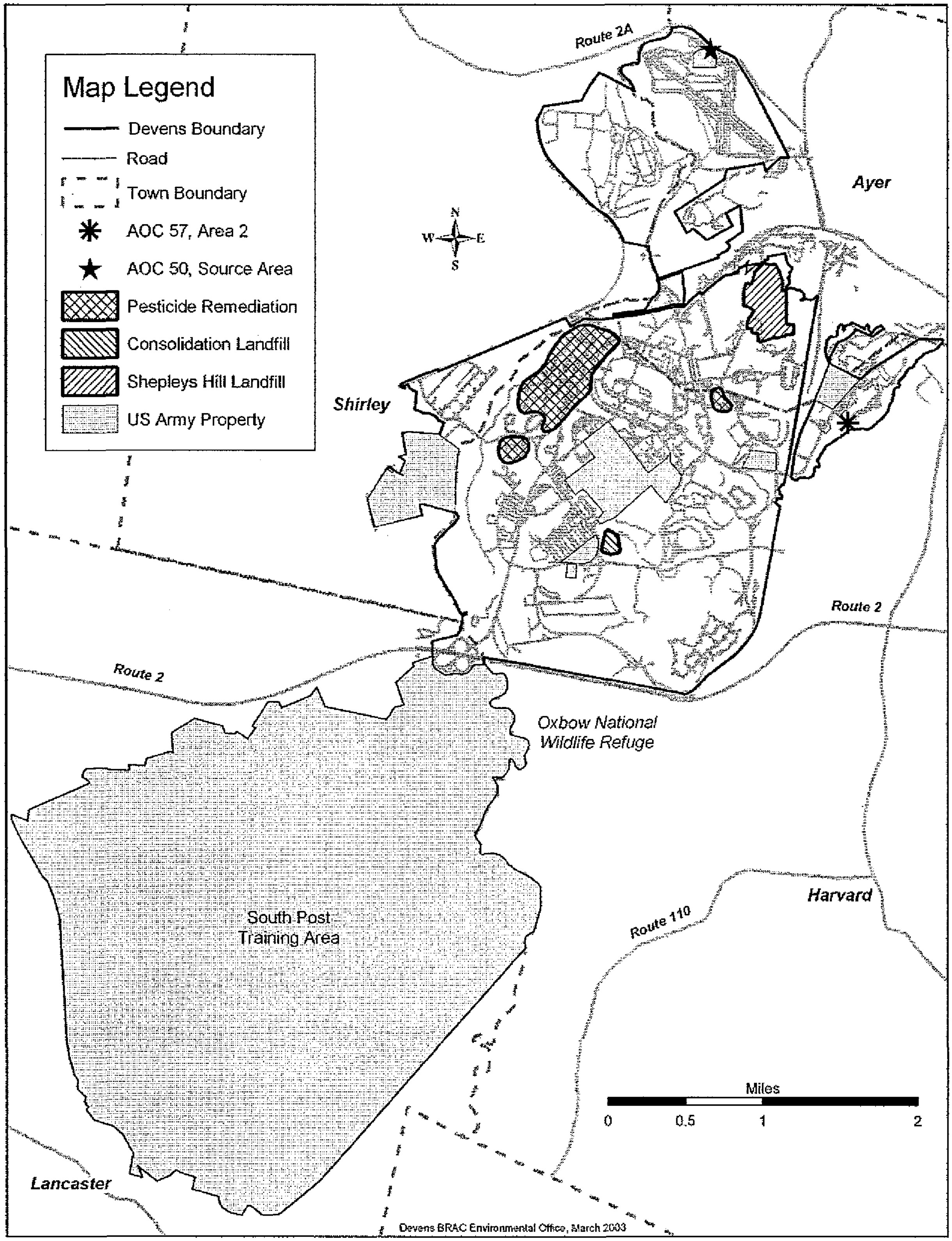
Come See Devens! Special thanks to Irene O'Grady, MassDevelopment, for the enclosed Devens Visitor Map.

CONTACT INFORMATION:

Devens BRAC Environmental Coordinator:
Ben Goff
BRAC Environmental Office
30 Quebec Street, Box 100
Devens, MA 01432-4479

Office Phone: 978-796-3835
On the Web at:
www.devens.army.mil/staff/brac/

Location of sites covered in this issue:

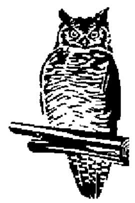


ENVIRONMENTAL NEWSLETTER

BRAC Environmental Office
Devens Reserve Forces Training Area

Issue Two
Summer 2003

WHO'S WHO AT DEVENS?



The environmental restoration of Devens is a collaborative process. While the Army retains ultimate responsibility for cleanup of former Fort Devens property, decisions relating to cleanup are made by consensus in the inter-agency **BRAC Cleanup Team (BCT)**. The following is a description of each agency.

The Devens **BRAC Environmental Office (BRACEO)** is responsible for cleanup and restoration of former Army property at Fort Devens, Sudbury Training Annex and Hingham Annex in Massachusetts. The BRAC Environmental Coordinator (BEC) is Benjamin Goff, and the Technical Project Manager is Peter Kaselis.

The **U.S. Army Corps of Engineers (USACE)**, New England District, provides technical assistance, contract management, field supervision, and documentation for various site-specific projects. USACE also performs groundwater sampling and analysis for sites that require long term monitoring. Team members include James Morocco, Resident Engineer; Randy Godfrey, Project Manager; Michelle Clemens, Project Engineer; and Christine Johnson, Construction Manager.

The **U.S. Environmental Protection Agency (USEPA)** maintains primary regulatory oversight at Devens. Cleanup activities and outcomes must meet USEPA standards for protection of human health and the environment, and must follow the CERCLA/Superfund process. Carol Keating, Remedial Project Manager, represents USEPA at Devens and receives support from a number of technical advisors including William Brandon, Geohydrologist, and James Murphy, Community Involvement Coordinator.

The **Massachusetts Department of Environmental Protection (MADEP)** provides state regulatory guidance and technical expertise on all restoration activities at Devens. The MADEP Director of Devens Superfund and Redevelopment Group is Lynne Welsh, and the MADEP Environmental Analysts are David Salvadore and Michael Backunas. MADEP also contributes guidance and expertise to facilitate the redevelopment of restored land.

MassDevelopment (Massachusetts Development Finance Agency, formerly the

Massachusetts Government Land Bank) oversees the redevelopment of Devens, providing services such as public works, fire and police, and business development. The Devens Enterprise Commission (DEC) was formed to serve such administrative functions as board of health, planning board, conservation commission, and zoning board of appeals. The Environmental Coordinator for MassDevelopment is Ron Ostrowski.

Public involvement in the decision making process occurs primarily in the **Restoration Advisory Board (RAB)**, which consists of the BCT and members of the community. RAB meetings provide an opportunity for interaction among the BCT and local residents interested in the restoration of Devens. RAB meetings typically occur on the second Thursday evening of each month at various locations.

DEVENS REMEDIATION SUMMARY:

CERCLA/Superfund
325 total sites identified for evaluation
243 sites approved for No Further Action (NFA) status
50 sites recommended for NFA status
21 sites undergoing active remediation per Record of Decision (ROD)
7 sites on hold, pending further evaluation
4 sites undergoing site evaluations

Massachusetts Contingency Plan (MCP)
150 former housing units identified for pesticide soil remediation
150 former housing units – pesticide soil remediation complete

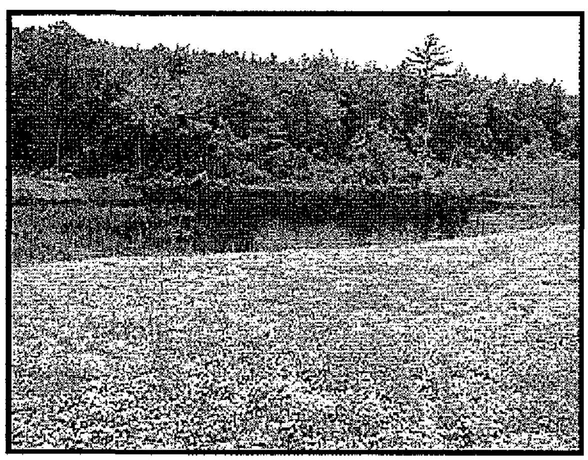
For more information on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund) program at the USEPA, visit: http://www.epa.gov/superfund/about.htm

REMEDIATION UPDATES:

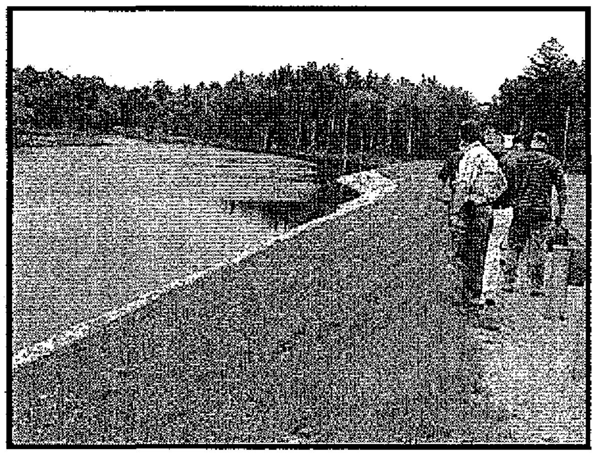
Landfill Consolidation Program:

Waste removal activities were completed in October 2002. Restoration has been completed at all excavation sites. Approximately 330,000 cubic yards of material were placed in the Consolidation Landfill. Construction of the landfill and installation of the landfill cap were completed in December 2002. Upcoming activities include regular maintenance of the landfill and restored areas, and re-seeding at excavation site AOC 9 (North Post).

Above: AOC 11 before restoration. (USACE)
Below: AOC 11 after restoration. (BRACEO)



Above: Debris pile at AOC 40. (USACE)
Below: AOC 40 after restoration. (BRACEO)



Area Of Contamination (AOC) 50 – Moore Army Airfield:

The Final Feasibility Study (FS) for AOC 50 was completed in December 2002, and the Proposed Plan for the remediation of PCE-contaminated groundwater at AOC 50 was issued in January 2003. Public comment on the Proposed Plan was received in February. Groundwater monitoring and investigation activities at the site continue. Finalization of the Record of Decision (ROD) for AOC 50 is anticipated by the end of September 2003.

Shepley's Hill Landfill Groundwater:

The 1995 Record of Decision (ROD) for Shepley's Hill Landfill specified the contingency remedy of a Groundwater Extraction system (a.k.a. Pump and Treat) to prevent the migration of arsenic-laden groundwater from Shepley's Hill Landfill. Due to evidence of offsite contamination, the Army is in the process of awarding a contract for the installation of an interim Pump and Treat system. The Army also intends to fund an investigation into the nature and extent of offsite contamination.

AOC 57 – Fuel Oil Spill Site:

As per the 2001 Record of Decision (ROD) for AOC 57, excavation activities to remove and dispose of soil impacted by spilled fuel oil near a former motor pool area east of Barnum Road were completed in February 2002. During backfill of Area 2, oily product was observed on the surface of water in an open excavation pit. The Army undertook an investigation into the source and extent of the oil. Sampling in September 2002 showed no evidence of a source of free-phase oil in the soil, and the extent of residual soil contamination was delineated. Excavation of the remaining impacted soil is scheduled for August 2003.

Pesticide Soil Remediation (Grant, Locust and Cavite Housing Areas):

Pesticide remediation at Grant, Locust and Cavite housing areas was completed in Fall 2002 according to the Massachusetts Contingency Plan (MCP) guidelines. During soil excavations, polychlorinated biphenyl (PCB) was detected at buildings 863 and 877 in Grant Housing Area. Removal of PCB contaminated soil began in May 2003. Due to the presence of PCB and concerns about arsenic in the soil, the Army will evaluate the three housing areas under the CERCLA program. The first step is to perform a Preliminary Assessment/Site Investigation (PA/SI).

NOTES AND REMINDERS:

Community members can participate in the Devens restoration process by attending the **Restoration Advisory Board (RAB)** meetings. RAB meetings are typically held the second Thursday evening of each month. Please contact the Devens BRAC Office for more information.

ACRONYMS IN THIS ISSUE:

AOC – Area of Concern/Contamination
BCT – BRAC Cleanup Team
BEC – BRAC Environmental Coordinator
BRAC – Base Realignment and Closure
BRACEO – BRAC Environmental Office
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (the federal regulatory mandate, a.k.a Superfund)
DEC – Devens Enterprise Commission
FS – Feasibility Study (CERCLA)
MADEP – Massachusetts Department of Environmental Protection
MCP – Massachusetts Contingency Plan
NFA – No Further Action (regulatory closure under CERCLA)
PA/SI – Preliminary Assessment/Site Investigation (CERCLA)
PCB – Polychlorinated biphenyl
RAB – Restoration Advisory Board
ROD – Record of Decision (CERCLA)
USACE – U.S. Army Corps of Engineers
USEPA – U.S. Environmental Protection Agency

AGENCY CONTACT INFORMATION:

Ben Goff
BRAC Environmental Office
30 Quebec Street, Unit 100
Devens, MA 01432
Phone: 978-796-3835
Ben.Goff@devens.army.mil

Randy Godfrey
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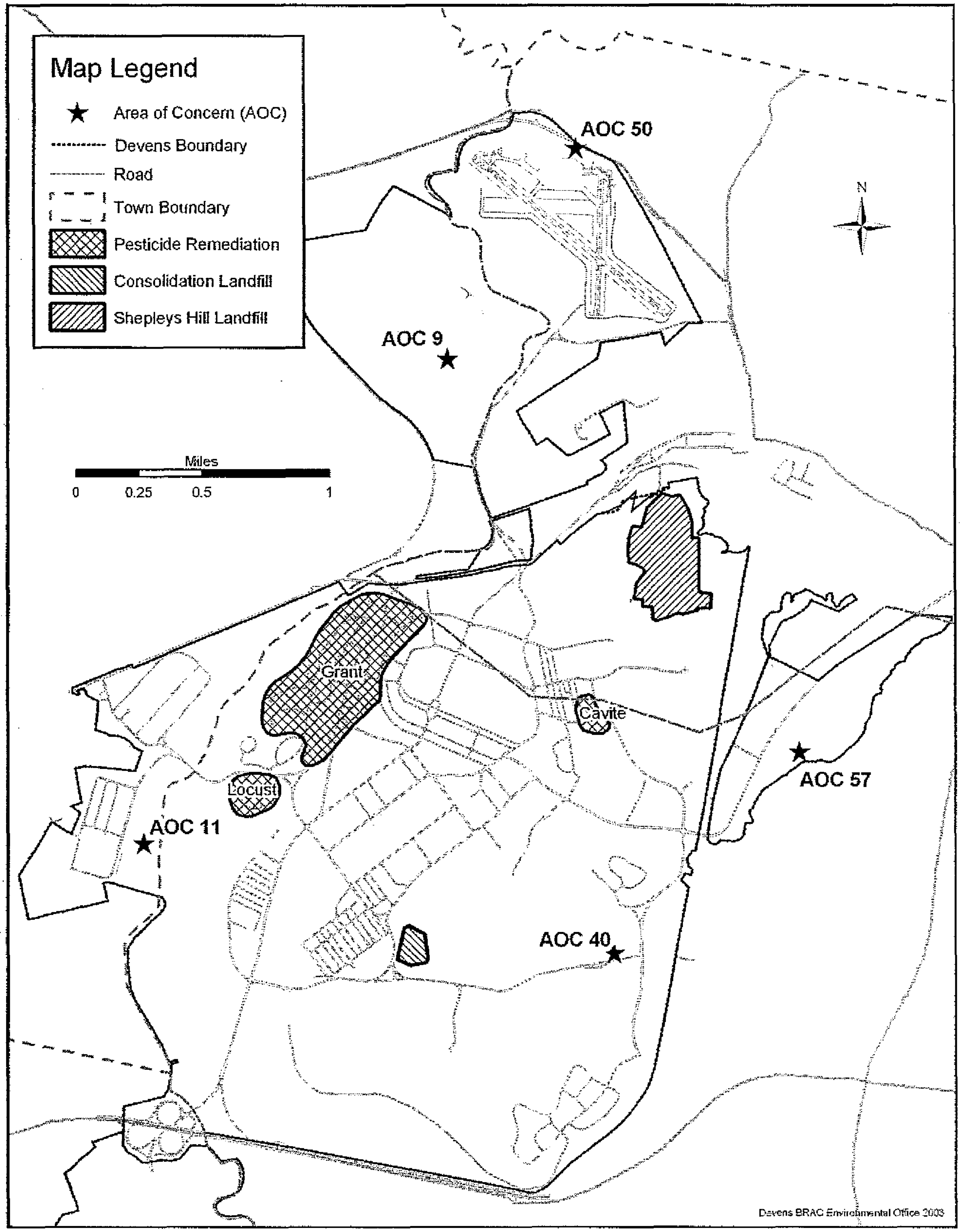
Location of sites covered in this issue:



BRAC ENVIRONMENTAL NEWSLETTER

BRAC Environmental Office
Devens Reserve Forces Training Area

FINAL
Summer 2004

REMEDIATION PROJECT UPDATES:

Landfill Consolidation Program:

Six former **waste disposal areas** were cleaned and approximately 330,000 cubic yards of material were placed in the Consolidation Landfill. The landfill was completed in Fall 2002. The Completion Report received regulatory approval in September 2003. Regulatory inspection of restored wetlands took place in June 2004.

A Finding of Suitability to Transfer (FOST) document has been prepared for the Area Of Contamination (AOC) 9, Study Area (SA) 13 and AOC 40 parcels. The FOST has been sent to agency headquarters for review and approval. After agency approval, the FOST will then be issued for a public review and comment period. Transfer of the cleaned properties is expected in Fall 2004

AOC 50 – Former Moore Army Airfield:

The Final Record of Decision (ROD) for AOC 50 was completed and approved in Spring 2004. This major milestone culminates months of collaborative effort on the part of the Army, regulatory agencies and local stakeholders. The ROD formalizes the decision to employ bio-remediation, in-well stripping and soil vapor extraction. These technologies will reduce and remove **chlorinated solvents in groundwater** beneath the former Moore Army Airfield.

The next steps are to reach agreements on the Remedial Design and the Remedial Action Work Plan. These documents lay out the specific details of the remedy and the work required of the Army's contractor, Arcadis, to implement it. Full-scale implementation of the remedy is expected to begin in late Summer 2004.

DEVENS REMEDIATION SUMMARY:

CERCLA/Superfund
325 total sites identified for evaluation
244 sites approved for No Further Action (NFA) status
50 sites recommended for NFA status
19 sites undergoing active remediation per Record of Decision (ROD)
7 sites on hold, pending further evaluation
5 sites undergoing site evaluations

For more information on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund) program at the USEPA, visit: www.epa.gov/superfund/about.htm

Shepley's Hill Landfill Groundwater:

The 1995 Record of Decision (ROD) for Shepley's Hill Landfill specified the contingency remedy of a groundwater extraction and treatment system (a.k.a. pump and treat) to prevent the migration of **arsenic in groundwater** from Shepley's Hill Landfill. Due to evidence of offsite arsenic contamination, the Army awarded a contract in September 2003 for the installation of an interim Pump and Treat system. Installation of the system is anticipated by January 2005.

AOC 57 – Barnum Road Motor Pool:

As per the 2001 Record of Decision (ROD) for AOC 57, excavation activities to remove and dispose of **soil impacted by petroleum, oil and lubricants (POL)** near the former motor pool area east of Barnum Road were completed in February 2002. During backfill, residual POL was observed on the water surface in an open excavation pit.

The Army undertook an investigation into the source and extent of the POL. Sampling in September 2002 showed no evidence of a source of free-phase oil in the soil, and the extent of residual soil contamination was delineated. Excavation of the remaining contaminated soil and restoration of adjacent wetland areas was completed in November 2003.

A long-term monitoring plan was developed and implemented in Spring 2004. Regulatory inspection of the restored wetland areas took place in June 2004.

Pesticide Soil Remediation (Grant, Locust and Cavite Housing Areas):

Pesticide remediation at Grant, Locust and Cavite housing areas was completed in Fall 2002 according to the Massachusetts Contingency Plan (MCP) guidelines. During soil excavation, polychlorinated biphenyls **(PCBs)**, polycyclic aromatic hydrocarbons **(PAHs)**, and **arsenic** were detected **in soil** near several buildings. PAHs have been cleaned to MCP and EPA standards. Removal of PCB contaminated soil is ongoing.

Due to the presence of PCB and concerns about arsenic in the soil, the Army is evaluating the housing areas under the CERCLA program. The first step, a Preliminary Assessment/Site Investigation (PA/SI), is ongoing.

The Army also completed a Devens-wide soil arsenic background study report in March 2004. Results presented in the report will be used to determine if arsenic found at future sites is naturally occurring or due to a release.

SA 71 – Former Railroad Roundhouse:

Railroad maintenance activities and the release of coal ash at SA 71 resulted in **soil contamination of heavy metals** and polycyclic aromatic hydrocarbons (**PAHs**).

Excavation in 1999 and 2000 removed the bulk of contaminated soil, approximately 2,400 cubic yards. However, a pocket of contaminated soil and sediment remains along the southeast edge of Plow Shop Pond. The Army is conducting a risk-based evaluation to determine if removal action is required. The evaluation will be completed in Fall 2004.

GET INVOLVED!

Community members can participate in the Devens restoration process by attending the **Restoration Advisory Board (RAB)** meetings. RAB meetings are typically held the second Thursday evening of each month. Please contact the Devens BRAC Office for more information.

EXPRESS YOURSELF!

Residents can also provide input through the **RAB Community Co-chairs**. A Co-chair volunteer from each community works with representatives of the Army, USEPA, and MADEP to ensure local interests and issues are included in the environmental restoration program. Please contact your Community Co-chair or the Devens BRAC Office for more information.

The RAB Community Co-chairs are:

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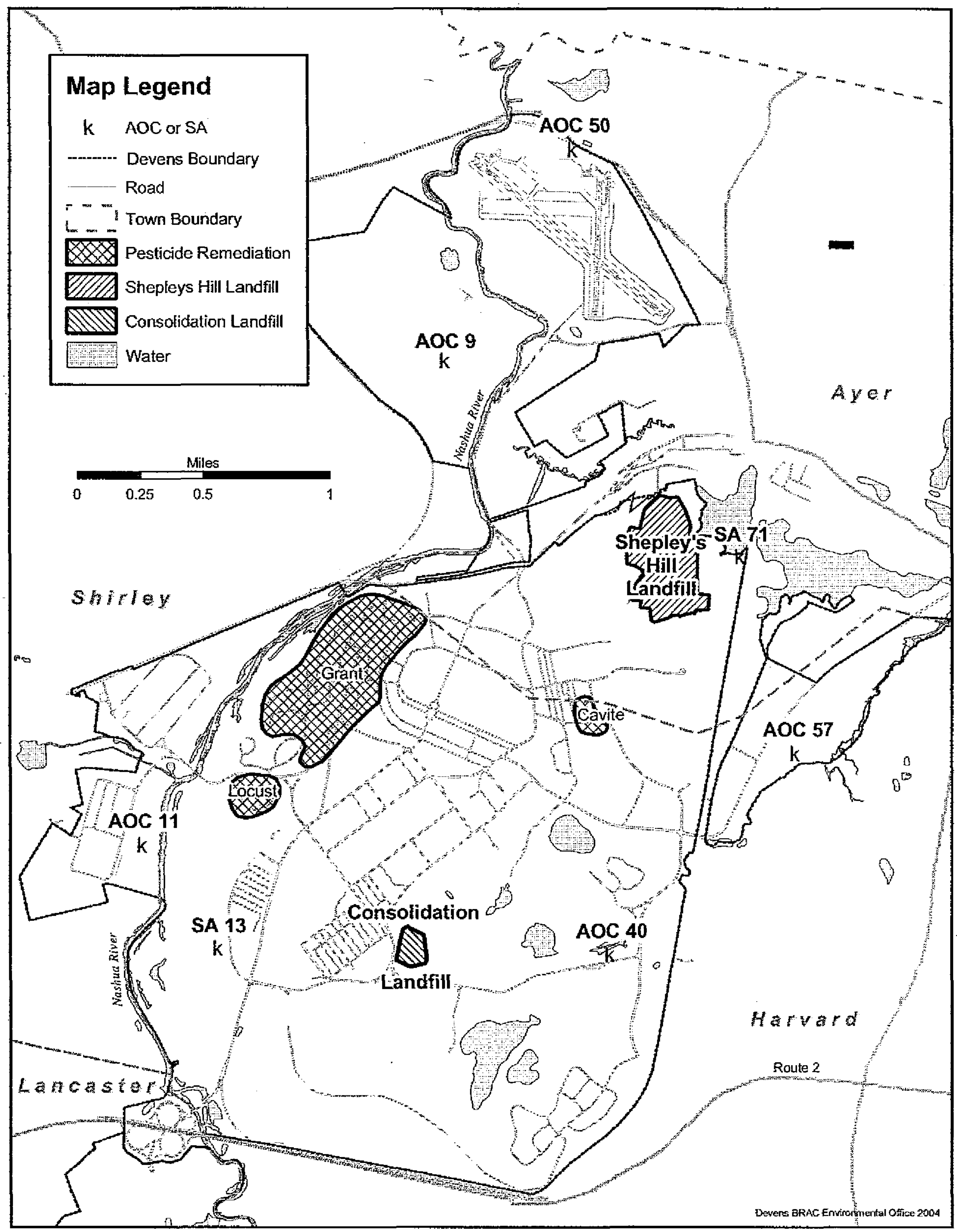


2005 Five-Year Review Devens, Massachusetts

September 8, 2005

Presented by:
U.S. Army Corps of Engineers

Statutory Sites

- Comprehensive reviews were performed for all sites where a CERCLA Record of Decision (ROD) has been executed. Five-year reviews should be conducted by statute if both of the following conditions are true:
  - Upon completion of the remedial action, hazardous substances, pollutants, or contaminants will remain on site; and
  - The ROD for the site was signed on or after October 17, 1986 (the effective date of SARA) and the removal action was selected under CERCLA 121

Statutory Sites *(continued)*

- Five-year reviews should be conducted as a matter of policy for the following types of actions:
  - A pre- or post-SARA remedial action that, upon completion, will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete;

Statutory Sites *(continued)*

- A pre-SARA remedial action that leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure;
- A removal-only site on the NPL where a removal action leaves hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure and where no remedial action has or will take place

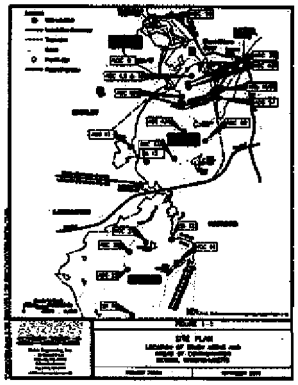
Statutory Sites *(continued)*

Five-Year Review were performed for the following sites:

- Policy Review Sites
  - AOCs 43G and 43J
  - AOCs 32 and 43
  - AOC 50 (Area Requiring Environmental Evaluation (AREE) 69)

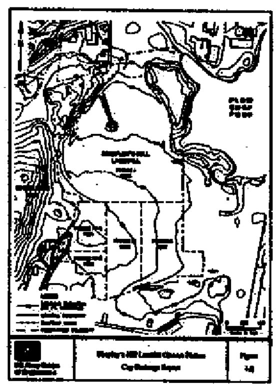
Statutory Sites *(continued)*

- Statutory Review Sites
  - Barnum Road Maintenance Yards (Area of Concern [AOCs] 44 and 52)
  - AOC 57
  - South Post Impact Area (SPIA), (AOCs 25, 26, 27, and 41 – Groundwater)
  - AOC 69W
  - Consolidation Landfill (AOCs 9, 11, 40, and 41; Study Areas [SAs] 6, 12, and 13)
  - Shepley's Hill Landfill Operable Unite (AOCs 4, 5 and 18)



2005 Five-Year Review
Devens, Massachusetts

- Currently finalizing the Five-Year Site Review for Nine (9) Sites at the Former Fort Devens
- Purpose of Five-Year Review is to determine whether the remedy at a site is protective to human health and the environment
- Five-Year Reviews were performed in accordance with U.S. Environmental Protection Agency (EPA) Comprehensive Five-Year Guidance, dated June 2001



Shepley's Hill Landfill
AOCs 4, 5 and 18

- Encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens.
- Landfill operations at the Landfill began at least as early as 1917, and stopped as of July 1, 1992. Capping was completed in May 1993
- RI/FS Completed in 1993
- ROD Signed in 1995

Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- Initial Remedy included:
  - ☐ Landfill Closure
  - ☐ Improvement of Stormwater Drainage System
  - ☐ Landfill Cover Maintenance
  - ☐ Landfill Gas Collection
  - ☐ Long-Term Groundwater and Gas Monitoring
  - ☐ Institutional Controls
  - ☐ 60% Design of Groundwater Extraction System

Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- Based on observed results, the Army and regulatory agencies decided to implement the contingent element at the selected remedy (Alternate SHL-9), Groundwater Extraction and Discharge
- Start-up of extraction system is scheduled for September 2005
- Elevated concentrations of arsenic in groundwater continue to be detected at the Shepley's Hill Landfill.
- A new arsenic MCL standard of 10 ug/L was promulgated in January 2001 and public water systems must comply with this new standard by June 2006

Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- Although various studies have been performed to date, data gaps may exist regarding lateral extent, flow directions discharge points, and nature of the arsenic plume
- In order to identify these data gaps and to evaluate risk associated with the remedies in place, a Comprehensive Site Assessment (CSA) and Corrective Action Alternatives Analysis (CAAA) will be performed

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Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- The CSA will include offsite groundwater plume and landfill cap investigation, and human health and ecological risk assessments.
- The CAAA will review all prior feasibility study alternatives, revise and/or validate the alternatives based on new data and develop any new alternatives as necessary.
- The CSA/CAAA began August 2005.

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Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- A protectiveness determination of the remedy cannot be made until further information is obtained through completion of the recommendations and follow up actions detailed above
- It is expected that these actions will take approximately 2 years to complete (mostly dependant on the CSA and CAAA), at which time a protectiveness determination will be made

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Shepley's Hill Landfill
AOCs 4, 5 and 18 *(continued)*

- Ponding on the northern half of the landfill and poor drainage in the northwestern and southern swales has been noted. These issues will be corrected as part of a cap maintenance contract to be completed in Fall 2005
- EPA will be performing an arsenic study of Plow Shop Pond in Fall 2005

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Barnum Road Maintenance Yards AOCs 44 and 52

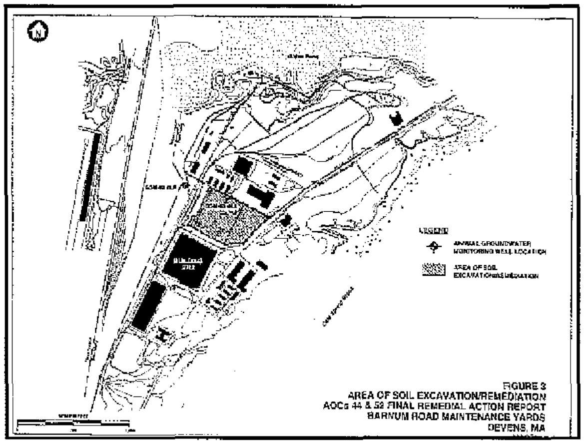
- Located in the northeast corner of the former Main Post, near Barnum Gate
- Site consists of former vehicle maintenance yards
- Contamination was primarily attributed to petroleum and oil releases associated with maintenance activity
- Feasibility study completed in 1994
- ROD signed 1995

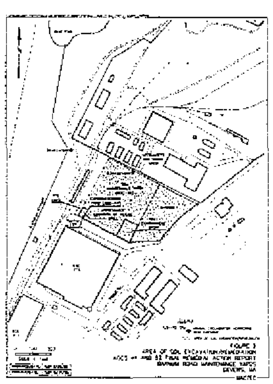
Barnum Road Maintenance Yards AOCs 44 and 52 *(continued)*

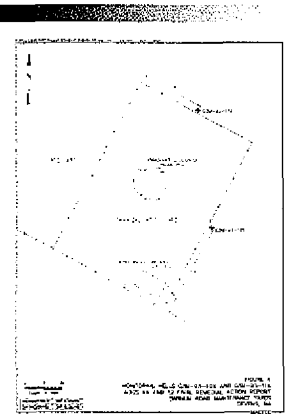
- Initial Remedy included:
  - Excavation of contaminated soils
  - Off-site soil disposal
  - Backfill and paving
  - Expand existing stormwater drainage system
  - Groundwater monitoring
  - Institutional controls
- In 1995-1996, remedial actions were completed including the off-site recycling of approximately 12,000 yard^3 of contaminated soil

Barnum Road Maintenance Yards AOCs 44 and 52 *(continued)*

- Analytical results of remaining in-ground soil samples were below site cleanup levels
- Most recent round of groundwater sampling was performed December 2003. All detections were below MADEP Method 1, GW-1 Standards
- Drainage system, including detention pond and separator was constructed throughout maintenance yards in 1996
- Remedy at AOCs 44 and 52 is protective of human health and the environment







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 adjacent to Barnum Road
- Sub-areas received stormwater runoff and wastes from former vehicle maintenance storage yards
- The former storage yards are no soil and grass-covered areas
- Feasibility studies completed in 2000
- RODS Issued in 2001

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AOC 57 *(continued)*

- Selected remedies included:
  - Soil excavation and off-site treatment and disposal
  - Wetlands protection
  - Long-term groundwater and surface water monitoring
  - Institutional controls
- Excavation activities were completed in 2003, which included the removal and off-site treatment of 4,600 tons of contaminated soil from Areas 2 and 3
- In 2004, an Explanation of Significant Difference (ESD) was issued based on data and observations made during excavation activities

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AOC 57 *(continued)*

- Four rounds of groundwater and surface water monitoring has been performed since 2002
- Elevated concentrations of arsenic have been detected in AOC 57 monitoring wells
- Available data suggests that reducing conditions are present; these conditions can cause naturally occurring arsenic in native soil to be mobilized
- Additional studies and further evaluation of groundwater monitoring data have been recommended
- Remedies are protective to human health and the environment

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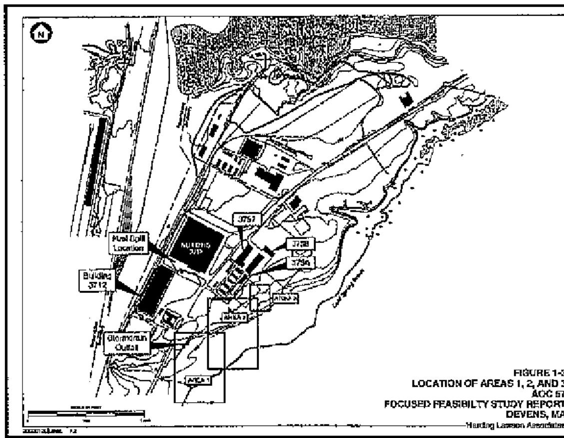

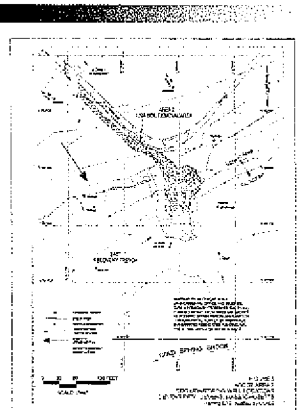

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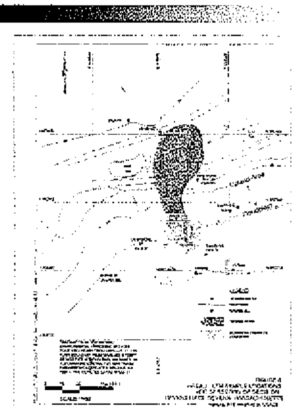

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AOC 43G and 43J

- Historic gas stations located within the Devens Reserve Forces Training Area (RFTA)
- AOC 43G is located on Queenstown Road in the central portion of the former Main Post
- AOC 43J is located on Patton Road at the southern edge of the former Main Post.
- Contamination at both sites is attributed to releases from gasoline and waste underground storage tanks (USTs)

AOC 43G and 43J *(continued)*

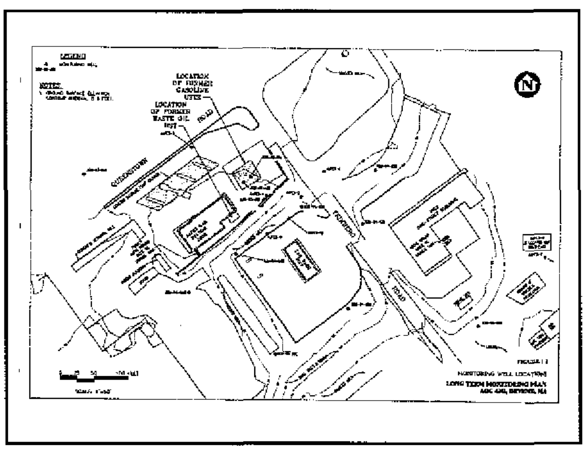
- Remedial Investigation (RIs) and Feasibility Studies (FSs) completed in 1996
- RODS issued in 1996
- Selected remedies included:
  - Intrinsic remediation
  - Intrinsic remediation and assessment and groundwater modeling
  - Installation of additional wells
  - Long-term groundwater monitoring

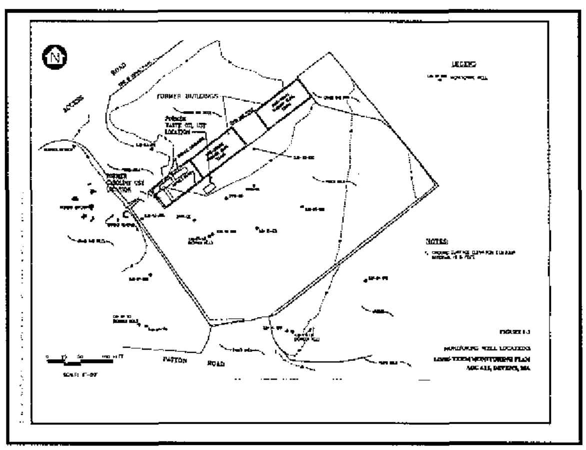
AOC 43G and 43J *(continued)*

- Groundwater monitoring has been conducted since 1996
- Review of the groundwater sampling indicates that groundwater concentrations of organic Contaminants of Concern (COCs) are decreasing at source locations at AOCs 43G and 43J and that the plumes are not expanding or migrating off RFTA property.
- Since manganese has been detected in site wells at both AOCs, development of risk-based standard for manganese has been recommended.

AOC 43G and 43J *(continued)*

- No further field action is warranted at either site; next scheduled sampling round is November/December 2005. The remedies are protective of human health and the environment, and immediate threats are addressed





South Post Impact Area
AOC 25, 26, 27 and 41

- Covers approximately 1,500 acres
- Located within 4,800-acre South Post section of the Former Fort Devens
- Active weapons and ordinance discharge area used by the Army, the Massachusetts National Guard, and law enforcement agencies for training purposes
- Includes several SAs, and a number of firing ranges along Dixie Road and Trainfire Road that are not designated as AOCs

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South Post Impact Area
AOC 25, 26, 27 and 41 *(continued)*

- Remedial investigations completed in 1994
- RODS were issued in 1996; the portion of the South Post Impact Area covered by ROD encompasses the 964 acres North and West of New Cranberry Pond
- Selected remedies include:
  - Long-term groundwater modeling
  - Installation of additional wells
  - Preparation of an Integrated Natural Resources Management Plan (INRMP)
  - Prohibition of new drinking water sources

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South Post Impact Area
AOC 25, 26, 27 and 41 *(continued)*

- Annual groundwater monitoring has been conducted since 1996, including testing for explosive residuals
- RDX (an explosive residual) has been detected in AOC 26 groundwater; however, it is believed that this does not make the remedial actions non-compliant with the ROD
- Army will continued to monitor and evaluate the presence of RDX and any potential impacts in the long-term monitoring reports
- Remedies are currently protective of human health and the environment

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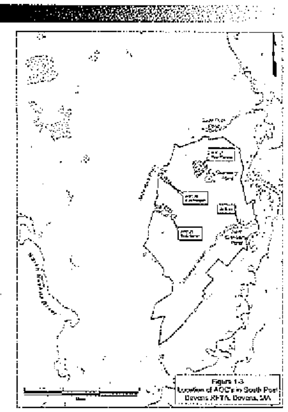

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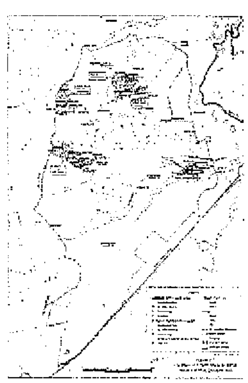

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Devens Consolidation Landfill
AOCs 9, 11, and 40, SAs 6, 12 and 13

- Consists of and 8 Acre landfill that was constructed between 2000 and 2002
- Approximately 590,000 tons of was placed at the landfill consisting of a variety of debris which was excavated from the 6 AOCs and SAs (all former landfills and disposal areas)
- Feasibility study issued in 1995; Feasibility Addendum Report issued in 1998
- ROD signed in 1999

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Devens Consolidation Landfill

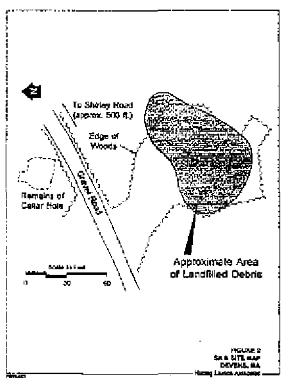
AOCs 9, 11, and 40, SAs 6, 12 and 13 *(continued)*

- Selected remedies consisted of:
  - Debris removal
  - Sediment removal
  - Wetlands restoration
  - Backfilling, re-grading, re-vegetation
  - Institution controls
- Routine operation and maintenance (O&M) is conducted at landfill including inspection of the leachate collection system

Devens Consolidation Landfill

AOCs 9, 11, and 40, SAs 6, 12 and 13 *(continued)*

- Soil erosion was noted in the north-northeast gabion slope drain during the last inspection of the landfill
- Repair of the slope drain is scheduled for the Fall 2005
- The remedies at the AOCs and SAs associated with the Devens Consolidation Landfill are protective to human health and the environment



AOC 32 and 43A

- AOC 32 (Defense Reutilization and Marketing Office [DRMA Yard]) was used as a materials storage facility. At the time of base closure in 1996, AOC 43A was being used as a petroleum, oils and lubricants (POL) storage area. Currently the majority of the site is comprised of a 35,000 foot^2 warehouse building that was constructed in 2000
- Remedial investigations completed in 1994
- Feasibility study completed in 1997
- ROD issued in 1998

AOC 32 and 43A *(continued)*

- Remedial components included:
  - Excavation and off-site disposal of contaminated soil
  - Installation of additional monitoring wells
  - Monitored Natural Attenuation (MNA)
  - Long-term monitoring
  - MNA Assessment and groundwater monitoring
- In 1998 metal debris, contaminated soil, tire scraps and asphalt were excavated and disposed off-site at appropriate facilities

AOC 32 and 43A *(continued)*

- The Army has installed source area groundwater monitoring wells and re-initiated long-term monitoring. The 2003 annual groundwater monitoring report and the groundwater sampling data from Fall and Spring 2004 document that natural attenuation is effectively remediating groundwater at AOCs 32 and 43A, with the possible exception of one location (32M-01-18XBR)

AOC 32 and 43A *(continued)*

- The current Long-Term Monitoring Program (LTMP) and Monitored Natural Assessment (MNA) were developed for the former site configuration and well network. The LTMP and MNA is currently being updated for the current site configuration. Since there are plans to expand the Webvan warehouse, the documents should take into account these proposed modifications to the site.
- The LTMP and MNA Assessment will be updated in October 2005
- The remedies at AOC 32 and AOC 43A are protective to human health and the environment

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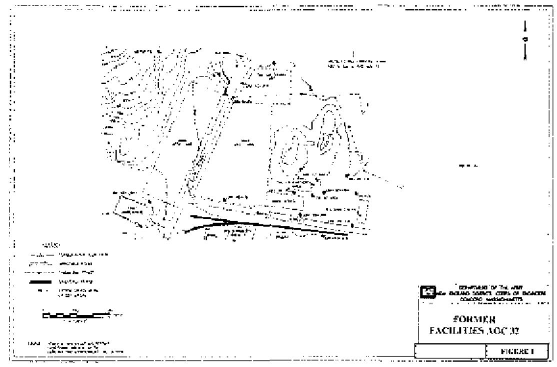

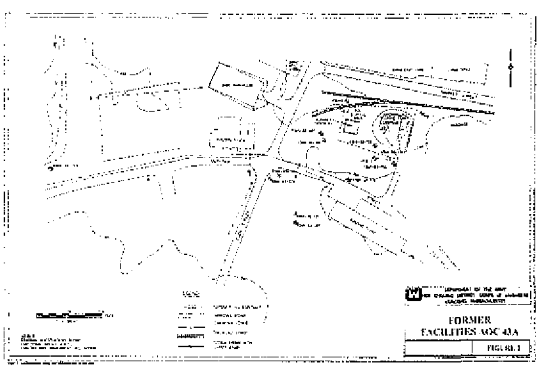

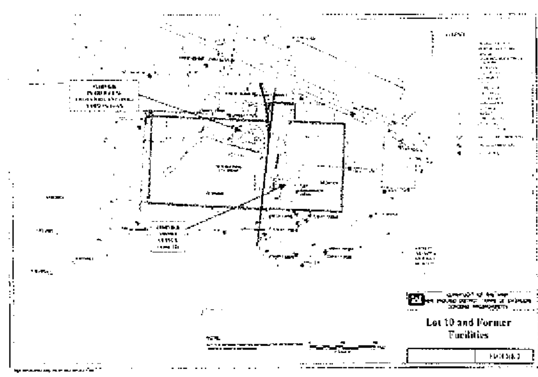

AOC 50

- Located on the northeastern boundary of the former Moore Army Airfield (MAAF), within the former Fort Devens North Post in Ayer, Massachusetts. The AOC 50 Source Area comprises less than 2 acres and includes Buildings 3803 (the former parachute shop), 3840 (the former parachute shakeout tower), 3824 (a gazebo), and 3801 (the former 10th Special Forces airplane parachute simulation building)
- Remedial investigations completed in 2000
- Feasibility study completed in 2002
- ROD signed in 2004

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AOC 50 *(continued)*

- Although contaminant sources have been removed or taken out of commission, groundwater underlying AOC 50 contains elevated concentrations of volatile organic compounds (VOCs) most notable tetrachloroethylene (PCE)
- Remedial components specified in the ROD included:
  - Enhanced Reductive Dechlorination (ERD) treatment program and In-Well Stripping (IWS);
  - Soil Vapor Extraction (SVE);
  - Long-term groundwater monitoring; and
  - Institutional controls

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AOC 50 *(continued)*

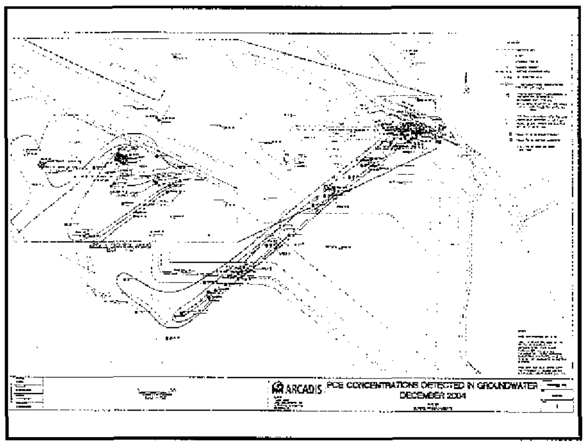
- Elevated concentrations of VOCs, continue to be detected in groundwater at AOC 50; however, a decreasing trend has been observed in some areas of the site due to the ongoing remedial efforts. A Remedial Action Work Plan (RAWP), including a Land Use Control Plan (LUCP) is currently being finalized by the Army

AOC 50 *(continued)*

- The remedial actions are expected to allow unrestricted use and unlimited exposure upon final achievement of Remedial Goals (RGs) in groundwater. The groundwater sampling data from Fall 2004 and Spring 2005 document that both the ERD system and the IWS system are effective in degrading PCE and creating proper conditions for treatment
- The Army believes that the remedy is operating properly and successfully (OPS) and will request OPS certification from the USEPA in the near future

AOC 50 *(continued)*

- Evaluation of the use and effectiveness SVE system is ongoing
- The remedy at AOC 50 is protective of human health and the environment. Human health is currently not at risk because groundwater is not being used for potable use nor proposed for potable use



AOC 69W

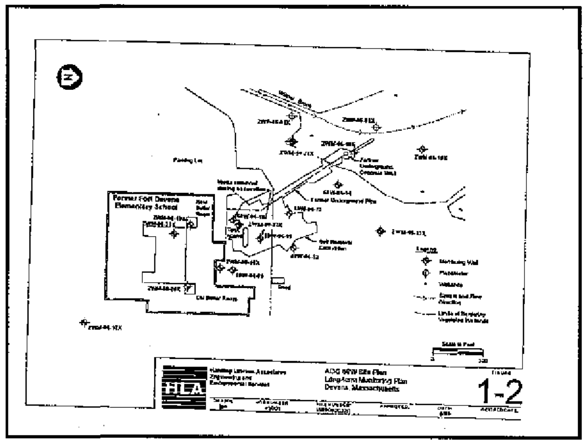
- Comprises the former Fort Devens Elementary School (Building 215) and the associated parking lot and lawn extending approximately 300 feet northwest to Willow Brook. Contamination is attributed to No. 4 heating oil, which leaked from underground piping in two separate incidences; once in 1972 and again in 1978
- Remedial investigation completed in 1998
- Removal action (soil excavation) completed in 1998. Approximately 3,500 yard^3 of contaminated soil removed

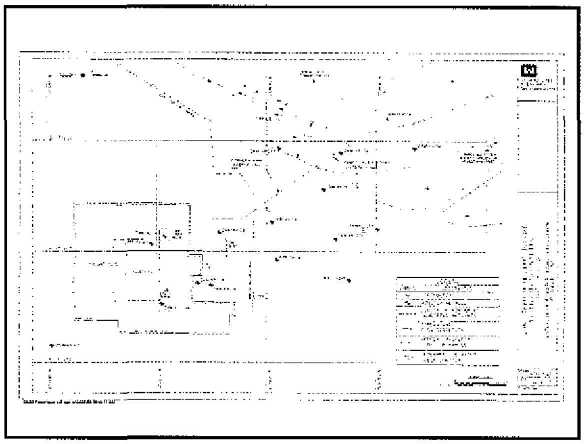
AOC 69W *(continued)*

- ROD issued in 1999
- Selected remedies included:
  - Long-term groundwater monitoring
  - Institutional controls
- Long-term monitoring has been conducted semi-annually since 1999
- Exceedances of Volatile Petroleum Hydrocarbons (VPH), arsenic and manganese have been detected in groundwater at SOC 69W slightly above their respective cleanup goals

AOC 69W *(continued)*

- Based on concentrations observed in AOC 69W sentry wells, Contaminants of Concern (COCs) are not migrating off-site
- If needed, recommendations will be made by the USACE within the 2004 Semi-Annual Summary Report
- The selected remedy at AOC 69W is protective of human health and the environment





APPENDIX L

REGULATORY AGENCY AND COMMUNITY COMMENTS

EPA Comments on the
Draft 2005 Five-Year Review
Former Fort Devens
Devens, Massachusetts
June 2005
(Responses Completed September 2005)

General Comments:

1. General Formatting and Editing:
   - The Draft 2005 Five-Year Review (FYR) is mostly information "cut and pasted" from other documents, including the Five-Year Review Report from 2000, the various RODs, and other site-related documents. However, in most cases the tense from the original document was not corrected, the references were not changed, and the document from which the information originated was not cited. Therefore, the Draft document does not read clearly. For example, information cut from the Shepley's Hill Landfill ROD, which was written 10 years ago, reads awkwardly and inappropriately for a 2005 document. Actions that are now long since completed are presented as if they still lie in the future. Another example is found in chapter 10 (AOC 50), where much of the description of the remedy (sec. 10.3.1) is written in the future tense, e.g., "*The exact locations, spacing, and completion details of the injection wells/transects* *will be specified* *in the RD*." However, the remedy is largely complete at the present time. The text should be edited thoroughly to make it clear what represents a projection forward made at some time in the past, what has now been done, the current status of any activity, and what is a projection for the future as of the time of the FYR preparation.
   - The "Site Chronology" section in each chapter identifies the "First Five-Year Review" in September 2000 as the last event, although it is not the last chronological event for this 2005 Five-Year Review. This is a remnant of being "cut" from the 2000 Five-Year Review report. List the 2000 Five-Year Review in appropriate chronological order and check each chapter's chronology to ensure that all important milestones for this 2005 Five-Year Review period are included, as many of the chronology tables seem to offer only limited or no events for this FYR evaluation period.
   - References throughout the document to sections within the document or Figures are often incorrect because they refer to references in the original document that the text was "cut" from. All references to sections within the document or Figures, etc. should be checked and corrected, as appropriate.
   - A thorough cite checking should be carried out for the entire document. References cited in the text should be cross-checked against the lists of "References" provided at the end of each chapter to verify that the references are complete.
   - In many cases, information is provided from historical RIs or SIs, but the information is not cited as such, so it is unclear what the source of the information is and what the time period of the information is – historical or current. Cite the source of all information, as appropriate, and ensure that all citations are included in the "References" section.
   - Data in appendix tables are often illegible due to highlighting in the original table and incorrect darkness settings during copying. Legible copies should be provided.

- ➢ Also, throughout the document are numerous editorial errors – run-on sentences, incomplete sentences, grammatical errors, misspellings, etc. Conduct a thorough editorial review of the document and correct these errors.

The issues listed above, have, and are being addressed. Some of the concerns will be corrected when a full version of report, when the appropriate documents are gathered for the Appendices.

2. The Executive Summary, on page ES-1, references "*U.S. Environmental Protection Agency (USEPA) guidance (USEPA, 1999)*" as being used to prepare the Draft 2005 Five-Year Review report. It is unclear where this reference is defined, as there is no reference section for the Executive Summary, and there are numerous reference sections, one at the end of each site chapter. Regardless, the guidance that should be followed for this 2005 Five-Year Review is EPA's "Comprehensive Five-Year Review Guidance" dated June 2001. In addition, the "Supplement to the Comprehensive Five-Year Review Guidance: *Evaluation of Institutional Controls*" dated March 17, 2005, which was transmitted to the Army via email on March 23, 2005, should be followed for this 2005 Five-Year Review. The Draft document is missing critical information required by these guidance documents. For example:

- ➢ Community involvement information should be discussed within the "Five-Year Review Process" sections. See Appendix A of the "Comprehensive Five Year Review Guidance" (2001).
- ➢ The interview and inspection information for all of the sites is inadequate. See Appendix C and D of the "Comprehensive Five-Year Review Guidance" (2001) for procedures and checklists that should be utilized for the interviews and inspections. Copies of the checklists should be included in the 2005 Five-Year Review report. For almost all of the inspection write-ups, there was not even a general site description (how big was the site, was it a landfill, was there buildings on the site, was the site active or inactive, were the people working on the site, what was the ground surface like across the site, what was the status of fencing/site access, etc.) In addition, for all of the interview sections, the same 3 people were interviewed and no comments or issues were reported by the interviewees.
- ➢ A Five-Year Review Summary Form should be included after the executive summary. See Appendix F of the "Comprehensive Five-Year Review Guidance" (2001).
- ➢ Per EPA's "Comprehensive Five-Year Review Guidance" (2001), Question B should read as follows: "*Question B: Are the <u>exposure</u> assumptions, <u>toxicity data, cleanup levels, and remedial action objectives</u> used at the time of the remedy selection still valid?*" Address this throughout the document and ensure information is provided for each site to address whether the ROD RAOs are still valid.
- ➢ "*Question C: Has any other information come to light that could call into question the protectiveness of the remedy*" should be addressed within each "Technical Assessment" section. A "*Summary of the Technical Assessment*" should be included within each section. See Sections 3 and 4 of the "Comprehensive Five-Year Review Guidance" (2001).
- ➢ "Issues" and "Recommendations and Follow-up Actions" should be presented as shown in Exhibits 4-3 and 4-4 of the "Comprehensive Five-Year Review Guidance" (2001), including milestone dates for completion of recommended actions.
- ➢ Some of the "Protectiveness Statements" are not consistent with Exhibit 4-6 of the "Comprehensive Five-Year Review Guidance" (2001). Check the status of each site against the guidelines in Exhibit 4-6 and ensure that each "Protectiveness Statement" is appropriate.
- ➢ None of the detail and analysis required by the Supplemental Guidance on Evaluation of Institutional Controls (2005) is addressed. On all sites where ICs were included in the

selected remedy, a more comprehensive analysis of the implementation of the ICs, consistent with the supplement guidance, must be performed. In addition, copies of documents demonstrating implementation of ICs must be included with the 2005 Five-Year Review report.

The issues listed above, have, and are being addressed. The EPA's "Comprehensive Five-Year Review Guidance" dated June 2001was followed. Where appropriate, exhibits 4.3 and 4.4 have been used. Additional information pertaining to ICs was gathered (and included in the report) during this process, however, more information may be needed to complete a comprehensive IC analysis, where applicable.

3. Overall, the level of detail for work completed over the past 5 years (since the 2000 Five Year Review) is inadequate. The draft document offers considerable detail regarding historical activities and monitoring results for each site, but often presents comparatively little material to update the history for the five-year period that is the focus of the report. Revisions should be made with attention to the balance of pre-2000 site history versus 2000 to 2005 developments. Specifically, what physical changes have been made to each site during the reporting period (e.g., completed and planned construction at AOC 32/43A)? What changes have been observed in the monitoring results over the review period (e.g., have the concentrations of fuel constituents at AOCs 43G and 43J declined significantly at key monitoring wells?)? What concerns are raised with respect to meeting projected cleanup timeframes (e.g., Are there differences in the response of organic and inorganic contaminants at AOC 32/43A? At AOCs 43G and 43J?)?

Additional details for each site were included in the report and information pertaining to site features was added.

4. The formatting and level of detail are inconsistent from site to site.

- ➢ The details of the remedial elements of the selected remedy were included for some sites, but not for all. Sections 2 through 5 and 10 provide details on each remedial element whereas sections 6 through 9 only provide bulleted remedial action elements. Details of all remedial components should be provided for all sites.
- ➢ For some sites, a table of COCs and cleanup levels was provided, but not for all. This information should be provided for all sites within the discussion of the selected remedy.
- ➢ The "Remedy Implementation" section of SHL provided a section for each element of the remedy to demonstrate the status of each element of the remedy, but this was not done consistently for other sites. This break out of elements in the "Remedy Implementation" sections should be provided for all sites.
- ➢ A table summarizing groundwater exceedances was provided for AOCs 32/43A, but this type of table presentation of data was not done consistently for other sites. A table presentation of exceedances or other relevant table presentation of historical data and data for the evaluation period, with a reference to an appropriate figure to show well locations, should be provided for all sites.

The issues listed above, have, and are being addressed. Data summary tables were added where appropriate and details to the Selected Remedy Section were added.

5. In a memo to EPA Superfund National Policy Managers on November 26, 2002, EPA recommended implementation of the November 2002 Draft Vapor Intrusion Guidance (<u>Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)</u>, EPA530-F-02-052). This guidance should be included in the section on changes in risk assessment methodologies in the answer to

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid? This draft guidance should be listed for each AOC that has VOCs in groundwater under buildings. The 2005 Five-Year Review should evaluate whether use of this guidance would change the conclusions of the ROD and the selected remedy.

Where applicable,, this guidance was added to the Technical Assessment Section and a discussion was included based on the available site conditions and available data.

6. Since Massachusetts Surface Water Standards are taken from EPA National Water Quality Criteria, the 2004 National Recommended Water Quality Criteria are ARARs. For each AOC with surface water, these criteria should be identified as ARARs in the section on "Changes in Standards and To Be Considered" in response to Question B. The available surface water data should be compared with these criteria to evaluate whether the ROD is still protective. The latest criteria are provided in the 2004 document available at http://www.epa.gov/waterscience/criteria/nrwqc-2004.pdf.

Where applicable, this Criteria was reviewed and a discussion was included in the Technical Assessment Section.

7. Language concerning manganese should be changed wherever it occurs in the report because it is incorrect that EPA Region I supports a less stringent RfD for manganese based on its Risk Update of 1996. EPA Region I now supports an oral RfD of 0.07 mg/kg/day for ingestion of soil, sediments or food. EPA Region I supports an oral RfD of 0.024 mg/kg/day for manganese in drinking water. EPA issued a Lifetime Health Advisory of 0.3 mg/l for manganese in January, 2004. This value should be used for infants younger than 6 months even for an acute exposure of 10 days. This value should be included in any discussion of manganese and should be considered a TBC for residential drinking water scenarios.'

Discussions pertaining to manganese was edited accordingly.

8. Language concerning risk assessment of iron should be changed wherever it occurs in the report to indicate that its risk cannot be quantitatively assessed because EPA's IRIS database does not have an oral reference dose.

Discussions pertaining to lead was edited accordingly.

9. The FYR asserts the remedy is "operating properly and successfully" for a number of the sites (see, e.g., p. 8-6, sec. 8.4, AOC 69W; p. 10-10, sec. 10.6, AOC 50). However, such a determination has not yet been made with regulatory approval. It would be more precise to state something to the effect that, "*Army believes that the remedy is operating properly and successfully, and will request OPS certification from the EPA in the near future.*"

The OPS statement was edited or removed as appropriate.

10. There is no text discussion for the policy review for the sites listed in Appendix J.

A discussion will be added. The "Policy Table" will be removed and only a Site Status Table will be included.

AOCs 44 and 52: Barnum Road Maintenance Yards (OU4)

1. Page 2-7, Section 2.3.2.2: The "Remedy Implementation" section should be expanded to document the status of implementation for each element of the selected remedy.

   The remedy implementation section will be expanded.

2. Page 2-7, Section 2.3.2.3: This section should provide details on the requirements of the work plan (referenced as Weston, 1998a) to show what must be done to meet the groundwater monitoring element of the ROD. Either in this section and/or in the issues section for this site, the document should define the issue discussed in EPA's comments on the Draft Remedial Action Report (May 2004) for this site (see General Comment #2 of EPA's comment letter on the Draft Remedial Action Report).

   Details of the Weston, 1998 work plan were added to this discussion. Issues discussed in EPA's Comments of the Draft Remedial Action Report were added to this, and the Issues section of the review.

3. Page 2-9, Section 2.6: The text under "Question A" states that groundwater monitoring is "...complete and no longer being implemented at this site." However, it should be noted that a supplemental round of monitoring was carried out in December 2003, and discussions of the implications with regulators are ongoing. See Specific Comment 2, above. In particular, a key monitoring well in the network, MNG-1, has been destroyed, and is not available for verification of down gradient groundwater quality. (This is acknowledged in the FYR on page 2-7, section 2.3.2.3, but is neglected in later discussion of the site status, which asserts that "... no further groundwater sampling is required" (page 2-10, section 2.6).

   The following was added "Annual groundwater monitoring has been completed and a supplemental sampling round was performed in December 2003 by the USACE. The data indicate no exceedances of GW-1 standards. The Remedial Action Closure Report is being reviewed by Regulatory agencies at this time."

Shepley's Hill Landfill: AOCs 4, 5, and 18 (OU1)

4. General Comment: The level of detail on the efforts over the last five years at this site is inadequate. There should be significantly more detail (and dates) on the major efforts that have been worked on since the last Five-Year Review: the design of the pump and treat system, the construction of the pump and treat system, the Explanation of Significant Differences, the plan for the Comprehensive Site Assessment/Corrective Action Alternatives Analysis (CSA/CAAA), and the Cap Maintenance Contract. There are only approximately 13 sentences in the SHL section that describe all of these major efforts that have occurred over the past 5 years.

   Comment noted. Additional details (including those listed above) have been added and detailed in the revised write-up.

5. Page 3-1, Table 3-1: It is notable in the table that the first FYR was completed in 1998 and the second was completed in 2000. The text should offer an explanation for this schedule.

   The text was revised to explain this schedule. In 2000, Five-Year Reviews were performed for all applicable sites at Devens to allow for the same Five Year Review cycle.

6. Page 3-1, Section 3.2, 2nd Para: It is unclear what the purpose of the discussion of the building here is to SHL background information. The discussion needs to be expanded to demonstrate the relevance of this event and to provide dates and potential impacts of this event. Is the infiltration basin "outside of the area contributing groundwater flow toward the landfill" or "contributing groundwater flow toward the landfill"? Please clarify.

   The discussion was not relevant in this section (Background). The discussion of the infiltration basins was moved to the Interview Section (3.5.4) and details of the infiltrations basins were included.

7. Table 3-2 and Page 3-6, 8th para: The manganese cleanup level in the ROD is 291 ug/L based on background, not 1,715 ug/L as listed in Table 3-2. On page 3-6, within the discussion of the "Five-year Site Review" element of the remedy, this revision is discussed. This discussion should be noted in Table 3-6 and the document that enacted this revision should be clearly cited.

   Table was edited and text was added accordingly.

8. Page 3-5: The write up of the "Landfill Cover Maintenance" element of the selected remedy is different than the ROD (page 36). The write-up of the "Long term Groundwater Monitoring" element does not specify semi-annual monitoring for a minimum of 30 years, as stated in the ROD.

   The text was edited accordingly with the language from the ROD.

9. Page 3-6: For the "Five-year Site Review" element, add the 1st sentence of the 2nd paragraph on page 39 of the ROD to the definition of this element.

   The text was edited accordingly with the language from the ROD.

10. Page 3-8, Last Para: The text states, "The purpose of the landfill gas monitoring program is to establish long term trends..." However, the subsequent discussion is concerned entirely with magnitudes, rather than trends. This section would be enhanced by a brief discussion of trends. For example, have VOCs, oxygen, hydrogen sulfide, LELs, carbon monoxide, carbon dioxide, or methane risen or fallen significantly over the monitoring and/or reporting period?

    Gas monitoring results and a discussion on trends was added to this paragraph.

11. Page 3-9, 2nd Para: With respect to the gas migration effort, expand this discussion to clarify when this was done and why (i.e., in response to recommendation in the 2000 Five Year Review). What has this monitoring revealed with respect to the question of off-site gas migration? Results should be discussed for completeness. Or, has this effort not been performed yet and is planned to be part of the Cap Maintenance Contract, as inferred from the text on page 3-11, Section 3.4? Please clarify.

    The paragraph was revised. A portion of the requested information was included in the previous paragraph that discussed results and trends. Additional gas migration efforts will be performed on the southern portion of the landfill after the Cap Maintenance Contract.

12. Page 3-9, Institutional Controls: The Town of Ayer's prohibition on private groundwater wells in the area down gradient (i.e., to the north) of the landfill is relevant here and should be

discussed. Although not under Army's control, this existing restriction is relevant to the protectiveness of measures to reduce risk associated with the landfill.

A comment from the MADEP (comment j from their July 20, 2005 comments letter) indicated that the Town of Ayer has a by-law that requires a permit to install a groundwater well for consumptive use. This information was included.

13. Page 3-9, 8th Para: The write-up of the "Five-Year Site Reviews" included here is the summary of the 1998 Five-Year Review, as printed in the 2000 Five-Year Review report. This section should be updated to include information on the 2000 Five-Year Review findings and recommendations. In addition, the text from the ROD (on page 3-6) notes that FYRs "were scheduled for 1998, 2003, and 2008," which appears to be at odds with the schedule as given in Table 3-1 and on Page 3-9 (1998, 2000, and, by inference from the present document, 2005). Please explain the change in the planned review schedule for clarity.

    The text was revised to explain this schedule.

14. Page 3-9 – 3-11: A summary of the SHL Supplemental Groundwater Investigation is provided here under the "Remedy Implementation" section. Since this was not required as part of the selected remedy in the ROD, it is suggested that it be made a separate section.

    This discussion was placed in a separate discussion.

15. Page 3-11, Section 3.4: This section must explain what the protectiveness statement was in the 2000 Five-Year Review.

    The protectiveness statement from the 2000 Five-Year Review was included.

16. Page 3-13, Section 3.5.4: This is not an MNA remedy.

    This sentence was removed.

17. Page 3-13 – 3-14, Section 3.6: The discussion of "Remedial Action Performance" here provides a summary of the first Five-Year Review of 1998 and then discusses 2003 data. Include a summary of the 2000 Five-Year Review and other relevant data from the 2005 FYR evaluation period. This section offers a discussion of "Remedial Action Performance" with a particular focus on changes in arsenic concentrations in groundwater. While this is appropriate, given the identification of arsenic as the principal risk driver, there are a number of other COCs that were identified for SHL (see Table 3-2). What can be said about the concentrations of the other COCs over the review period? Are there any remaining exceedances for COCs other than arsenic? This bears upon the performance of the remedy.

    This section was revised accordingly. A discussion of the other COCs was added. The information was obtained from the Draft 2004 Annual report, prepared by the USACE.

18. Page 3-14, Last Para and Page 3-17, Section 3.7: The "Early Indicators of Potential Remedy Failure" section and the "Issues" section need to be expanded to clearly detail the unresolved issues at the site and explain planned responses to those issues. The "Issues" section does not do justice to the number of unresolved issues at SHL that are detailed in correspondence and BCT meeting minutes and which have served as the driver for the implementation of the contingency remedy and the planning for the CSA/CAAA.

These sections were revised accordingly. Additional details and the planned responses were included.

19. Page 3-15, Para 3 and Page 3-16, Para 2: Human health risks are not eliminated by institutional controls, because ICs do not protect off-site groundwater that is contaminated. A statement might be made here concerning the Town of Ayer's restrictions on groundwater use down gradient of SHL for completeness.

    Comment noted. Information on the Town's by-law was included.

20. Page 3-15, 5th Para: Change the discussion concerning manganese to address General Comment 7, above. Identify the revised cleanup goal that was calculated for the long term monitoring program.

    This section was revised accordingly

21. Page 3-17, Section 3.8, 2nd Para: It is agreed that there may be opportunities to reduce monitoring costs by eliminating certain analytes that do not appear to contribute to risk evaluations, remedy performance, or general understanding of transport processes affecting COCs of interest. With respect to the specific analytes listed here, it should be noted that cadmium, chromium, and mercury have been identified as particular concerns in sediment in adjacent Plow Shop Pond, and the interaction of SHL groundwater with the pond is under study at the present time. Although SHL has not been implicated as a likely source of Cd, Cr, or Hg to Plow Shop Pond, their significance in the pond system should be weighed when considering revision of the SHL LTM analyte list.

    Comment noted, text was revised accordingly.

22. Page 3-17, Section 3.8: The "Recommendations and Follow-Up Actions" section must include the start-up of the pump and treat system, performance monitoring of the pump and treat system, the Cap Maintenance contract efforts, the CSA/CAAA efforts, and implementation of a final remedy for SHL, in a manner consistent with Exhibit 4-4 of the "Comprehensive Five-Year Review Guidance" (2001), including milestone dates. Bryan Olson, EPA Federal Facilities Section Chief, clearly stated at the March 10, 2005 BCT meeting that EPA expected that the CSA/CAAA efforts would be significantly included within the 2005 Five-Year Review and that a protectiveness statement on SHL would be conditional upon the Army's completion of the CSA/CAAA effort.

    Exhibit 4-4 was included with the efforts identified. Estimated start-up dates were used as milestone dates. Additional discussions on the CSA and CAAA were included throughout the Shepley's Review.

23. Page 3-18, Section 3.9: The EPA does not agree with the protectiveness statement for SHL. Refer to Exhibit 4-6 of the "Comprehensive Five-Year Review Guidance" (2001). Since it has been determined that the contingency remedy should be implemented and the Army has not begun operation of the contingency remedy, and since other issues with the SHL remedy are to be evaluated as part of the CSA/CAAA and the CAAA is expected to result in a final remedy for the site, the EPA considers that the remedial action at SHL is "under construction" not "operating or completed". EPA proposes that the appropriate protectiveness statement at this time should be a "protectiveness deferred" statement - "A protectiveness determination of the remedy at SHL cannot be made at this time until further

information is obtained through completion of the recommendations and follow-up actions detailed in Section 3.8. It is expected that these actions will take approximately (insert time frame) to complete, at which time a protectiveness determination will be made."

This protectiveness statement was included. A timeframe to complete these activities was discussed with Mr. Robert Simeone and was based on the estimated schedule for the CSA and CAAA.

AOC 57 (OU09)

24. Page 4-5, 1st Full Para: Why is this discussion of Alternative II-2 included here? This section of the report is presenting the RAOs for Area 3, not Area 2, and Alternative II-2 was not even the remedy for Area 2.

    The discussion of Alternated II-2 was not applicable and was removed.

25. Page 4-5, Last Para: Explain the purpose of the ESD and provide dates and details of the ESD that resulted in the COC changes referenced here.

    Details of the ESD were included.

26. Page 4-6 – 4-7, Section 4.3.3: The COCs and cleanup goals for soils are provided, but not for groundwater. Incorporate the groundwater COCs and cleanup goals from Table 12 of the ROD as amended by the ESD.

    The groundwater COCs and cleanup goals from the ROD were included.

27. Page 4-10, Section 4.3.5 and Page 4-18, Section 4.8: The "Remedy Implementation" section discusses the soil excavation and groundwater monitoring elements of the remedy in some detail. However, this should also discuss the surface water monitoring, wetlands protection, institutional controls, institutional control inspections and five-year review elements if the remedy in sufficient detail to demonstrate that these elements of the remedy have been or are being addressed. The 1st sentence of the 3rd paragraph of this section does not even list these elements as components specified by the ROD. In addition, Section 4.8 also excludes these other elements of the remedy. The "Remedy Implementation" discussion of the soil excavation element of the remedy should refer to the Interim RA Complete Report (September 2004) and provide some narrative about that report and provide additional details on the total material removed and where it was disposed.

    Discussions for implementation of the identified items were included. A discussion of the RA Complete Report was also included.

28. Page 4-10 – 4-11, Section 4.3.5.1: Provide a reference for the performance standards documented here.

    The reference was added.

29. Page 4-11: Wetland inspection findings are not addressed in the "Assessment of Monitoring and Site Inspection Data" section.

    The wetland inspection findings were included in this section.

30. Page 4-11, Section 4.3.5.2: The LTMP is referenced as being in Appendix C of the Final Interim RA Complete Report. The LTMP is not included in the referenced report. EPA is issued comments on the Draft LTMP on July 12, 2005.

The reference was removed from this discussion.

31. Page 4-11: The compounds listed here for Area 2 and Area 3 environmental monitoring are wrong. These are not the COCs for this site.

The correct COCs were included.

32. Page 4-12 – 4-13, Section 4.5.2: This presentation of data is very difficult to follow. A table summary presentation of exceedances should be considered. On page 4-13, paragraph 2 refers to a contaminant at 50 ug/L, but does not indicate which compound. On page 4-13, 4th paragraph, information on naphthalene is provided, but naphthalene is not a COC. Also, note that the text refers to summaries of results from December 2003 and November 2004 monitoring, but does not mention May 2004 monitoring. Results from the last are included in Appendix C as Table 2a.

A table that summarizes the results was included in place of the textual descriptions.

33. Page 4-12, Section 4.5.2.1, 1st Para: The text cites results for 57M-95-03X and 57M-96-11X at "... 13 ug/L and 16 ug/L, respectively." What are these results for? These figures do not appear to represent total VOCs, based on the results provided in the Appendix for December 2003, nor do they appear to represent concentrations of any single VOC. Please clarify.

The provided table replaced this discussion.

34. Page 4-13, 1st Para: Since the arsenic MCL is changing, change the first sentence on this page from "Arsenic was detected below the GW standard in three monitoring wells..." to "Arsenic was detected below 50 ug/l in three monitoring wells...".

The provided table replaced this discussion.

35. Page 4-13, Section 4.5.2.1, Area 3: The text cites results for 57M-03-05X at "... 12 ug/L." What is this result for? This figure does not appear to represent total VOCs, based on the results provided in the Appendix for December 2003, nor does it appear to represent the concentration of any single VOC. Please clarify.

The provided table replaced this discussion.

36. Page 4-13, Section 4.5.2.1: In the section on total metals, correct the units for arsenic in the first sentence (currently 50 mg/L and 270 mg/L). Correct the last sentence in this paragraph which compares lead in surface water to the groundwater standard. There is no date provided for this data.

The provided table replaced this discussion.

37. Page 4-13, Section 4.5.2.1: The second paragraph under "EPH" gives results for arsenic at Sump 4. Should this information be given under the previous subheading ("Total Metals")? Or, is the intent here to separate results for the sump samples from those for groundwater and

surface water. If so, perhaps additional subheading(s) would clarify the structure of the reporting.

The provided table replaced this discussion.

38. Page 4-14, Section 4.5.3: This (and/or other) section(s) may be an appropriate place to note that a major stormwater management structure was constructed immediately southwest of the AOC57 during the five-year review period. Insofar as potential hydrologic impacts on AOC57 were considered in the design of the retention basin, this activity represents a change that should be acknowledged.

    Information pertaining to the stormwater management system was included.

39. Page 4-14, Section 4.5.4: This is not an MNA remedy. Please remove the statement that the AOC57 remedy is operating properly and successfully. An OPS demonstration for the AOC57 remedy has yet to be prepared for EPA review and approval. What is meant by the last sentence of this section?

    The reference to MNA, OPS and last sentence were removed from this section. They were not applicable to AOC 57.

40. Page 4-14, Section 4.6: Under the "Remedial Action Performance" section, the text states, "A LTMP has been implemented ... ," yet the following section acknowledges that, "... the LTMP has not yet been finalized." Perhaps it would be more precise to state something to the effect that initial rounds of monitoring have been performed following a draft LTMP as an interim measure, pending revision and approval. In addition, provide details in this section of how groundwater data is being interpreted to show that cleanup levels will be met in less that 30 years and COCs are not migrating off the property?

    The statement concerning the LTMP was revised as requested and information on how data is being interpreted was included.

41. Page 4-15: Under the "Implementation of Institutional Controls" section at the top of the page, it is stated that "No institutional controls are required". ICs are required by the AOC57 ROD.

    This statement was removed.

42. Page 4-15: The last paragraph of the "Changes in Standards to be Considered" section discusses DEP Method 1 standards. Why is this discussion here and why is the data summary here?

    This discussion was not applicable to this section and was removed.

43. Page 4-15, Last Para: Change the first sentence in this paragraph from "No current risks exist at the Site." to "No current risks exist at the Site because there are no exposures."

    This revision was made.

44. Page 4-16, Section 4.6, 1st line: Please revise "...will eliminate the potential ingestion of groundwater exposure pathways" to "...will eliminate the potential groundwater exposure pathways."

This revision was made.

<u>AOCs 43G and 43J (OU06)</u>

45. Page 5-3, Section 5.3, 2nd Para: Remove the first sentence concerning the less stringent RfD for manganese as per General Comment 7.

    The sentence was removed and the section was revised in accordance with General Comment #7.

46. Page 5-5, 2nd Para: Change the last sentence of this paragraph from "...and a determination will be made by the Army and USEPA that the selected remedy remains protective..." to "...and a determination will be made by the Army and USEPA whether the remedy remains protective..."

    The modification was made accordingly.

47. Page 5-7 – 5-9, Section 5.3.5: There is not adequate detail on the implementation of the elements of the remedy. There is no discussion on the implementation of the installation of groundwater monitoring wells, long term monitoring and reporting elements of the remedy. Refer to the "Remedy Implementation" section for this site in the 2000 Five-Year Review report. Why wasn't this information and a summary of this information included in this 2005 FYR?

    This information was included.

48. Page 5-7 – 5-8, Section 5.3.5.1: Provide a reference for the document that set the "Performance Standards" defined on pages 5-7 and 5-8. How does the "Regression Analysis" discussion on page 5-11 relate to the "Performance Standards"? How do the "Performance Standards" and the "Regression Analysis" relate to the modeling required by the ROD? Information provided in this section does not clearly support that COCs are decreasing and the plume is not expanding.

    Reference and information how these items are related was included. Additional information was added to support findings and conclusions.

49. Page 5-10, Section 5.5.2: This section provides a fairly detailed review of recent monitoring results (e.g., specific wells at which each COC have exhibited exceedances of the cleanup standards). To the extent that the MNA remedy depends for its ultimate success on long-term declines in concentration, it would be useful to provide an overview of trends for the principal COCs at the sites, particularly over the 5 years that are the focus of the report. Are COCs indeed attenuating demonstrably? Have any COCs at any wells gone from exceedance to compliance within the past five years? Do any appear to be stable, potentially undermining the premise of the MNA remedy?

    The requested information was included. Data summary was included that includes historical and current results.

50. Page 5-11: There needs to be an explanation of the statement "Manganese (291 ug/L Goal Risk based Shepley's 1715)".

The explanation was included.

51. Page 5-11 – 5-13 and Page 5-15, Section 5.6: What about the exceedances in the sentry wells? AOC 43G has manganese exceedances in sentry wells. AOC 43J has VPH, iron, manganese and arsenic exceedances in sentry wells. It is inadequate to infer that exceedances and updating of the model will be addressed in the 2004 Annual Report and make a statement of protective without any recommendations for follow-up actions. The 2005 Five-Year Review report should be the document that offers thorough analysis of the data and the "Technical Assessment" (Section 5.6) should identify where the remedy is not meeting RAOs. If RAOs are not being met, the "Recommendations and Follow-Up Actions" section (Section 5.8) should identify measures to address deficiencies with specific milestones and the "Protectiveness Statement" (Section 5.9) should be subject to these follow-up actions, as appropriate.

    Analytical results from the sentry wells will be discussed and data summary tables was included. An evaluation of the data will be discussed in Technical Assessment Section in regards to the selected remedy and RAOs. Recommendations were included as necessary.

52. Page 5-13, Section 5.5.2.2, Arsenic: The text states, "Concentrations increased from below the goal in source well 2446-03 in October 2004." Please be more specific; in particular, it might be noted that As increased from 46 ug/L in November 2003 to 78 ug/L in October 2004. The historical range given in Table 4-6 is 31 to 110 ug/L (with some uncertainty due to the difficulty of reading the photocopy). These figures give some perspective on the exceedance observed in October 2004. With respect to the arsenic exceedance in October 2004, the performance standard indicates that additional field actions will be implemented if MCL exceedances are detected in sentry wells. The current goal is the former MCL for arsenic (50 ug/L). This goal should be changed since the remedy should comply with the upcoming MCL of 10 ug/L. Please discuss in Section 5.8 what action will be taken as a result of the MCL exceedance in a sentry well, as well as how the performance standard for arsenic should be changed due to the change in the MCL from 50 ug/L to 10 ug/L.

    Details of the noted conditions and recommendations in regards to the observed concentrations of arsenic was included in the appropriate sections.

53. Page 5-14, Section 5.5.2.5: The text states, "At AOC 43J, the only exceedance of VPH GW-1 concentrations within sentry wells occurred for C9-C10 aromatic hydrocarbons in 2446-04." Please add the date, e.g., "... in October 2004 at monitoring well 2446-04."

    This information was included and was summarized in the data tables.

54. Page 5-14, Section 5.5.2.5: The text notes that well 2446-04, which detected an exceedance for VPH, "... is only approximately 50 feet down gradient of the former waste oil UST." Is the implication that this well should not be classified as a "sentry?" If so, should this be a recommendation put forward in Section 5.8?

    The 2003 Annual Report, prepared by the USACE states that well 2446-04 is a "sentry well". The well is downgradient of the source are, but is not located on the site perimeter.

55. Page 5-15, Section 5.5.4: Section 5.5.4 indicates that ICs are in effect; however, no ICs were required by the ROD. ICs possibly should be considered to ensure groundwater is not used for drinking water until the cleanup levels are achieved. The remedial action objectives include protection of commercial/industrial receptors on and off Army Reserve Enclave

property from exposure to groundwater having chemicals in excess of specified remedial goals. This "Implementation of ICs" section should identify how such exposures will be prevented without ICs or should propose ICs. If ICs are proposed, this should be reflected in Section 5.6 and the "Recommendations and Follow-Up Actions" section.

The following statement was added to the section: "Until the time of property transfer, institutional control restrictions will be covered by the Installation Master Plan."

56. Page 5-15, Section 5.6: The "Remedial Action Performance" section refers to this as a no action remedy – this is not a no action remedy.

    This statement was removed.

57. Page 5-15, Section 5.6: The 2000 Five-Year Review recommended no longer analyzing for iron and nickel (in the "Recommendations" section) or carbon tetrachloride (in the "Optimization" section); however, these recommendations were not implemented in the LTM program. Should these recommendations be reconsidered in the "Opportunities for Optimization" section and the "Recommendations and Follow-up Actions" section of this 2005 Five-Year Review? Note that the 1st sentence on page 5-18 may imply that nickel should continue to be monitored.

    This recommendation was reconsidered in the Opportunities for Optimization section.

58. Page 5-15 – 5-16, Section 5.6: Please describe how the original remedial goal for arsenic of 50 ug/L will be changed to reflect the change of the arsenic MCL from 50 ug/L to 10 ug/L.

    A statement in regards to this change was added.

59. Page 5-16, Section 5.6: In the "Changes in Exposure Pathways" section, the report notes, "Groundwater monitoring data at each AOC suggest that organic COC concentrations are decreasing at source wells ...". This is an important conclusion, central to evaluation of the performance of the MNA remedy. The FYR would be strengthened by supporting data. Some simple measure(s) of performance might be given, such as the maximum concentrations of key organic COCs at the beginning and end of the five-year review period (and, perhaps, at the beginning of the LTM program, to provide reference points for the longer-term trends).

    Upon review of the updated data tables, this conclusion was reconsidered.

60. Page 5-19, Section 5.9: The information provided in the report on this site does not support the conclusions of the "Protectiveness Statement", that concentrations of COCs are decreasing and the plume is not expanding off-site. Revise the document so that the data is presented to effectively demonstrate these conclusions.

    In accordance with this comment and the ones noted above, the document was revised accordingly.

South Post Impact Area, AOCs 25, 26, 27, and 41 (Groundwater) (OU03):

61. In the 2000 Five-Year Review, on page 6-12, DEP raised a question regarding annual reporting related to the Natural Resources Management Plan. Was this question ever resolved?

The Army is currently finalizing an updated Natural Resources Management Plan that will cover 2005 through 2009. Annual submissions were not required as part of this plan.

62. Page 6-3 – 6-9, Section 6.2: A few subsections (6.2.1.1, 6.2.3.1, 6.2.4.1) of the "Background" section provide a summary of post-ROD groundwater data. It is unclear why this is presented in the "Background" section and whether this is a complete summary of all groundwater data for the AOC. A similar summary of data is not presented for AOC 26. A complete summary of post-ROD data should be presented in the "Data Review" section.

The data was revised and moved accordingly and information for AOC 26 will be added.

63. Page 6-4, Section 6.2.1.5: It is stated in the first paragraph that manganese exceeded its MCL; however, manganese does not have an MCL. The secondary MCL is 0.05 mg/L, and the lifetime health advisory is 0.3 mg/L.

The section was revised accordingly.

64. Page 6-5, Section 6.2.2.4: Please edit, "Suggested potential effect of the permeability of soils in AOC 26, if contaminants are solubilized there is a potential contaminates could infiltrate the groundwater" for clarity. Is the intent to state something like, "It was suggested that, due to the permeability of soils in AOC 26, contaminants could be leached to groundwater"?

Text was revised accordingly.

65. Page 6-5, Section 6.2.2.5: Change the sentence "Unfiltered groundwater shows several elevated metals, but filtered groundwater shows exceedances of drinking water standards only for manganese." Manganese does not have an MCL. The secondary MCL is 0.05 mg/L, and the lifetime health advisory is 0.3 mg/L.

Text was revised accordingly.

66. Page 6-6, Section 6.2.2.5: In the second paragraph it is stated that no risks were identified for turtles "using a real data". Please correct this and describe what data were used to indicate no risk.

Text was revised. The information provided was from the previously submitted reports. The text has been revised to more clearly state that ecological risk to turtles is considered to be minimal based on site-specific toxicity tests.

67. Page 6-6, Section 6.2.3.1: In the first sentence of the second paragraph, the background level of RDX should be changed from 2 g/L to 2 ug/L.

Text was revised accordingly.

68. Page 6-9, Section 6.2.4: The concentration units in the last paragraph of this section should be changed from g/L to the correct units.

Text was revised accordingly.

69. Page 6-11, Section 6.3.2: The "Remedy Implementation" section does not discuss all of the elements of the remedy. No information is provided on the elements related to no installation of new drinking water wells and no change of property use.

    This information was added.

70. Page 6-12, Section 6.5.2 and Page 6-15, Section 6.9: The presentation of data does not clearly support that COCs are not migrating off-site. The "Data Review" section should discuss whether groundwater has been analyzed for perchlorate and, if so, what the results were and discuss the potential for off-site migration of perchlorate.

    Groundwater was analyzed in the fall of 2004 for perchlorate. The data was included in the data review section.

71. Page 6-12, Section 6.5.4: This section indicates ICs are in effect. ICs are not in effect at SPIA.

    The text was revised accordingly.

72. Page 6-12, Section 6.5.4: It would be useful to present data from interviews with personnel on the site related to the use of the DW-1 drinking water well to demonstrate if the actual current use of the source is consistent with the risk assessment assumptions.

    Information pertaining to D-1 was included in the report accordingly.

73. Page 6-13, Section 6.6: The last sentence of the 2nd paragraph under Question B indicates that the "remedy includes limiting the use of groundwater as drinking water". Please elaborate.

    The text was revised to preclude the use of the noted unclear statement.

74. Page 6-15, Section 6.9: The second paragraph should discuss why "potable use on an extremely limited basis" ensures human health is not at risk.

    The text was revised to more accurately state that health risks are limited by the infrequent short-term use of the groundwater by a small healthy population during military training.

<u>AOCs 32 and 43A (OU05)</u>

Nobis is now in receipt of a draft of the 2004 Annual Review. This document makes recommendations that Nobis has evaluated in light of the Roadmap to Long-Term Monitoring Optimization, a guidance document prepared by EPA in May 2005. The recommendations can be supported in that they propose reducing the number of wells to be sampled to those that contribute useful data to the knowledge of contaminants at and around Well 32M-01-18XBR. The recommendations further eliminate a number of analytical tests, on the ground that they are unlikely to contribute meaningful information about either the contaminants at the site (test results are often non-detect; some tests are for parameters that describe the likelihood of bioremediation of chlorinated organics, but since the only well with known VOC contamination is 32M-01-18XBR, and this well has an extremely low score for bioremediation, the tests are not fulfilling a useful purpose. Nobis supports these recommendations, but it is acknowledged in the new text that the changes will need to be reflected in the new LTMP.

75. Pages 7-1 – 7-2, Section 7.2: Details of the MNAA, construction of the building, and installation of the replacement wells should be discussed in the background.

    Discussions of these activities were added to the background section.

76. Page 7-4, Section 7.3.3: The description of the selected remedy for groundwater should specify that data is to be incorporated into groundwater flow and transport models and that Five-Year Reviews are supposed to review field data and model predictions, as specified in the ROD.

    This statement was added to the selected remedy for groundwater.

77. Page 7-4, Section 7.3.3: The excavation and disposal activities completed in October and December 1998 should be discussed in the "Remedy Implementation" section, not the "Selected Remedy" section.

    These activities were moved to the Remedy Implementation Section.

78. Page 7-5 – 7-6, Section 7.3.4: The "Remedy Implementation" section is inadequate:
    The OPS demonstration was before the building was constructed.
    The summary of the MNAA is inadequate.
    The RA completion for the soils component is not discussed.
    There is no discussion of ICs.
    The discussion of the construction of the building and its effect on the remedy is inadequate.

    A note was added stating that the OPS was completed prior to the construction of the warehouse building. Additional details of the other subjects identified were included in this section.

79. Page 7-6, Section 7.3.5: The text states, "*Groundwater monitoring is being performed in accordance with the LTMP (SWETS 2001a,b) ... .*" It should be noted here that this LTMP was developed for the former site configuration and available well network. It therefore serves only as a rough guide for the current program. Discussion is ongoing to develop an updated LTMP appropriate to current site conditions. Furthermore, it should be noted that additional changes to the site are proposed, and that these changes may require further adjustments to the LTMP.

    This information was added to this section and in other appropriate sections of the Five-Year Review.

80. Page 7-6, Section 7.4: There were a number of recommendations in the 2000 Five-Year Review that are not discussed in Section 7.4.

    The recommendations from the 2000 Five-Year Review were added.

81. Page 7-7, Section 7.5.2.1: The text states, "*Natural attenuation parameters (dissolved oxygen [DO] and ORP/Eh) are only useful from bedrock source well 32M-01-18XBR, as it is the only well that continues to show exceedances of the same parameters.*" Presumably, it is not

the intent to state that DO and ORP are "in exceedance." Should this read, "... continues to show exceedances of organic contaminants"? Please clarify.

Yes, this statement should read "...organic contaminants" and was edited accordingly.

82. Page 7-9, Section 7.5.4 and Page 7-10, 4th Para: The "Interviews" section indicated there is no deed restriction, yet the IC section on page 7-10 indicates there is a deed restriction. Please clarify.

    This contradiction was corrected. There is currently a deed restriction in place.

83. Page 7-10, 2nd Para: Why isn't the sampling recommendation in the "Optimization" section included in the "Recommendations" section?

    This statement was added to the Recommendations section.

84. Page 7-11, Section 7.6: The potential for vapor intrusion into the newly developed warehouse is acknowledged in the section on "Changes in Exposure Pathways". Although no unacceptable risks were found based on modeled indoor air concentrations, this should be confirmed with the EPA draft vapor intrusion guidance. See General Comment 5.

    The Draft Vapor Intrusion Guidance was reviewed and the appropriate information was included.

85. Page 7-12, Sections 7.7 and 7.8: There are issues with this remedy that have been discussed at BCT Technical meetings. Resolution of these issues should not be put off to the 2004 Annual Report, as suggested on page 7-9, 1st paragraph. The issues need to be explained in the "Issues" section and recommendations to address the issues need to be included in the "Recommendations" section with proposed follow-up actions and milestones. The 3rd paragraph on page 7-13 is a good start to addressing this. If more time is needed to evaluate the concerns, as suggested on page 7-10, 3rd paragraph, then make the argument in the 2005 Five-Year Review of why more time is needed and present the follow-up actions and schedule in the "Recommendations" section. Then, the "Protectiveness Statement" will need to linked to the completion of appropriate follow-up actions.

    The issues were discussed and broken out in the Issues section and recommendations were added accordingly. The Protectiveness Statement was updated to state that the remedy is currently and foreseeably protective.

86. Page 7-14, Section 7.9, 4th Para: This discussion does not include ICs, modeling, and MNA, other components of this remedy that need to continue to be met.

    These items were included in this section.

AOC 69W (OU07)

87. Page 8-1, Section 8.0: The chapter on AOC 69W nowhere informs the reader of the current use of the site. Section 8.2 ("Background") discusses the former use as Fort Devens Elementary School, and notes that it was closed in 1993, and, in 1996, was "expected to be re-opened in the near future." The chapter later alludes to property transfer (e.g., p. 8-8, sec. 8.7). Please add information concerning current site use for completeness.

Details of the current property use were included.

88. Page 8-1, Section 8.2, 2nd Bullet: The release was No. 2 fuel oil, not No.4.

Reference to a No. 4 was replaced with No. 2 fuel oil.

89. Page 8-1 – 8-4, Section 8.2: The 2000 Five-Year Review included a large section summarizing site risks in the "Background" section. Why wasn't this information or a brief discussion of this information included here?

Summary of information presented in the 2000 Five-Year Review was included.

90. Page 8-2, Section 8.2: Figure 8-1 is referenced in the 3rd and 5th bulleted paragraphs, but this cannot be found in Appendix G. Please correct.

Reference to Figure 8-1 was removed from the 3rd and 5th bulleted paragraphs.

91. Page 8-2 – 8-3: What is the source of the information presented in sections 8.2.1, 8.2.3 and 8.3?

Unless otherwise noted, the provided information in these sections was gathered from the 1999 ROD, prepared by HLA.

92. Page 8-4, Section 8.2.3: In the second paragraph, it is stated that MCLs were exceeded for EPH and VPH. There are no MCLs for EPH and VPH. Please clarify.

MCL/Massachusetts Groundwater Quality Standards 310 CMR 6.0.

93. Page 8-5, Section 8.3.1: The details of the LTMP should be provided in the "Remedy Implementation" section, rather than the "Selected Remedy" section.

Details pertaining to the LTMP presented in the "Selected Remedy" section was incorporated into the "Remedial Implementation" section.

94. Page 8-5, Section 8.3.2: ICs are a critical element of the remedy, yet are not discussed in the "Remedy Implementation" section.

Information pertaining to ICs was included.

95. Page 8-5, Section 8.3.2, Para 1: The text refers to additional sentry wells ZWM-01-25X and -26X. Please note that the site map supplied in Appendix G is from a monitoring program document that pre-dates the installation of these wells, so that their locations cannot be found in material provided with the FYR. Perhaps an updated figure could be found to replace the one labeled Figure 1-2 in the current Draft version of the FYR. It would also be informative to readers to offer an explanation for the installation of the two additional sentry wells in 2001, i.e., that successive rounds of COC exceedance were detected at former sentry well ZWM-69-23X.

Figure 1-2 was updated to included ZWM-01-25X and -26X.

96. Page 8-6 – 8-7, Section 8.5.2: The presentation of data is inadequate. Paragraph 2 of this section talks about "four years" of data. What are the dates of this data? Data is not

presented to support that contaminants are not migrating off-site and decreasing over time. Revise the document so that the data is presented to effectively demonstrate these conclusions.

A table was included that summarizes the discussed data.

97. Page 8-6, Section 8.5.2: The report notes that C11-C22 aliphatics have decreased overall, but that well ZWM-99-22X has remained consistently above the cleanup target of 200 ug/L. On a positive note, it might be observed that C11-C22 aliphatics appear to have declined significantly at this well, having gone from three rounds >1000 ug/L through April 2001, but having remained <500 ug/L for five successive rounds (2002 - 2004).

A table was included that summarizes the discussed data. A statement in regards to the C11-C22 aliphatics was added.

98. Page 8-7, Section 8.5.2, Para 1: The report notes that C9-C10 aromatics were in exceedance of the cleanup standard of 200 ug/L in April 2004 at ZWM-99-22X. As it reads, this seems to signal a change in the most recent monitoring round. However, it should be noted that it is a change in the cleanup standard that caused this exceedance, rather than an increase in contaminant concentration. It appears from the tables in Appendix G that the relevant standard (MADEP GW-1) was 1000 ug/L through 2003, and was lowered to 200 ug/L in 2004. LTM results from well -22X for C9-C10 aromatics have fluctuated widely in the range 34 to 840 ug/L over the ten rounds tabulated in Appendix G. The April 2004 result of 650 ug/L (as well as the October 2004 result of 600 ug/L, which is not mentioned in the text) lies toward the high end of, but within, that historical range. The report does acknowledge this change in the cleanup goal on the next page (p. 8-8, sec. 8.7), but it would help the reader to see the 2004 exceedances in perspective if it were noted earlier in section 8.5.2.

A table was included that summarizes the discussed data. The change in the C9-C10 aromatic hydrocarbon standard was noted.

99. Page 8-7, Section 8.5.4: The discussion of ICs in this section refers to the "LIFC with LUC as described for Shepley's". What does this mean?

Reference to Shepley's was removed from the discussion.

100. Page 8-11, Section 8.8: MassDevelopment is planning to sell this property in the near future. This should be discussed and plans for addressing ICs should be addressed in the "Recommendations" section.

Discussion was added regarding transfer of property and plans for addressing ICs.

<u>Landfill Consolidation, AOCs 9, 11, and 40, SAs 6, 12, 13, and 41 (OU02)</u>

101. Page 9-1, Section 9.1: Add information on pre-ROD chronology. Include the 2003 RA completion event.

Pre-ROD information was included in the Chronology, including the RA completion event.

102. Page 9-1 – 9-7, Section 9.2: Provide dates for all of the background information.

Dates for background information were included.

103. Page 9-2, Section 9.2.2: The volume estimated was 112,000 cy, not 120,000 cy.

The volume estimate was changed to 112,000 cy.

104. Page 9-2, Section 9.2.2, Last Para: The reference to "background" here should be clarified, since there is no specific background number for Devens for arsenic. "Devens RFTA background concentrations" are referenced throughout Section 9.2.2 and 9.2.3. Please clarify.

Comparisons to background at Devens have evolved recently and upcoming comparisons to background will differ from those used even recently in the past. The comparisons to background noted in the Five Year Review summary are thus based on methods that were appropriate at the time. More rigorous background comparisons might be forthcoming (per the Final Soil Arsenic Background Study) as LTM proceeds.

105. Page 9-8, Section 9.3.1: For the selected remedy for AOC40, drum removal was an element of the selected remedy, but it is not included here. Also, for AOCs 9, 11, and 40 and SA 12, disposal of the excavated debris was to be disposed in the Consolidation Landfill or off-site. The "off-site" option was not noted in the description of the selected remedy.

Drum removal information was discussed and reference to off-site option was included.

106. Page 9-8, Section 9.3.2: The "Remedy Implementation" section does not provide adequate discussion of the implementation status of all elements of the selected remedy, including wetland restoration, ICs, AOC 40 drum removal, and cover system monitoring and maintenance.

These elements were discussed in more detail.

107. Pages 9-9 – 9-10, Sections 9.3.2.2 – 9.3.2.6: These sections all include 2 different numbers for the volume of material disposed in the Consolidation Landfill versus the material removed from the area. Please clarify these figures and explain the delta.

Both values represent the amount of material disposed at the landfill. One value is in tons and the other is in cubic yards. The actual tonnage of material was tracked with weight scales at the landfill. The delta was a result of converting from a per ton quantity to a per yard quantity.

108. Page 9-10, Section 9.3.2.5: The last paragraph of this section discusses restoration activities at SA 12. However, the selected remedy did not include restoration at SA 12. Please clarify

A clarification was provided. Extensive slope excavation occurred at the side to remove the debris material. As a result of the extended debris limit and deeper excavation slope reconstruction and restoration was required.

109. Page 9-11, Section 9.3.3: Provide details on the O&M Plan requirements.

Details of the O&M Plan were included.

110. Page 9-16, Section 9.5.2.7: Provide a reference for the LTMP for this site and details of the LTMP requirements. This section reports that there was a lead exceedance in 2003. Did lead levels decrease to below the reportable concentration in 2004?

A reference to the LTMP was added and details of the LTMP were included. Lead levels were non-detect for sampling conducted in October 2004.

111. Page 9-17, Para 3: ICs are required for AOCs 9, 11, and 40 and SA13 where "unrestricted future use is not achievable or economical". Has this determination been made for the related sites?

As is now noted in the subject document, institutional controls are being incorporated into the revised DRFTA Master Plan, and will be incorporated into the deed upon transfer of the property.

112. Page 9-19, Section 9.8: Provide a schedule for the repair of the drainage swale.

Repair of the drainage swale is anticipated to be in the Fall of 2005, and this is now noted in the document.

AOC 50 (OU08)

113. Executive Summary, Page ES-6: Please remove the statement that the AOC 50 remedy is operating properly and successfully. An OPS demonstration for the complete AOC 50 remedy has yet to be prepared for EPA review and approval.

The reference to the OPS was removed.

114. Page 10-2, Para 2: Property affected by the north plume portion of the AOC 50 site also includes the GFI Ayer, LLC property. Please revise the text.

The text was revised.

115. Page 10-2, Para 3: It is stated that residential use of the AOC 50 site is unlikely based in part on existing zoning restrictions. Zoning of the MAAF property could change when the Towns of Ayer, Harvard and Shirley vote in 2006 on the ultimate disposition of Devens property.

This information was included.

116. Page 10-3 – 10-4, Sections 10.2.4 (In-Situ Soil Vapor Extraction) and 10.2.7 (SVE): These two sections seem to present the same information. Please consolidate these two sections into one.

The two sections were combined.

117. Page 10-4, Section 10.2.8: Please specify that the reagent currently being used is a molasses-water solution. The document describes the ERD pilot test carried out in 2001 - 2002. It might be noted that a previous pilot test was conducted in the same area by Harding/MACTEC, using hydrogen release compound (HRC).

The identified information was included.

118. Page 10-5, Section 10.3.1: In the section titled "Pre-Design Investigation Activities", change the phrase "Over the past two years…" to identify the actual dates over which Army has undertaken extensive field investigation at AOC 50.

The timeframe was included (since 2004).

119. Page 10-9, Section 10.6: It is unclear why the institutional control objectives are presented at the beginning of this section. This section should discuss how all the remedial components are meeting remedial action objectives specified in the ROD. Please revise.

The institutional control information was summarized and moved to the end of this section.

120. Page 10-10, Section 10.6, Remedial Action Performance: IRZs are still in the process of being established for some of the ERD transects. Efforts are currently underway to accelerate the establishment of the IRZs through the implementation of the Army's ERD optimization plan. Please revise the text.

This information was included.

121. Page 10-10, Section 10.6, Remedial Action Performance: Please remove the statement that the AOC 50 remedy is operating properly and successfully. An OPS demonstration for the complete AOC 50 remedy has yet to be prepared for EPA review and approval.

The OPS statement was removed.

122. Page 10-10, Section 10.6, Opportunities for Optimization: The Army is currently implementing an ERD remedy optimization plan. Please revise.

Information of the optimization plan was included.

123. Page 10-10, Section 10.6, Changes in Standards and TBC: MCLs are enforceable standards, not guidelines. Please revise.

Text was revised accordingly.

124. Page 10-11, Section 10.6: In the section titled changes in exposure pathways, it is stated that groundwater underneath buildings is at a sufficient depth to limit exposure through vapor intrusion. This conclusion should be confirmed with the EPA draft vapor intrusion guidance.

A site specific risk assessment evaluated exposures to vapors migrating into indoor air and identified excess risk associated with residential/educational use in the Source Area. Use of the Source Area is restricted by the Lease and ICs. This section was revised accordingly.

125. Page 10-13, Section 10.9: This section states that COCs exceeding drinking water standards are not migrating off-site. Please support this conclusion with a discussion of the data, particularly the maximum concentration of PCE or other COCs in the groundwater at the boundary of the site, which includes the Nashua River.

This section has been revised. PCE was detected in well G6M-02-07X at 26 ug/l and in G6M-04-14X at 14 ug/l during the sampling in September 2004. PCE was not detected in G6M-02-06X and G6M-04-08X during the sampling in September 2004. These wells are screened at levels where PCE was detected during vertical profiling and range 30 to 85 below ground surface. These sampling locations are within the F&WS property and subject to the restriction on groundwater extraction. Furthermore, there is a low flow dilution factor of 237 for groundwater discharging to the Nashua River. The interim porewater cleanup level for PCE is 125 ug/l. Surface water concentrations are predicted to be less than the MCL.

Draft Final 2005 Five-Year Review (FYR), June 2005
MADEP Comments, July 2005
Responses to comments prepared September 2005

General Comments:

1. MADEP notes that the title to this document should be "draft", not "Draft Final". The Federal Facilities Agreement and the Department of Defense State Memorandum of Agreement require primary document development to include a draft prior to the issuance of a draft final version.

   Comment noted.

2. The document requires major editing efforts in order to be consistent with the USEPA Comprehensive Guidance Five-Year Review, June 2001 and the Supplemental to the Comprehensive Five-Year Guidance dated March 17, 2005. The 2001 Guidance includes additional questions to be answered regarding the selected remedy and Institutional Controls that are missing from this FYR. This draft FYR utilizes much of the previous 2000 FYR material with additional brief updated information appended to the end.

   The report was revised in accordance with these documents.

3. The 2001 Guidance for a Five-Year Review identifies actions that trigger …'as a matter of policy', FYR of sites where a removal action leaves hazardous substances, pollutants, or contaminants on a site above levels that allow for unlimited use and unrestricted exposure and where no remedial action has or will take place'. MADEP has concurred with several NFADDs where this condition exists and where our concurrence with the NFADD was conditioned to follow up actions. MADEP did this to facilitate the Army's progress in closing sites as several locations contained numerous sites or AREE conditions and would like the Army to report on these follow-ups.

   Comment noted. This concern has been discussed with the Army.

4. MADEP has published new draft standards for RDX and HMX. The proposed Method 1 Standards are 0.8 ug/l and 8 ug/l respectively for GW-1 areas. The GW-1 set of standards would be the appropriate designation for the Main and North Posts at Devens. MADEP requests that these draft standards be included as To Be Considered, TBC, in the Technical Assessment - ARAR sections and discussions of application of these standards be included in Shepley's Hill Landfill where results in monitoring well SHL- 24 had relatively high levels of explosive residual and at CB-1 at AOC 40/SA 24.

   Where applicable, the draft standards for RDX and HMX were included in the TBC sections.

5. MADEP is also enclosing results for monitoring well sampling for explosive residuals done by ACE in 1992. There were several monitoring wells that had relatively high levels of various explosive compounds. Follow- up has been discussed at several BCT meetings. MADEP would like recommendations to be included in this FYR for follow-on actions, including possible re-testing, that the Army has or will take to address potential releases associated with these results. (re-test)

   Comment noted. The Army will be considering follow-up actions in regards to these issues.

6. The FYR's Executive Summary (ES) is incomplete and does not portray the major points of each site covered; the Barnum Road Maintenance Yards (AOC 44 & 52) does not mention the fact that the Army is seeking a Closure, Shepley's Hill Landfill OU (AOC 4, 5, & 18) does not mention that the 2000 FYR recommended implementing the Contingency Remedy, nor does it mention that both the Off Site Investigation and the Red Cove area are recommended to be included in this OU, recommendations are not included for either AOCs 44 & 52, 4, 5, & 18 or AOC 50. Additionally, the ES states that AOC 50 is Operating Properly and Successfully, but, at this time, a regulatory determination has not been made or discussed concerning a status change for this AOC.

   The Executive Summary was revised accordingly and the noted information has been included.

Statutory FYRs:

1. **AOC 44 and AOC 52**

   a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR.

      Please refer to response to EPA comments 1 through 3 for AOC 44 and AOC 52.

   b. Section 2.3.2.3 indicates that…' no further groundwater monitoring is required' but does not mention that both MADEP and USEPA have requested that the damaged monitoring well, MNG-1, be replace and monitored in order to Close Out this site. MADEP requests that the damaged MW, noted above, be repaired or replaced and sampled as part of an additional round of monitoring to satisfy the ROD requirements.

      Please refer to EPA comment No. 3.

   c. The stormwater system for these AOCs consisted of catch basins, piping and a detention pond located across Barnum Road. The pond was located in an area where excavation to evaluate the probable Eastern Acid Pit Disposal Area, associated with the TDA Building, SA 38D. As the stormwater detention basin construction did not locate the former Eastern Acid Pit Disposal Area, SA 38 D NFADD should not have been given a NFA determination.

      Comment noted., however, no changes to the subject document appear to be required.

2. **Shepley's Hill Landfill**

   a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR.

      Please see the detailed responses to the EPA Comments 4 through 23.

   b. Section 3.3.3 Remedy Implementation – The MADEP has noted the need for general Operations and Maintenance improvements in two letters to the Army; August 23, 2004 and March 30, 2005, therefore we request the word 'substantial' be removed as a descriptor for the work the Army has performed. In addition it should be noted that in almost every US Army Corps of Engineers

Annual Report, as well as the 1996 Close Out Report, contained similar recommendations for cap maintenance work. The Cap Maintenance Contract, referenced in Section 3.5.3 Site Inspection, is suppose to address these issues.

Substantial was removed. The Cap Maintenance Contract will address these issues.

c. Section 3.3.3 Remedy Implementation - Past Annual Inspections monitoring for landfill gas shows that many of the vents have both Oxygen readings above 10% and LEL levels above >100% (readings from Industrial Scientific TMX 412 CGI calibrated on 53% LEL Methane/Pentane). These readings suggest potentially explosive conditions that should be addressed immediately with a surface scan for methane and increase landfill gas monitoring. The CSA/CAAA should include an evaluation of the stage of landfill decomposition; determine the need for additional vents in the landfill mass and around the entire perimeter.

The CSA/CAAA will include an evaluation of landfill gas and determine the need for additional gas vents at the landfill. Additional gas probes will be installed on the southern portion of the landfill as part of the cap maintenance work in Fall 2005.

d. Section 3.3.3 The Supplemental Ground Water Investigation was not part of the SHL ROD and should not be included in the Remedy Implementation Section. It should be in a separate section. Also, please note that the title of the document should be *'Draft'* because it was never approved as a final document. Agreement has not been reach on some of the areas contained in this report.

The Supplemental Ground Water Investigation discussion was moved to it's own section and labeled as Draft.

e. Section 3.5.4 Interviews - The SHL ROD is a source control remedy not an MNA remedy, please change this. MADEP has made its issues known through comment letters. It is misleading to state that the...'None of the personnel interviewed were aware of any reported problems...'

The reference to MNA was removed and the noted statement was removed.

f. Section 3.6 Question A: Technical Assessment-Remedial Action Performance - This section should include and highlight work that has been performed within the 2000-2005 time period. Please include the information presented at the June 10th BCT and RAB meetings by USEPA regarding continued discharge to Red Cove and Plow Shop Pond. Opportunities for Optimization - MADEP does not agree with the recommendations for optimization, at this time, given the number of unresolved issues that are detailed in correspondence and BCT meeting minutes. These issues which will guide the implementation of the Contingency Remedy and the planning of the CSA/CAAA.

The noted information was included in the appropriate sections of the report and the Opportunities for Optimization section was revised accordingly.

g. Section 3.6 Technical Assessment – Question A: Early Indicators of Potential Remedy Failure - A discussion is needed to describe what a CSA/CAAA is and a reference should be included at the end of the section.

Details of the CSA/CAAA were added to the Interview (3.5.4), Issues (3.7), and Recommendations (3.8) Sections.

h. Section 3.6 Question B: Changes in Standards and To Be Considered – See General Comment 4. The ROD for SHL noted explosive concentrations in SHL 24 but did not address it because it was an upgradient well. The well must be re-sampled and analyzed for the SHL COC list of constituents and explosive residuals. If there are still residual levels of explosive constituents in SHL 24 then the issue of explosive residuals needs to be added to the scope of the CSA/CAAA.

A recommendation to resample SHL 24 for explosives was added to this section.

i. Section 3.6 Question B: Changes in Exposure Pathways – See Comment 2.c. A trespasser pathway should be included in the risk assessment due to the use of SHL as a hiking destination for students of the adjacent high school. Given the possible explosive conditions at the vents indicated in the Annual Monitoring Reports, this pathway should be included in the risk assessment until the condition is addressed. Additionally, given new data and information an eco risk assessment will be included in the CSA/CAAA and need to evaluate this exposure pathway should be included in this section.

This section was revised accordingly. An evaluation of this exposure pathway will be performed as part of the CSA/CAAA.

j. Section 3.6 Question B: Changes in Exposure Pathways – The documents states that …'Institutional Controls prohibiting the use of groundwater as drinking water source at SHL will eliminate the potential groundwater exposure pathway. ' As of this date there is no zoning or regulation in Ayer that '*prohibits*' groundwater use. There is an Ayer by-law requiring a permit to install a groundwater well for consumptive use. MADEP does not believe this Institutional Control eliminates groundwater as an exposure pathway.

This section was revised to include the Ayer by-law and discussion of the Institutional Control was revised.

k. Section 3.6.1. Applicable or Relevant and Appropriate Review – In addition to forthcoming legal comments, there is a potential for the Clean Air Act requirements related to…'New Source Performance Standards and Emissions Guidelines for MSW landfills [to apply]. Landfills that commenced construction, modification or reconstruction after May 30, 1991, and that have accepted waste at any time since November 8, 1987' may be subject to these provisions. This issue will have to be evaluated in the CSA/CAAA, as well as, a more accurate waste volume calculation, in order to determine any additional requirements.

These issues will be addressed by the CSA/CAAA.

l. Section 3.9 Protectiveness Statement – MADEP concurs with USEPA comment in that this statement is not appropriate given the Contingency Remedy is not implemented and since other issues with SHL, Red Cove, off-site plume and Plow Shop Pond will be evaluated in the CAS/CAAA and the CAAA is expected to result in a final remedy for the site.

The Protectiveness Statement was revised in accordance with EPA Comment 23.

2. **AOC 57**

a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR.

Please refer to responses to EPA comments 24 through 44.

b. <u>Section 4.5.3 Site Inspection</u> - MADEP observed soil erosion caused by surface water runoff entering the site from a rip-rap swale. The swale has become silted in due to soil erosion from an up-gradient source. Additionally, orange stains are visible at groundwater breakouts at the toe of slope near Cold Spring Brook wetland at AOC 57. This staining is typical of bacteria degradation of hydrocarbons. This should be noted. MADEP has some concerns with the remedy and cannot agree that it is operating properly and successfully until there is sufficient evidence that the source of the staining is not the biological degradation of hydrocarbon contamination associated with AOC 57 Area 2 and impacting the wetlands ecosystem.

The noted information pertaining to the swale and staining observations was included. Additional details of wetland inspections are included in the Wetland Protection Section of the Remedy Implementation (4.3.5).

c. <u>Section 4.5.4 Interviews</u> – Please rewrite this section to note the determination has not been made for OPS, comments regarding the erosion and staining were made to during the Site Inspection and the remedy for this AOC is not MNA.

The OPS statement and the MNA language was removed. Information pertaining to the erosion and staining was included.

3. **AOC 43G & J**

a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR

Please refer to response to EPA comments 45 through 60.

b. <u>Section 5.7 Issues</u> - The information provided in the report on this site does not support the conclusions of the "Protectiveness Statement". Concentrations of COCs are not decreasing and the plumes appear to be expanding off-site. Please give recommendations for follow-on actions the Army will undertake to address these issues.

Reconsideration to the protectiveness statement was performed based on the findings of this review. Recommendations were made accordingly.

5. **SPIA**

a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR

Please refer to the EPA comments 61 through 74.

b. MADEP requested information as a comment to the 2000 FYR regarding the Natural Resource Management Plan that was required by the SPIA ROD. This Plan has not been received. Please provide a copy of this Plan for review.

Please refer to EPA comment 61.

c. AOC 26 groundwater results indicate increasing amounts of RDX in MW 26M-92-04, as shown on the attached charts.

Comment noted. Information pertaining to RDX at AOC 26 was included in the report.

d. Groundwater concentrations of RDX have been reported as 400 ppb in MW 26M-92-04. The MADEP is concerned over the appearance of elevated RDX in groundwater MWs 26M-92-03X, 26M-92-04X and 26M-97-08X located on AOC 26. MW 26M-92-03X in 2002 showed a high.

Comment noted. Information pertaining to RDX at AOC 26 was included in the report.

e. RDX concentration of 270 ug/l and monitoring well 26M-92-04X has shown high levels since 1993 and most recently in 2004 a concentration of 270 ug/l. It should be mentioned that well 26M-92-08X located the furthest down gradient from AOC 26 is showing a concentration range from 29 ug/l in 1997 to 46 ug/l in 2004, with the highest concentration level recorded in 2002 of 66 ug/l. The contaminant plumb of residual explosives is moving with groundwater in a northwest direction and may have impacted surface water and ecological resources in Slate Rock Brook and Cranberry Pond or may have migrated under Slate Rock Brook and off the property boundary of the SPIA.

Comment noted. Information pertaining to RDX at AOC 26 was included in the report.

f. Section 6.6 Technical Assessment Question B - MADEP has published new draft standards for RDX and HMX. The proposed Method 1 Standards are 0.8 ug/l and 8 ug/l respectively for GW-1 areas. The GW-1 set of standards would be the appropriate designation for the Main and North Posts at Devens. MADEP requests that these draft standards be included as To Be Considered, TBC, in the Technical Assessment - ARAR sections and discussions of application of these standards be included in Shepley's Hill Landfill where results in monitoring well SHL- 24 had relatively high levels of explosive residual and at CB-1 at AOC 40/SA 24.

This information was included in the Technical Assessment section.

g. Section 6.9 Protectiveness Statement - MADEP believes that the situation requires additional evaluation to determine if the plume has moved outside the limits of each site. This should include additional monitoring wells downgradient of the plume, an update of the groundwater model with fate and transport refinements, an adjustment of the LTMP to verify that groundwater discharge areas (wetlands, ponds or waterways and the associated ecosystems) and additional ecological investigations to ensure there are no unacceptable ecological impacts from the migration of residual explosive contaminants.

The potential for off-site migration is evaluated annually in the LTM report. This has been noted in the text.

6. **AOCs 32 & 43A**

a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR

Please see the detailed responses to the EPA Comments 75 through 86).

b. <u>Section 7.3.5 System Operation/Operations and Maintenance</u> - Groundwater Monitoring is not following the LTMP. Previous BCT meetings have discussed the need to re-evaluate the LTMP and then determine is the MNA remedy working. Monitoring Well 32M-01-18XBR is located immediately east of the former the waste oil storage tank # 13 and outside of the building footprint has continuously shown exceedances in groundwater for 1,2- dichlorobenzene, 1,3-dichlorobenzene, 1,4- dichlorobenzene and C9-C10 aromatic volatile petroleum hydrocarbon. Concentrations of 1,2- dichlorobenzene, 1,3- dichlorobenzene, 1,4- dichlorobenzene and manganese appear to be increasing in groundwater at monitoring well 32M-01-18XBR.

The revisions to the LTMP are now described in the "Issues" table in Section 7.7, and it is noted that recommended changes to the sampling plans will need to be reflected in this revised document. The Army is currently preparing a revised CSM and LTMP for this site under a contract to MACTEC Engineering and Consulting. The completion of these documents is scheduled for early Fall 2005.

It is noted that current documents showing maps of the site often have the label "UST EXCAVATION AREA" inside the footprint of the current warehouse. There is an associated arrow from the label to the former tank location, which is north, not east, of 32M-01-18XBR. The proximity to the building remains an issue, however, and the vapor intrusion study is also included as an "Issue" in the table in Section 7.7.

c. <u>Section 7.8 Recommendations for Follow On Actions</u>
MADEP recommends a more comprehensive evaluation of the regional groundwater regime, to include areas abutting these AOCs. There should be a strategy developed by the BCT to determining the adequacy of the present monitoring system and give recommendations for any additional monitoring is developed. Consideration should also be given to the replacement of groundwater monitoring wells in the building to ensure that adequate groundwater is available to monitor, nearer the source areas.

Additionally, evaluating the integrity of the bedrock monitoring well grout seals should be done. It appears that groundwater from the over burden may have entered the bedrock monitoring wells at 32M-01-14XBR, 43-01-16XBR, 43M-01-17BR and 43A-01-20XBR. The groundwater elevation differential between the overburden monitoring wells 32M-01-14XOB, 43-01-16XOB, 43M-01-17OB and 43A-01-20XOB and the bedrock wells noted above does not appear to be consistent.

The table of recommended follow-up actions now includes inspection and repair of wells at the site. The draft 2004 Annual Report has addressed possible contamination from shallow to deep wells at four well-pairs, and this review is now reflected in the Five Year Review in Section 7.5.2.3. Differences in well recovery rates at well pairs and differences in values of equilibration parameters indicate that there is no leakage between the deep and shallow wells. The requirement to consider sampling wells in neighboring land south-east of the site is noted as a requirement of the LTMP to be prepared (Section 7.8 table). A revised CSM (which will look at regional groundwater) is scheduled for completion early Fall 2005.

d. Section 7.9 Protectiveness Statement –
The issues with the LTMP and the possibility that there are problems with the MNA remedy should be put in the 'Issues' section, with recommendations outlined in the 'Recommendations' section with proposed follow up actions and milestones. At this time it does not appear that a Protectiveness Statement can be supported.

(See also the response to EPA Comment No. 85.) The Protectiveness Statement now notes the requirement to re-examine the MNA assumptions given current condition of the site, to update the LTMP, and to re-examine vapor intrusion requirements according to EPA guidelines. The milestone date for well repairs is given as October 2005: this is intended to prevent snow/sand/roadsalt intrusion.

7. **AOC 69W**

USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR

Please see the detailed responses to the EPA Comments 87 through 100.

8. **Devens Consolidated Landfill**

a. Section 9.6 Technical Assessment Question B To Be Considered - MADEP has published new draft standards for RDX and HMX. The proposed Method 1 Standards are 0.8 ug/l and 8 ug/l respectively for GW-1 areas. The GW-1 set of standards would be the appropriate designation for the Main and North Posts at Devens. MADEP requests that these draft standards be included as To Be Considered, TBC, in the Technical Assessment - ARAR sections and discussions of application of these standards be included in AOC 40/SA 24 results in monitoring well CB -1 had relatively high levels of explosive residuals. This should be follow up on.

Comment noted and will be considered in upcoming discussions with the BCT.

b. Section 9.5.3 Site Inspection – MADEP noted during the FYR Inspection that additional areas of erosion around the perimeter swale, as this is not included in the upcoming Operation and Maintenance Contract, it should be included.

Comment noted and will be considered in upcoming site inspections.

9. **AOC 50**

a. USEPA has made extensive comments about the form and content of this section of the FYR, MADEP will not reiterate them but does concur that major editing needs to be done in order to follow the USEPA Guidance and provide adequate detail and consistency throughout the FYR.

Please see the detailed responses to EPA comments 113 through 125.

b. Section 10.6 Remedial Action Performance – Please remove the statement that the remedy is operating properly and successfully, OPS. MADEP has indicated that there are two major concerns with the remedy: 1) persistence of arsenic and vinyl chloride outside the ORZs and 2) the existence of contamination upgradient of the cesspool, which seems out of line with the fluctuation pathway seen for the Northern Plume before it would consider this site to be operating properly and successfully. Additionally, the Army should consider Opportunities for Optimization and the possible need to enhance the SVE system with groundwater pumping to allow a larger and deeper efficiency for vapor extraction.

The OPS statement was removed. The MADEP's concerns were noted in applicable sections of the report. A statement regarding the SVE system was added in the Opportunities for Optimization section.

Policy FYR Sites:

There are several attachments covering our comments for sites and a FYR as a matter of policy; they are:

A. Summary of DEP's Concerns on the Draft No Further Action Decision Document (NFADD) dated August 2003 Lower Cold Spring Brook – Study Area (SA) 73.
B. A List of NFA Sites with Reservations. In most cases the requested work may have been completed by the Army or Mass Development, but the Comprehensive Guidance Five-Year Review, June 2001 indicates that ''as a matter of policy', FYR of sites where a removal action leaves hazardous substances, pollutants, or contaminants on a site above levels that allow for unlimited use and unrestricted exposure and where no remedial action has or will take place', therefore MADEP would like you to consider this list for review.
C. Results for explosive residuals in groundwater monitoring wells conducted in 1992 by the Army Environmental Center. In light of the new Method 1 GW-1 standards for RDX and HMX, we would like the Army to follow up with re-testing these wells to see if these contaminants are a potential problem.

Comments noted. Discussions pertaining to these comments are ongoing.

EPA Comments (Part 1 of 2) on the
Revised Draft 2005 Five-Year Review Report
Former Fort Devens
Devens, Massachusetts
Submitted Electonically August/September 2005

General Comments:

1. Community Involvement: EPA suggests that the Community Participation sections be removed from each of the AOC write-ups and relocated to a separate section of the FYR titled "Community Involvement and Participation". In each existing Community Participation section, refer the reader to the new section. A consolidated community involvement section will provide a better overall picture of the community activities. The boiler plate language that currently exists in the various community sections is generally outdated and not worth repeating over and over. In a few of the sections, there is some sparse site specific-information, but the site-specific information need to be expanded. The boiler plate language states: *"The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at AOC X."* There have been very few press release, fact sheets or newsletters over the past five years. It would be useful to count them and note them specifically. They can optionally be included in a Community Involvement and Participation appendix. The two boiler plate paragraphs on the Technical Review Committee and RAB are fine for the historical perspective, but there needs to be additional language that chronicles the history of the RAB since around 1995. There is no mention of co-chairs, particularly the inclusion of the Devens community representative; there should be at least one full paragraph about the role of PACE over the past several years; there is nothing about the base tours that have been organized over the past several summers; there is no discussion of meetings that have been held with local town officials. There could also be mention of the work by the RAB co-chairs to revise the Community Involvement Plan. Although a draft was never completed, a survey was produced and distributed which provided some information to the Army. There also needs to be some general discussion of community issues over the past several years. While the community point of view is not always captured in the RAB minutes, a review of past meeting minutes would be useful to catalogue the issues discussed at a minimum. Some issues that have been discussed in recent years include institutional controls, responsibilities for long tern O&M, and the related but separate issue of Devens disposition. The discussion to be held at the September 8th RAB should provide some additional text for a community participation section.
2. Minor formatting and grammatical errors remain in the document. Please ensure that grammatical errors are corrected in the Draft Final.
3. ARARs: In many of the ARARs sections, the change to the federal drinking-water standard (MCL) for arsenic is noted. Is it also relevant to note the corresponding change to the Massachusetts arsenic standard. (The state has adopted the federal MCL.)

Specific Comments:

Executive Summary and Introduction:

Comments will be provided by September 13, 2005.

AOCs 44 and 52: Barnum Road Maintenance Yards (OU4):

1. Section 2.3.2: Much of the detail of the remedial elements of the selected remedy was removed in this revised draft (contrary to EPA's Comments on the Draft FYR, Comment 4, 1st bullet, which requested details of remedial elements be included). At a minimum, replace the details of the Institutional Controls element.
2. Page 2-8, Section 2.3.2.4: Explain how the Installation Master Plan ensures that the ICs are complied with and provide supporting documentation, as per EPA Comments on the Draft FYR, Comment 2, last bullet.
3. Page 2-8, Section 2.3.4: Explain who is responsible for O&M of the drainage system and oil/water separator and how this O&M will be completed over the long-term.
4. Page 2-13, Section 2.9: To be consistent with the Protectiveness Statements detailed in the Comprehensive Five-Year Review Guidance, delete "and immediate threats do not exist" and replace with "and exposure pathways that could result in unacceptable risks are being controlled."

Shepley's Hill Landfill: AOCs 4, 5, and 18 (OU1):

5. Page 3-1, Section 3.1: Add the following milestones to the chronology table: Final Capping Closure Report, 1996; Final ESD, June 2005; RD/RA Work Plan Final 100% Submittal for the SHL Groundwater Extraction, Treatment and Discharge Contingency Remedy, May 2005; Start-up of the Treatment System, August 2005; and, Performance Monitoring Plan for SHL Groundwater Extraction, Treatment and Discharge Contingency Remedy, August 2005.
6. Page 3-6, Section 3.3.2: In the "Long Term Groundwater Monitoring" section, change "The ROD required development of plans for long term groundwater monitoring at Shepley's Hill Landfill to *alternative* performance ..." to, "... *evaluate* performance ...," or other appropriate wording.
7. Pages 3-8, 3-10, 3-13, 3-15, 3-16, 3-23, 3-24 and 3-25: The contract for the cap maintenance efforts planned for this fall is referred to on all of the listed pages, but the reference is not consistent throughout. In some places it is referred to as "Cap Maintenance Contract" and other places "Cap Maintenance and Repair Contract" and some references identify the "summer or early Fall of 2005" and some the "Fall 2005". Please make the reference to this effort consistent throughout the document. Do no include the word "Repair" in the reference, as the contract does not include cap "repair" efforts.
8. Page 3-8, 3-20 and 3-24: The discussion on the manganese cleanup level was included to address EPA General Comment 7 on the Draft FYR. As appropriate, where this is discussed in the FYR, specify **when** the manganese cleanup level will be revised based on the updated RfD value for water intake. On the bottom of page 3-20, the statement that a revised cleanup goal for manganese "...is being *considered* based on the updated RfD..." conflicts

with the language on the top of page 3-8 which states that the manganese cleanup level "*...will be revised* based on the updated RfD..."

9. Page 3-10 – 3-11: Under the "60 Percent Design" section, the 2nd paragraph cites the 100% design document, but does not include the date of the document or specifics regarding the development and implementation of the document. Since the development and implementation was a major work effort over the period of evaluation for the FYR, the report should include a few sentences summarizing major milestones in this effort with corresponding dates. In addition, this paragraph goes on to describe the ESD. Revise this information to specify that a Final ESD was issued in June 2005 and that the discharge will be going to the Devens POTW. A separate sentence indicating that the Army is evaluating on-site discharge options for the future could be included, but it is premature to identify this as a possibility in the FYR. On-site discharge was not addressed in the ESD and, if pursued, another ESD would need to be completed.
10. Page 3-11 – 3-12, Section 3.3.4: The bulleted list of items covered by the Supplemental Groundwater Investigation might also note that the study included a preliminary evaluation of various remedial alternatives, utilizing the groundwater flow model.
11. Page 3-13 – 3-14, Section 3.4: The last paragraph of this section refers to the 100% design document and the ESD. Again, as stated in the comment above, the 100% design document was a major work effort over the FYR evaluation period. Revise this section to include additional details and dates on this effort. The ESD is now final and does not allow for on-site discharge. Update consistent with comment 9, above. Also, a discussion of the development of the Performance Monitoring Plan and a summary of the purpose and requirements of this plan should be included in this section.
12. Page 3-15, Section 3.5.2: As per EPA Comments on the Draft FYR, Comment 4, last bullet, EPA requested a relevant table presentation of historical data and data for the evaluation period. A table of 2004 data showing Arsenic exceedances is included on page 3-17.
13. Page 3-16: With respect to ICs, there is a reference that the ICs for SHL are "included in the Lease In Further*ance of* Conveyance currently in affect for SHL". Explain how this document implements ICs and, as per EPA Comments on the Draft FYR, Comment 2, last bullet, copies of documents demonstrating implementation of ICs must be included in the FYR.
14. Page 3-17, Section 3.5.5: See General Comment 1. The section on community participation provides a general statement regarding current community involvement. In the new community involvement section, update this information to include site-specific information related to the current efforts to implement the contingency remedy. What specific involvement has the community had in the decision process for design and construction of the pump-and-treat remedy, accompanying performance monitoring, etc.?
15. Page 3-19: In the paragraph regarding the extraction, treatment and discharge system and the ESD, revise and supplement this information consistent with comments 9 and 11 above.
16. Page 3-20, 2nd Paragraph, Last Sentence: This sentence includes a recommendation for re-sampling of well SHL-24 for explosives constituents. This recommendation needs to be incorporated into Section 3.8 and the corresponding table.
17. Page 3-20: In the "Changes in Exposure Pathways" section,
    - 1st paragraph, the 4th sentence indicates that the Town of Ayer by-law "requires a permit to install a water supply well" versus the language on page 3-10 indicated that the Town of Ayer "restricts private groundwater supply wells downgradient of SHL". The

MADEP comment on the Draft FYR was consistent with the former description requiring a permit. The EPA was under the impression that Ayer had a prohibition on the installation of private drinking water wells in the area downgradient of SHL. A prohibition, rather than a permitting requirement, or in addition to a permitting requirement would be the better safeguard that permitting alone. Please clarify Ayer's requirements on this issue and update the document as appropriate.

- 1st paragraph, the last sentence states, "There is no indication that hydrologic/ hydrogeologic conditions are not adequately characterized." It may be appropriate to state something to the effect that further characterization associated with implementation of the contingency remedy (including development of the performance monitoring network) has not led to significant changes in the conceptual model for the SHL hydrogeologic/hydrogeochemical system. However, EPA believes that there are substantial open questions, and those are, at least in part, motivation for the upcoming CSA/CAAA study. Please revise this statement to indicate that characterization is ongoing, and the overall adequacy is yet to be determined.
- There is no mention of a trespasser exposure pathway (or that it will be addressed in the CSA/CAAA) as requested by MADEP in their comment 2.j. This section should include a discussion that this pathway (hiking student trespasser) was not addressed in the original risk assessment and how it is being addressed (i.e. CSA/CAAA, or fencing, etc.).

18. Page 3-23, 3rd Para: Consistent with Comments 9 and 11 above, revise the discussion on the treatment system and ESD.

19. Page 3-23, Section 3.7: As per the EPA Comments on the Draft FYR, Comment 2, 6th bullet, the "Issues" should be presented as shown in Exhibit 4-3 of the Comprehensive FYR Guidance.

20. Page 3-23, Last Para: Revise the last sentence to indicate that the EPA Study in planned "to begin" in September 2005.

21. Page 3-24, Section 3.8: Include a discussion in the narrative regarding the start-up of the treatment system. Paragraph 4, 1st sentences indicates that the semi-annual LTM will be conducted by the treatment system contractor. What is the purpose of this statement here? With respect to the discussion in Paragraph 4 of the PMP, why are only 4 wells listed? A more detailed summary of the purpose and requirements of the PMP should be included here. Paragraph 5 indicates that corrective actions outlined in the Draft Cap Drainage Report should be implemented. This report was an internal Army report that was not released to the regulatory agencies or the public. The FYR should detail the corrective actions. The section should be clarified to explain whether all of the corrective actions will be address by the Cap Maintenance Contract effort. If not, unaddressed corrective actions should be included in the table with milestone dates. The last paragraph indicates that the CSA/CAAA "will determine the need for additional gas vents" and then indicates that "additional gas probes will be installed….as part of the cap maintenance work". These statements seem to contradict. Please clarify.

22. Page 3-24, Section 3.8: It is noted that the specific analytes listed here (cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, BOD_5, and cyanide) as deemed not to contribute to site risk or understanding of groundwater chemistry is not consistent with that given on page 3-18, section 3.6. Please check for internal consistency. EPA reiterates that Cd, Cr, Pb, and Hg, in particular, are of interest with respect to sediment in adjacent Plow Shop Pond, as noted in the document, and further discussion will be necessary with regard to dropping analytes from the SHL LTM program.

23. Page 3-25, Table: Since the Cap Maintenance efforts are required to maintain the integrity of the cap and the CSA/CAAA is required to determine a final remedy for SHL, these items should be characterized with a "Y" in the last 2 columns, as these actions do affect the protectiveness.

AOC 57(OU09):

24. Page 4-1, Title: AOC57 is a statutory review, not a policy review, because it was a post-SARA remedial action that will leave contaminants on site above levels that allow for unlimited use.

25. Page 4-1, Section 4.1: Since the AOC57 ROD was not signed until after the 2000 FYR, do not include the 2000 FYR in the chronology for this site.

26. Page 4-5, Section 4.3: The brief summary of the remedies selected for Areas 2 and 3 should include groundwater and surface water monitoring.

27. Page 4-5, Section 4.3: The text refers the reader to sections 4.3.1 and 4.3.2 for details of the remedies. It appears that this pointer should be to sections 4.3.3 and 4.3.4. Please check for consistency.

28. Page 4-7, Section 4.3.3: The tables show that the cleanup level for (EPH) C11-C22 aromatic hydrocarbons for Area 2 is 200 mg/kg, while that for Area 3 is 930 mg/kg. Please check for consistency with the ROD. If correct, please add text to explain the rationale for the different cleanup levels.

29. Page 4-8, Section 4.3.4: As per EPA Comments on the Draft FYR, Comment 4, bullet 1, it was requested that details of the remedial elements as specified in the ROD be included in the FYR. The Draft FYR for AOC57 did include the details, but they have been removed in this revised draft.

30. Page 4-10, Section 4.3.5: Elsewhere in the document (e.g., p. 4-13, sec. 4.3.5.2), it is noted that four sumps were installed in the collection trench in Area 2. Is regular servicing of these sumps an element of the remedy and/or LTMP? If so, this does not appear to be stated anywhere in the description of the elements of the remedy or of the LTMP. Please revise for completeness.

31. Page 4-10, Last Para – 4-11, Paras 1-6: The discussion in the last paragraph of page 4-10, which continues on page 4-11, reports "Wetlands Protection" information. The information is useful, but likely cut-and-pasted directly form an Annual Report and needs to be revised for clarification in the context of the FYR. The year needs to added throughout the discussion to be clear on when the different observation/activities occurred. In addition, there is discussion of an issue in 2004 of "uncontrolled erosion and sedimentation" that resulted in "erosion within the drainage swale and deposition of fine silt within the wetland and covering of vegetation" within AOC57 and discussion of findings, in May 2005, that "the silt had directly impacted the restored wetland". The resolution of these issues is not reported on nor is this issue identified for follow-up in Sections 4.7 and 4.8 of this Chapter. Please clarify.

32. Page 4-11, Last Para: Explain how ICs are "currently in effect at AOC57". As per EPA Comments on the Draft FYR, Comment 2, last bullet, copies of documents demonstrating implementation of ICs must be included in the FYR.

33. <u>Page 4-12, 2nd Para:</u> The LTMP is referred to as "approved". Change to "draft".
34. <u>Page 4-12, Section 4.3.5.1, 1st Para:</u> Should the 2nd sentence refer to "designated sentry wells" rather than "any of the designated monitoring wells"? In addition, as per EPA Comments on the Draft FYR, Comment 28, provide a reference for the performance standards discussed here.
35. <u>Page 4-13, Section 4.3.5.2:</u> The title of this Section should be revised to delete the term "Groundwater". The Draft AOC57 LTMP covered not only groundwater monitoring, but also surface water monitoring, wetland inspections and IC inspections. Also, this section is confusing. It starts out with a sentence on the submission of EPA comments, without introducing the issuance of the Draft LTMP. Then, it includes several sentences regarding Low-Flow Sampling Procedures, which seem out of place. The remainder of the section is presented as a summary of the Draft LTMP. The 2nd paragraph of the section seems to summarize the total sampling program and, following, there are breakdowns on what is required in Area 2 versus Area 3. However, it is not specified that these are the breakdowns, not something in addition to what is presented in the summary paragraph. Finally, there is no discussion of the wetland and IC elements of the Draft LTMP, there is no reference to a figure depicting the wells identified, no indication of which wells are sentry wells, and there is no discussion of how the data will be used to confirm that the remedy is operating effectively.
36. <u>Page 4-14, Section 4.5.2:</u> If, during the period of updating the Revised FYR, the Draft 2004 Annual Report is issued, update the reference here.
37. <u>Page 4-17, Section 4.6:</u> As per EPA Comments on the Draft FYR, Comment 40 (last sentence), provide details in this section of how groundwater data is being interpreted to show that cleanup levels will be met in 30 years and COCs are not migrating off the property.
38. <u>Page 4-17, Last Para:</u> The last sentence indicates that the Army will prepare an OPS "for the LTMP". Revise to refer to AOC57.
39. <u>Page 4-18, 3rd Para:</u> The "Early Indicators" paragraph appears to be cut-and-pasted from an Annual Report. Please clarify.
40. <u>Page 4-18, 4th Para:</u> The ICs paragraph indicates that ICs are "in effect". Please explain how ICs are implemented.
41. <u>Page 4-18, Question B:</u> In the section entitled "Changes in Standards and To Be Considered", change the reference from Section 4.6.1 to Section 4.6.2 since Section 4.6.1 does not contain a discussion of changes in ARARs/TBCs. In the 2nd paragraph of this section, why is the ESD approval referred to as "conditional"?
42. <u>Page 4-19, 2nd Para:</u> The exceedance of the criteria continuous concentration (CCC) for lead and cadmium should be discussed further. Since the lead and cadmium water quality criteria are expressed as dissolved concentration, not total concentration, please specify whether the sample results were for total or dissolved concentrations. Exceedances are more likely if the samples were analyzed for total metals rather than dissolved metals. If both total and dissolved were measured, discuss the differences between the results, if any. On the other hand, the criteria used for the comparison are based on water hardness of 100 mg/l. The criteria would be lower if the hardness of the surface water is lower than 100 mg/l. EPA suggests that a statement be made in this section that uncertainties concerning the potential exceedance of water quality criteria will be reduced by monitoring and evaluation of total

and dissolved metals and hardness in the future. This recommendation should then be linked to the related recommendation in Section 4.8 (last sentence of Section 4.8).

43. Page 4-22, Section 4.8: The recommendations listed in Section 4.8 should be presented as shown in Exhibit 4-4 of the Comprehensive Five-Year Review Guidance, including milestone dates. The finalization of the LTMP should also be included in this Section.

44. Page 4-22, Section 4.8: The document recommends, "...that the reducing conditions observed at AOC57 be assessed by the Army by plotting and contouring arsenic concentrations, as well as ORP and DO." These steps are endorsed, as they would provide valuable insight into the spatial distribution of conditions favorable to the mobility of arsenic in groundwater. The text also states "The assessment would include determining the cause of the reducing conditions, by evaluating the relationship between arsenic levels and DO/ORP." It is not clear how this relationship would elucidate the *cause* of the reducing conditions; rather, elevated As is caused by low DO/ORP, which results in dissolution of ferric oxyhydroxides, mobilizing sorbed arsenic and other trace metals. It may be useful to seek a relationship between hydrocarbon levels and DO/ORP; a correlation (i.e., elevated hydrocarbons associated with low DO/ORP) may be suggestive of a causal relationship. That is, microbial utilization of the hydrocarbons as an electron donor and DO and other species as electron acceptors can cause low DO/ORP.

AOCs 43G and 43J (OU06):

Comments will be provided by September 13, 2005.

South Post Impact Area, AOCs 25, 26, 27, and 41 (Groundwater) (OU03):

Comments will be provided by September 13, 2005.

AOCs 32 and 43A (OU05):

45. Page 7-1, Section 7.2.1: The text states, "UST #13 and the remainder of AOC 32 appear to be in separate groundwater regimes." Please elaborate on this statement. The UST was on a bedrock knob and near a groundwater divide, so that flow in the area was divergent. Is this the basis for the statement? Also, please expand the text to clarify that this statement refers to the original groundwater configuration, which is now altered substantially

46. Page 7-2, Section 7.2.1: This section does not include a discussion of the MNAA for AOC 32 (refer to SWETS 2000b). [Section 7.2.2 includes a discussion of the MNAA for AOC 43A.]

47. Page 7-3, Section 7.2.2: A separate sub-heading should be added for the discussion of the redevelopment and new monitoring well installation since this is applicable to both AOCs.

48. Page 7-3, Section 7.3: Change the word "Outcomes" to "Objectives".

49. Section 7.3: As per EPA Comments on the Draft FYR, Comment 4, bullet 2, a table of COCs and cleanup levels should be provided in this section.

50. Section 7.3.3: As per EPA Comments on the Draft FYR, Comment 4, bullet 1, details of the remedial elements of the selected remedy should be included in this section.

51. Section 7.3.4: As per EPA Comments on the Draft FYR, Comment 78, bullet 3, a discussion of the RA completion for the soils component (Final Soils Remedial Action

Operable Unit Completion Report, Soil, Asphalt, and Debris Removal at AOC 32, January 2000) should be discussed in this section.

52. Page 7-6, MNAA Section: This section does not include a discussion of the MNAA for AOC 32 (refer to SWETS 2000b).
53. Page 7-6, MNAA Section, 2nd Para: This paragraph refers rather broadly to two wells showing exceedances of organic contaminants, and two wells showing exceedances of inorganics in 1999. Please add more specific information, including the principal compounds and/or elements that were in exceedance, and the maximum concentrations observed. This will provide an important basis for comparison at a forthcoming point in the document, when current conditions are discussed. Also, note the reference omitted at the end of this paragraph.
54. Page 7-6 – 7-7: The bullet at the end of page 7-6 refers to 13 wells. The 3rd bullet on page 7-7 refers to 14 wells and then refers to 26 wells. Please clarify.
55. Page 7-7: This second bullet on this page advances recommendations for monitoring on adjacent property and in the neighborhood of 32M-01-18XBR. The other bullets in this list present results of monitoring from 2002 to 2004, rather than recommendations for adjustments to the monitoring program. Perhaps this bullet should be relegated to a section more clearly intended to forward recommendations (e.g., Section 7.8). Also, the latter portion of this bullet argues that a well close to 32M-01-18XBR is recommended for elimination from the monitoring program, and that, therefore, "... sampling ... farther to the south would not provide useful chemical data ... ." This rationale is not clear, and should be developed further if this recommendation is to be included in the document (whether in this or some other section).
56. Page 7-7, Last Para: As per EPA Comments on the Draft FYR, Comment 2, last bullet, provide a copy of the deed.
57. Page 7-8, Section 7.4: In addition for the recommendations of the 1st FYR, this section should include the status of recommendations and follow-up actions and results of implemented actions.
58. Section 7.4: This section needs to include an analysis of the data with reference to wells in Figures to support the statements on page 7-14 and 7-16 that off-site migration is not occurring.
59. Page 7-13, Section 7.5.5: See General Comment 1. The section on community participation gives some detail through the FS in 1997, followed by a rather broad, general outline of public involvement at present. In the new section, address any specific community participation there has been with respect to the changes in site use since the FS (e.g., development of a LTMP, property transfer, grading and construction on the site, replacement of monitoring wells, etc.)?
60. Page 7-19, Section 7.8: Note in this section that the sampling/analyte recommendations discussed in this section will be addressed via the planned update of the LTMP. While there is undoubtedly room to optimize the long-term monitoring, the specifics are somewhat premature, pending regulator review and discussion of the Army's revised conceptual model for the groundwater flow and contaminant transport pathways under current and projected (e.g., in response to proposed new construction) conditions.
61. Page 7-20, Section 7.9: Since Section 7.8 indicates that the protectiveness is affected by the proposed recommendations and follow-up actions, EPA proposes that the appropriate protectiveness statement at this time should be a "protective in the short term" statement –

"The remedy at AOC 32 and AOC 43A currently protects human health and the environment because ICs are incorporated into the deed that prohibit the extraction of groundwater from the site for industrial and/or potable use and contaminants are not migrating off-site. However, in order for the remedy to be protective in the long-term, the recommendations and follow-up actions detailed in Section 7.8 need to be taken to ensure long-term protectiveness."

AOC69W (OU07):

62. Page 8-1, Title: AOC69W is a statutory review, not a policy review, because it was a post-SARA remedial action that will leave contaminants on site above levels that allow for unlimited use.
63. Page 8-1, Section 8.1: Include the same level of detail for the 1978 leak as is included for the 1972 leak for consistency. Include the submission of the Draft OPS document in the chronology.
64. Page 8-6, Section 8.3: Clarify in the text that the information presented in this section is taken from the ROD.
65. Section 8.3: As per EPA Comments on the Draft FYR, Comment 4, bullet 2, a table of COCs and cleanup levels should be provided in this section.
66. Page 8-7: As per EPA Comments on the Draft FYR, Comment 93, move the details of the LTMP to the "Remedy Implementation" section, rather than the "Selected Remedy" section.
67. Page 8-7, Section 8.3.2: The last paragraph on this page indicates that MassDevelopment is the current property owner. This property has not been transferred to MassDevelopment to date. This section needs to incorporate additional information on how ICs are implemented and enforced.
68. Page 8-8, Section 8.5.2: If, during the period of updating the Revised FYR, the Draft 2004 Annual Report is issued, update the reference here.
69. Page 8-9, Table 8-2: The "*" notation to the footnote seems to be placed in the wrong places in the table. If it is related to data from the period May 2000 to May 2003, it would seem the "*" should be included in the first 4 columns. The footnote should include both paragraphs under the table. The table is titled a "Summary of Exceedances", but appears to be a table of all data for the FYR evaluation period.
70. Page 8-10: The 2nd paragraph, which begins "Recommendations", is confusing. Please clarify.
71. Page 8-10: With respect to ICs, there is a reference that the ICs are "included in the Lease In Furtherance *of* Conveyance". As per EPA Comments on the Draft FYR, Comment 2, last bullet, copies of documents demonstrating implementation of ICs must be included in the FYR.
72. Page 8-11, 1st Para and Page 8-16, Section 8.9, 1st Para: Please update these paragraphs to indicate that the Draft OPS demonstration document was submitted.
73. Page 8-11, 2nd Para: Provide more detail on the planned transfer.
74. Page 8-12, Section 8.6: The 1st paragraph of "Remedial Action Performance" indicates that "goals include meeting groundwater cleanup levels in less than 30 years". The ROD does not specify 30 years for groundwater cleanup. Was this reference from another document? In the 1st sentence of the 2nd paragraph, what is meant by the reference to "off-site migration"? Please clarify.

75. Page 8-13: Under the "Changes to Exposure Pathways" section, the 5th paragraph indicates that "A site-specific assessment is recommended to determine whether the exposure pathway is complete, including evaluation of measures subslab soil gas and (if warranted) indoor air concentrations, and/or site-specific mathematical modeling." This recommendation needs to be included in Section 8.8, with a corresponding milestone date.
76. Section 8.5.2 and Section 8.6: As per EPA's Comments on the Draft FYR, Comment 96, the document needs to include an analysis of the data trends to support the conclusions that contaminants are decreasing over time and not migrating off-site. See related comments on the Draft OPS issued by EPA on August 18, 2005.
77. Page 8-16, Section 8.8: As per EPA's Comments on the Draft FYR, Comment 100, the planned transfer of the property should be discussed, along with plans for ensuring that ICs are adequately addressed.
78. Page 8-16, Section 8.9: To be consistent with the Protectiveness Statements detailed in the Comprehensive Five-Year Review Guidance, revise the statement to read "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."

Landfill Consolidation, AOCs 9, 11, and 40, SAs 6, 12, 13, and 41 (OU02):

Comments will be provided by September 13, 2005.

AOC 50 (OU08):

Comments will be provided by September 13, 2005.

EPA Comments (Part 2 of 2) on the
Revised Draft 2005 Five-Year Review Report
Former Fort Devens
Devens, Massachusetts
Submitted Electronically August/September 2005

General Comments:

1. Many of the references within the document to other sections in the document were incorrect, likely as a result of the substantial revisions made to the document. Where found, EPA has made a specific comment to address these reference errors. However, please complete a thorough check of internal references for the Draft-Final report to ensure that the references are correct.

Specific Comments:

Introduction and Executive Summary:

1. **Ensure that any requested changes to the recommendations and/or protectiveness statements per specific comments on the specific OU sections are reflected in the Executive Summary.**
2. Page 1 of Introduction: Since SHL had a FYR in 1998, refer to this as the "second *comprehensive* five-year review". Change the end date of the review to "September 2005".
3. Page ES-1: Since SHL had a FYR in 1998, refer to this as the "second *comprehensive* Five-Year review".
4. Page ES-2, SHL, 2nd Para: Delete the statement "operation depends on final selection and approval of system effluent discharge location" and indicate that the system is discharging to the Devens POTW. Revise the reference to the ESD to cite to the Final ESD. Revise the last sentence to indicate that "*Alternate* discharge options.....are currently under evaluation by *the Army and* the regulatory agencies."
5. Page ES-4, AOCs 43G and 43J, 2nd Para: It is stated here that arsenic, manganese and iron at AOC 43J are above cleanup goals at sentry wells. Page 5-22 stated that the wells showing exceedances of arsenic and iron were not downgradient/perimeter wells. A clarification on this was requested in specific comment 21 below. Please clarify here also.

AOCs 43G and 43J (OU06):

6. 5-2, Section 5.2: Change reference to "5.1.1 and 5.1.2" to "5.2.1 and 5.2.2".
7. Page 5-4, Section 5.3: Change reference to "5.2.1 and 5.2.2" to "5.3.1 and 5.3.2".
8. Page 5-4, Section 5.3; Page 5-25, Section 5.6; and Page 5-28, Section 5.8: The discussion on the manganese cleanup level was included to address EPA General Comment 7 on the Draft FYR. As appropriate, where this is discussed in the FYR, specify **when** the manganese cleanup level will be revised based on the updated RfD value for water intake. Language on page 5-4, which indicates that "the Army *will*

consider establishing a new RG for manganese", contradicts language on page 5-28, which recommends the "risk-based remedial goal for manganese *be updated*". Please clarify.

9. Page 5-5, Section 5.3.4: The details of the remedial elements of the selected remedy were removed in this revised draft (contrary to EPA's Comments on the Draft FYR, Comment 4, 1st bullet, which requested details of remedial elements be included). The language in this section is now duplicative of the language in Section 5.3.3. Note that the reference to "sub-section 5.3.2" should be changed to "5.3.5".
10. Page 5-6, Section 5.3.5: The references at the end of the 2nd sentence should be changed to "(SWETS, 1999a, 1999b)".
11. Page 5-6, Section 5.3.5: It should be noted here that, although modeling and extrapolation of data trends performed for the MNA assessment indicated that the target cleanup timeframe would be met, there were also some ambiguities noted even at that time, including the apparent recalcitrance of heavier hydrocarbon fractions and a highly uncertain timeframe for the evolution of redox conditions (and, correspondingly, inorganics concentrations). These observations have been further reinforced by subsequent LTM results, as summarized in later sections of this chapter.
12. Page 5-10, Section 5.3.6.1: Provide a reference for the performance standards information presented here. In the 3rd paragraph, change the reference to "5.3.2.3" to "5.3.6.3". Also, please provide the meaning for the acronym "BIRA".
13. Page 5-11, 3rd Para: Change reference to "5.3.2.3" to "5.3.6.3".
14. Page 5-11, Section 5.3.6.3: Provide a reference to a figure, to be included in the appendix, showing the LTM monitoring well network.
15. Section 5.5.2: Page 5-14 and 5-15 identifies C5-C8 and C9-C10 cleanup goals and exceedances for AOC 43G. Page 5-18 identifies C5-C8 and C9-C10 cleanup goals and exceedances for AOC 43J. Sub-sections 5.5.2.1 and 5.5.2.2 state that the cleanup values are "as developed in the ROD (unless otherwise noted)". However, Section 5.3.6.2 states that "RGs within the plume are not established for VPH" and the "Army uses the MCP GW-1 concentrations for …VPH boundary performance standards". Therefore, it appears that the "cleanup goals" identified in Section 5.5.2 are not RGS established by the ROD, but rather goals related to the VPH boundary standard. Please clarify. In addition, ethylbenzene is a COC with an RG (Section 5.3.1) for AOC 43G, but it is not discussed in this section and carbon tetrachloride is a COC with an RG (Section 5.3.2) for AOC 43J, but it is not discussed in this section. Please clarify.
16. Page 5-14, Section 5.5.2.1: The bullets following the C5-C8 Aliphatics table might note that the 2004 analyses suffered from problems with the laboratory detection limits, which are higher than the cleanup goal for the source-area wells. Thus, no conclusions can be drawn with respect to changes in this VPH fraction for 2004.
17. Page 5-14, Section 5.5.2.1: The second bullet following the C5-C8 Aliphatics table should acknowledge that there was an exceedance of the cleanup goal at sentry well XGM-94-04X in 2000.
18. Page 5-16, Section 5.5.2.1: Note in this section that the regression analysis was performed only for benzene, and other COCs do not show the same demonstrable decline.

19. Page 5-21, Section 5.5.2.5: Change reference to "5.3.3.1" to "5.3.6.1".
20. Section 5.2.2: The phrase "for some time" is used numerous times throughout this section to describe the timeline that different COCs are likely to persist above cleanup levels. One of the performance standards detailed in Section 5.3.6.1 is related to whether COCs will be reduced to cleanup levels within 30 years. As per EPA's Comment on the Draft FYR, Comment 51, this report should identify where the remedy is not meeting RAOs and identify measures to address deficiencies where appropriate. There needs to be an analysis of whether the "Remedial Duration Assessment" performance standard is being met or, at a minimum, a commitment to perform an analysis as a follow-up to the FYR. If it is a follow-up action, it must be included in Section 5.8, with a corresponding milestone date.
21. Page 5-22, Section 5.5.2.5: Throughout this section on "AOC 43J" it is indicated that well 2446-04 is "not considered a down gradient/perimeter well" with respect to discussions related to iron and arsenic exceedances. This well is designated in Section 5.2.2 as a "sentry well". Please clarify.
22. Page 5-23, Top Para: Damaged wells are discussed here. Well XGM-97-11X, one of the wells discussed here, is not listed in Section 5.3.6.3 as a LTM well. Please clarify.
23. Page 5-24, Section 5.6: The IC section indicates that ICs will be covered by the Installation Master Plan. EPA's Comments on the Draft FYR, Comment 55, had discussed that ICs should possibly be considered to ensure groundwater is not used for potable water until RGs are achieved. Add additional information in this section to identify how exposures will be prevented without ICs (i.e., how the Installation Master Plan will address this) or consider proposing the implementation of ICs at this site. Reflect follow-up actions in Section 5.8, as appropriate (with milestone dates).
24. Section 5.7 and Section 5.8: With respect to manganese, page 5-22 of the FYR indicates that "manganese (above the cleanup goal of 291 ug/L) may be migrating off AOC 43G and AOC 43J". The elevated manganese levels are likely the result of fuel degradation causing reducing conditions and mobilizing metals. The downgradient extent of these effects is not well studied or understood, nor is the time scale over which redox conditions might recover following depletion of source-area carbon. There needs to be a more concerted look at this specific issue with reference to all available data (field parameters, associate Fe concentrations, etc.), taking into account such variables as turbidity, which can affect these results. EPA requests that the "Issues" section discuss the manganese results in more detail and explain the redox conditions that are the likely "source" of the metals. Further, EPA requests that Section 5.8 include a recommendation, with corresponding milestone dates, for evaluating the potential off-site migration of manganese. The Issues section must also address the nature of the properties downgradient of AOC 43G/J with respect to the potential that groundwater in these downgradient properties could be used as drinking water. If it is clear that downgradient groundwater is not being used as drinking water, the protectiveness statement can remain as is (simply address specific comment 26 below). If there is the potential that downgradient groundwater could be used as drinking water, the Army should revise the protectiveness statement.

25. Section 5.8: The recommendations listed in Section 5.8 should be presented as shown in Exhibit 4-4 of the Comprehensive Five-Year Review Guidance, including milestone dates.
26. Page 5-29, Section 5.9: To be consistent with the Protectiveness Statements detailed in the Comprehensive Five-Year Review Guidance, delete "and immediate threats are addressed" and replace with "and exposure pathways that could result in unacceptable risks are being controlled."

South Post Impact Area, AOCs 25, 26, 27, and 41 (Groundwater) (OU03):

27. Page 6-4, Section 6.2.1.5: EPA specific comment 63 is not adequately addressed. The first paragraph of section 6.2.1.5 now uses the term "cleanup standard" for manganese in groundwater. There is no cleanup standard in groundwater. Please accurately identify the manganese criterion that is being used here (screening level, cleanup goal, etc.).
28. Page 6-6, Section 6.2.2.5: EPA specific comment 65 is not adequately addressed. The first paragraph of section 6.2.2.5 now uses the term "cleanup standard" for manganese in groundwater. There is no cleanup standard in groundwater. Please accurately identify the manganese criterion that is being used here (screening level, cleanup goal, etc.).
29. Page 6-12, Section 6.3.2: It is indicated that the Army is currently finalizing the Integrated Natural Resources Management Plan (INRMP). Include this in Section 6.8, with a corresponding milestone date.
30. Page 6-16, Section 6.6 and Page 6-18, Section 6.6.2: Section 6.2.2.2 and Section 6.2.3.2 indicate that constituents were detected in surface water above Ambient Water Quality Criteria. EPA's Comments on the Draft FYR, General Comment 6, was not addressed here. Section 6.6, under "Changes in Standards and To Be Considered" and in Section 6.6.2 on ARARs, must be revised to address EPA National Water Quality Criteria. Please indicate that NRWQC are ARARs, and discuss whether the concentrations in surface water detected during the RI or subsequently exceeded current NRWQC. Discuss whether this affects the protectiveness of the remedy.
31. Page 6-16, Last Line: Change reference to "6.6.1" to "6.6.2".
32. Page 6-19, Section 6.7 and Section 6.8: In this section and in other areas of the report, it is indicated that "there is a potential for RDX to migrate off the boundary of AOC 26". Page 3-1, Section 3.1, of the LTMP (SWETS, 1997), states, with respect to five-year site reviews, that "If there is indication of contaminants emanating from the SPIA-monitoring area, the Army will evaluate the need for additional assessment." Section 6.8 recommends that "RDX at the SPIA continue to be monitoring and evaluated for potential off-site impacts in the LTM Annual Reports." EPA believes that the requirements of Section 3.1 of the LTMP requires a more active assessment of the RDX issue than is proposed in Section 6.8 of the Draft FYR via the LTM Annual Reports. Include a recommendation in Section 6.8 for an assessment related to potential off-site migration of RDX from AOC 26, with a corresponding milestone date. The Issues section must also address the nature of the properties downgradient of AOC 26 with respect to the potential that groundwater in these downgradient properties could be used as drinking water. If it is clear that

downgradient groundwater is not being used as drinking water, the protectiveness statement can remain as is (simply address specific comment 34 below). If there is the potential that downgradient groundwater could be used as drinking water, the Army should revise the protectiveness statement.

33. Page 6-19, Section 6.8: The recommendations listed in Section 5.8 should be presented as shown in Exhibit 4-4 of the Comprehensive Five-Year Review Guidance, including milestone dates.
34. Page 6-20, Section 5.9: To be consistent with the Protectiveness Statements detailed in the Comprehensive Five-Year Review Guidance, delete "and immediate threats do not exist" and replace with "and exposure pathways that could result in unacceptable risks are being controlled."
35. Page 6-20, Section 6.9: To address EPA's Comments on the Draft FYR, Specific Comment 74, language was added which indicates that the risk assessment assumptions for this location addressed "potable use on a limited basis by a small, healthy population (by soldiers, during short-term military training exercises)." Provide a reference here to the risk assessment and include the reference in the reference section. In addition, in Section 6.5.2, provide a review of the monitoring data for the supply well over the FYR period to verify that its chemistry is stable and consistent with the data considered in the risk assessment.

Landfill Consolidation, AOCs 9, 11, and 40, SAs 6, 12, 13, and 41 (OU02):

36. Page 9-21: The IC section indicates that ICs "are being incorporated into the revised DRFTA Master Plan" and, upon transfer to MD, ICs "will be incorporated into the deed." Some of these properties are the subject of a recent Final FOST and are likely close to transfer. Include the recommendation to incorporate ICs in the revised DRFTA Master Plan and the deed in Section 9.8, with corresponding milestone dates.
37. Page 9-21, Question B, 1st Para: Change reference to "9.8.1" to "9.6.2".
38. Section 9.8: The recommendations listed in Section 9.8 should be presented as shown in Exhibit 4-4 of the Comprehensive Five-Year Review Guidance, including milestone dates.

AOC 50 (OU08):

39. Section 10.3: As per EPA Comments on the Draft FYR, Comment 4, bullet 2, a table of COCs and cleanup levels should be provided in this section.
40. Page 10-4, Section 10.2.6: Change "10^{-1}" to "10^{-4}".
41. Page 10-5, Section 10.3.1: The text introduces a number of acronyms (e.g., ERD, IWS) here for the first time. Please provide the full terminology when it first appears in order to define the abbreviations.
42. Page 10-6, Section 10.3.1, IWS: The text refers to details to be specified in the Remedial Design, as if this is a forthcoming document. Please check the status of the RD, and correct the references to it accordingly.
43. Page 10-9, Section 10.5.2: In the data review and succeeding sections, there are no specific contaminant concentrations cited. Because the full-scale remedy was

initiated only at the end of the review period, there is little need to relate detailed performance data. However, a few words to indicate the magnitude of the contamination being addressed would enhance the section. For example, what are the maximum PCE concentrations observed in the source area, the North Plume, and the Southwest Plume domains during the characterization phase? (The text does refer to a specific high arsenic detection observed in the area of the ERD pilot test.)

44. Page 10-11, Section 10.5.5: See General Comment 1 of EPA Comments issued on 9/7/05. The text provides some detail on the public participation process for the Proposed Plan. Were other recent documents and decisions open to public input (e.g., the Remedial Action Work Plan, the Remedial Design, the Operations and Maintenance Plan, the Long-Term Monitoring Plan, etc.)? Please expand on any additional public participation in the "new" public participation section.

45. Page 10-12: Under the "Changes in Standards and To Be Considered" Section, revise reference "Section 10.6.1" to "Section 10.6.2".

46. Page 10-12: It is stated in the section entitled "Changes in exposure pathways" that there are no current complete exposure pathways. However, it is stated in Section 10.2 that the buildings on the property are "generally inactive". The risk assessment found that there was an unacceptable risk to future commercial/industrial workers due to vapor intrusion. Please clarify in section 10.2 whether there are any current exposure pathways for vapor intrusion.

47. Page 10-15, Section 10.7: Change the statement that a RAWP "has been finalized" to "is in the process of being finalized".

48. Section 10.9: Since the remedy is operating and not complete, the protectiveness statement should be changed to ".....expected to be protective upon completion, and in the interim, exposure pathways that could lead to unacceptable risks are being controlled."

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September 12, 2005

Mr. Robert Simeone
BRAC Environmental Office
30 Quebec Street, Unit 100
Devens, MA 01434-4479

Re: AOC 57 Draft Five-Year Policy Site Review
Areas 1, 2 and 3
Harvard, Massachusetts

Dear Mr. Simeone:

On behalf of People of Ayer Concerned about the Environment (PACE), Engineering & Consulting Resources, Inc. (ECR) reviewed the September 2005 Draft Five-Year Policy Site Review (FYR) for AOC 57 in Harvard, Massachusetts. We appreciate the opportunity to comment on this document.

Our comments at this time are as follows:

- Although the increasing concentration of trichloroethene in well 57M-03-02X was acknowledged, the FYR does not fully address the detection of chlorinated compounds in groundwater in AOC 57, Area 2. As shown in Table 5 of the September 2004 Final Interim Remedial Action Completion Report, tetrachloroethene, cis-1,2-dichloroethene, trichloroethene and vinyl chloride were all detected in wells located in Area 2. These compounds are not considered Contaminants of Concern (COCs) at AOC 57, but they have not been attributed to other releases in the vicinity of AOC 57. No tables summarizing the volatile organic compound (VOC) analytical results were included in this Draft Five-Year Review. Given that chlorinated compounds have been detected in groundwater at AOC 57 above Maximum Concentration Levels, PACE and ECR request that an evaluation of the potential source and impact of these compounds be included as part of the Five-Year Review.

- The FYR did not include a discussion of the previously detected separate-phase product in the recovery trench sumps located in Area 2. PACE and ECR request that a thorough discussion of observations of the presence or absence of separate phase product at AOC 57 be included in the FYR. Furthermore, PACE and ECR request that an evaluation of the significance of the separate-phase product be conducted to evaluate the effectiveness of the selected remedy.

Engineering & Consulting Resources, Inc.
www.ecr-consulting.com

- PACE and ECR concur with the Massachusetts Department of Environmental Protection (MADEP) comment on *Section 4.5.4 Interviews*, stating that monitored natural attenuation is not an approved remedy at AOC 57. However, in *Section 4.3.3 Selected Remedy* of the revised Draft Five-Year Review, the following sentence is present in the first paragraph:

  > "The remedy is to mitigate existing groundwater contamination through natural attenuation and remediation and reduce the potential risk of future commercial/industrial exposure to contaminated groundwater."

  PACE and ECR ask that this sentence be modified so as not to imply that natural attenuation is an approved remedy at AOC 57.

We thank the Army for the opportunity to comment on this document. Please feel free to contact Richard Doherty at (978) 500-3199 or Laurie Nehring at (978) 772-9749 if you have any questions or comments regarding our concerns.

Sincerely,

Richard Doherty

Digitally signed by Richard Doherty
DN: CN = Richard Doherty, C = US, O = ECR
Date: 2005.09.12 16:05:24 -04'00'

Richard E. Doherty, P.E., L.S.P.
President
Engineering & Consulting Resources, Inc.

Laurie Nehring
People of Ayer Concerned
About the Environment

cc: Harvard Board of Selectmen

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September 12, 2005

Mr. Robert Simeone
BRAC Environmental Office
30 Quebec Street, Unit 100
Devens, MA 01434-4479

Re: AOC 69W Five-Year Policy Site Review
Parker Charter School
Ayer, Massachusetts

Dear Mr. Simeone:

On behalf of People of Ayer Concerned about the Environment (PACE), Engineering & Consulting Resources, Inc. (ECR) reviewed the September 2005 Five-Year Policy Site Review for AOC 69W in Ayer, Massachusetts, currently occupied by the Parker Charter School. We appreciate the opportunity to comment on this document.

Our comments at this time are as follows:

- The response to Question B in Section 8.6 of the Five-Year Review includes a recommendation for a "site-specific assessment . . . to determine whether the (indoor air) exposure pathway is complete, including evaluation of measured subslab soil gas and (if warranted) indoor air concentrations, and/or site-specific mathematical modeling." Although PACE and ECR strongly support additional indoor air testing at the school, we believe that existing data has already established that the indoor air pathway is complete. Previous results have indicated ethylbenzene concentrations in indoor air within the school kitchen/cafeteria of 470 micrograms per cubic meter (ug/m^3), which is 94 times the MADEP-established background value of 5 ug/m^3. In a sample taken from a classroom, xylenes were detected at 92 ug/m^3, over 30 times the background value of 3 ug/m^3, and toluene was detected at 1,000 ug/m^3, over 34 times the background value of 29 ug/m^3. These samples were taken in the vicinity of documented petroleum releases. The presence of these levels of petroleum hydrocarbons within the indoor air of a school building should be cause for a greater level of attention than has been shown to date. Furthermore, the existence of a complete exposure pathway to sensitive receptors also calls into question the protectiveness of the natural attenuation remedy.

- Indoor air testing performed to date has either had quality issues[1], or was performed during fair-weather months (October 1997 and April 1998). We request that the analyte lists for all soil gas and indoor air testing include a full suite of volatile organic compounds, as well as naphthalene and 2-methylnaphthalene. We further request that the sampling be performed in winter months with the heating system operating. Because of the current use of the building as a school, we believe that it is important to expedite this assessment of indoor air at AOC 69W.

- The Five-Year Review discusses the Institutional Controls implemented to restrict the use of groundwater at AOC 69W, including a restriction on its use as a potable water source. This restriction was a primary assumption used to justify the implementation of the limited action alternative. However, AOC 69W is located within a medium-yield aquifer and the Zone II area of contribution for the MacPherson well. Designation of an area as a Zone II by definition indicates that it is being used as a potable water source. PACE and ECR believes that this is a fundamental issue that needs to be addressed. If the Army believes that the Zone II does not in fact apply to the site, then the burden of proof is on the Army to show that the Zone II delineation is incorrect.

We thank the Army for the opportunity to comment on this document. Please feel free to contact Richard Doherty at (978) 500-3199 or Laurie Nehring at (978) 772-9749 if you have any questions or comments regarding our concerns.

Sincerely,

Andrew W. Clark
Staff Geologist
Engineering and Consulting Resources, Inc.

Laurie Nehring
People of Ayer Concerned
About the Environment

Richard Doherty

Digitally signed by Richard Doherty
DN: CN = Richard Doherty, C = US, O = ECR
Date: 2005.09.12 17:04:38 -04'00'

Richard E. Doherty, P.E., L.S.P.
President
Engineering & Consulting Resources, Inc.

cc: Ayer Board of Selectmen
Ayer Board of Health
Ayer Town Administrator

[1] The 1996 data was unreliable because the sample tubes were saturated due to high flow rates and/or long sample time. The October 1997 data did not include results for naphthalene and 2-methylnaphthalene, two major components of heating oil.

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September 12, 2005

Mr. Robert Simeone
BRAC Environmental Office
30 Quebec Street, Unit 100
Devens, MA 01434-4479

Re: AOC 43G and 43J Five-Year Policy Site Review
Former Service Stations
Harvard, Massachusetts

Dear Mr. Simeone:

On behalf of People of Ayer Concerned about the Environment (PACE), Engineering & Consulting Resources, Inc. (ECR) reviewed the September 2005 Draft Five-Year Policy Site Review (FYR) for AOC 43G and AOC 43J in Harvard, Massachusetts. We appreciate the opportunity to comment on this document.

Our comments at this time are as follows:

- The selected remedy at these sites consists of monitored natural attenuation (MNA). The FYR states that "Both the statistical analysis and modeling suggest that organic COCs will likely be reduced to cleanup levels within the duration criteria specified in the ROD."[1] However, data collected to date indicates that the target date for achievement of cleanup goals either has not been achieved, or is unlikely to be achieved. At Area 43G, where cleanup goals were to be achieved by 2007 to 2009, concentrations of benzene in 2004 were up to 52 times the 5 ug/l cleanup goal at well XGM-97-12X. Moreover, this well showed only a 4 percent decrease in benzene concentration between 1999 and 2004.[2] C9-C10 aromatics in this well actually increased 64 percent over the 5-year period, and as of 2004 were 37 times higher than the stated cleanup goal. Inspection of the data tables show other instances where little or no progress is being made toward acheiving cleanup goals. Rather than indicating a significant downward trend, these data indicate that the ROD target cleanup date of 2007-2009 is extremely unlikely. Furthermore, the data provide strong evidence that MNA is not working as planned at this site, and that a contingency remedy is needed.

---

1 Section 5.3.6.1.

2 The FYR interpretation of benzene results at AOC 43G states "The field results suggested that benzene concentrations are likely to persist for some time slightly above the cleanup goal." Given that benzene results in XGM-97-12X are persisting at levels over 50 times the cleanup goal, we believe that this statement is misleading and should be modified to better reflect the data.

- Similar results can be seen at AOC 43J, where cleanup goals were to have been acheived between 2004 and 2006. At source area well XJM-97-12X, concentrations of ethylbenzene, C5-C8 aliphatics, and C9-C10 aromatics increased 142%, 300% and 48%, respectivey, between 1999 and 2004. While some increases have been sporadic and inconsistent, C5-C8 aliphatics increased steadily over the 5-year period. At well 2446-02, ethylbenzene decreased only 4% over the 5-year period, and as of 2004 was a factor of 3.5 above the stated cleanup goal. C9-C10 aromatics in this well increased 14% over the 5-year period, and according to the most current data, are 40 times higher than the stated cleanup goal. These data indicate that the 2004-2006 cleanup time frame has not and likely will not be acheived, and that MNA is not effective at this location. PACE and ECR therefore recommend the implementation of a contingency remedy at AOC 43J.

- Although VPH cleanup goals for source area wells are shown in the tables in Section 5.5.2.1 and 5.5.2.2 of the FYR, and are discussed in the accompanying text, other report sections states that VPH cleanup goals for source area wells have not been established. For example, Section 5.3.6.2 states that "If GW-1 concentrations [for VPH fractions] are exceeded at the boundary or compliance point, the Army will develop risk-based concentrations." However, data summarized in the five-year review indicate that VPH fractions have exceeded GW-1 standards at sentry wells on several occasions. Although the FYR states that subsequent results in each case were below GW-1 standards, significant slugs of contaminated groundwater could have migrated off-site in the time between annual sampling rounds. Because the criteria set forth for development of VPH cleanup goals for source area wells does not specify that exceedances must persist for a period of years before the standards are developed, we believe that VPH cleanup goals for all wells should be in place.

- The detection limits for C5-C8 aliphatics during the 2004 sampling round at AOC 43G exceeded the cleanup goal. The resulting data are therefore not useful for evaluating prgress toward cleanup goals. A basic data quality objective for all future sampling events should be that detection limits must be below cleanup goals.

- The FYR contains a detailed summary of Mann-Kendall statistical testing used to support the conclusion that concentrations of hydrocarbons are decreasing. However, according to Section 5.3.5.3, none of the data used in the analysis was collected over the past five years. To perform a meaningful Five-Year Review, it would seem appropriate to utilize data collected over the past five years, rather than simply incorporate report sections more relevant to the prior five-year review.

- Statements in the FYR that utilize the annual sampling data to make broad statements about the actual concentrations over a long time period are in our opinion misleading, and should be deleted or re-worded. For example, the review states that "there have been no exceedances of VPH GW-1 concentrations in the other four sentry wells from December 1999 to October 2004." The wording implies a greater level of knowledge than that provided by annual grab samples.

- Because data obtained to date indicate occasional spikes in concentration and uneven trends, we believe that monitoring wells at these sites should be sampled more frequently than annually. We propose bi-annual monitoring at a minimum for both AOCs.

We thank the Army for the opportunity to comment on this document. Please feel free to contact Richard Doherty at (978) 500-3199 or Laurie Nehring at (978) 772-9749 if you have any questions or comments regarding our concerns.

Sincerely,

Richard Doherty Digitally signed by Richard Doherty DN: CN = Richard Doherty, C = US, O = ECR Date: 2005.09.12 16:04:57 -04'00'

Richard E. Doherty, P.E., L.S.P.
President
Engineering & Consulting Resources, Inc.

Laurie Nehring
People of Ayer Concerned About the Environment

cc: Harvard Board of Selectmen

APPENDIX M

INSTALLATION MASTER PLAN (IMP) AND LEASE IN FURTHERANCE OF CONVEYANCE (LIFOC)

REAL PROPERTY MASTER PLAN

LONG RANGE COMPONENT

for

DEVENS RESERVE FORCES TRAINING AREA

JUNE 1999

Prepared for:

Commander
Devens Reserve Forces Training Area
Devens, Massachusetts

Prepared Under the Guidance of:
U.S. Army Installation Support Center
Director of Facilities Management
Planning and Real Property Division
Alexandria, Virginia

Prepared by:

R&K Engineering
Roanoke and Alexandria, Virginia
and San Antonio, Texas

LAND-USE CONTROLS

APPLICABLE TO

DEVENS

RESERVE FORCES TRAINING AREA

REAL PROPERTY [redacted]

Area A (Main Cantonment)AAFES Gas Station Queenstown Street

- Residual soil and groundwater contamination has been documented for [redacted] which is undergoing MNA
- Conduct EBS Prior to transfer and incorporate suitable deed restrictions in FOST EPP

Area B (3400 Area)

No applicable land use controls; NFADD's issued for AREE's & SA's

Area C (Range & Training Area)

The ROD is based on Army retention of the [redacted] and restricted access to the site and groundwater.

- Sample and analyze Well D-1 for explosives and MA and EPA Drinking Water (MMCL/MCL)
- Assure no new drinking water sources are developed within the SPIA monitored area

Area D (Motor Pool Annex)

- Residual soil and groundwater contamination has been documented for [redacted] which is undergoing MNA
- Conduct EBS Prior to transfer and incorporate suitable deed restrictions in FOST EPP

Area E (Old Commissary 94TH HQ)

No applicable land use controls; NFADD's issued for AREE's

Area F (3700 Area Former Motor Pool)

- Assure the Property is not used for residential purposes and suitable deed restrictions are placed in the FOST EPP prior to transfer.
- Maintain the existing paved areas and stormwater collection systems to prevent long-term worker exposure to residual oil contaminated soils 2-5 feet BGS associated with AOC 44/52.
- Assure that Soil Management Plans and Health and Safety Plans are prepared and executed prior to subsurface excavations.

Area G (3800 Area former Moore AAF Hangers RTC)

Active remediation and monitoring of the AOC 50 chlorinated solvent plume, which is under building 3813 is ongoing. Treatment transects and associated monitoring wells are located in the RTC vehicle storage area and on the Southwest Corner of Building 3813 former hanger, along the axis of the plume through retained Parcel H.

- Provide periodic access to treatment transects and monitoring wells
- Coordinate construction plans with BRAC Environmental Coordinator /BCT to facilitate ongoing remediation and future access to plume areas
- Avoid groundwater extraction or injection for any purpose
- Coordinate construction plans for modifications to stormwater systems with BRAC Environmental Coordinator /BCT including engineered stormwater management plans and hydrologic/ mounding studies. (Continue use of existing stormwater system to direct stormwater away from the plume)

E. ENVIRONMENTAL CONCERNS

Issues

Environmental issues in any region have both positive and negative implications for development. Devens RFTA is unique in that it is designated a National Priority List site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (Super fund) and a BRAC (base closure) site. These federal actions were combined to identify, investigate, and remediate sites on the former Fort Devens that may pose a threat to human health and the environment. The Devens RFTA has twelve CERCLA sites on retained property that still require action. One site is located in the Area A, one site is located in Area B, and three sites are located in Area C. One site is located in the Area D and six sites are located in the South Post. Any proposed actions in these areas should be coordinated with the environmental office of the DPW or the BRAC environmental office.

National Register Eligibility

The Cemetery and its associated Caretaker's Building (P-3611) is the only historic property within the Devens RFTA that has been evaluated as eligible for listing in the National Register of Historic Places by the Massachusetts State Historical Preservation Office and the U.S. Army. Established in 1939, the Cemetery and Caretaker's Building are significant for their association with the former Fort Devens during its inter-war period of development (1919-1940), which saw the mission of the base change from temporary status to a permanent cantonment. The Cemetery is also significant for its architectural design, which features the extensive use of fieldstone.

Archaeological Sites

Several areas of the Devens RFTA have been evaluated and determined to be archaeologically sensitive. These areas have a potential to contain prehistoric and/or historic period resources that may yield information important to the prehistoric and historic settlement of north central Massachusetts. South Post contains approximately 2,153 acres assessed to be archaeologically sensitive. The southwestern, northwestern, and eastern perimeter sections of the 3400 area are also assessed to be archaeologically sensitive. These areas are subject to further archaeological field investigations to determine potential significance and mitigation alternatives, if the land is to be transferred or developed by the Army. If areas are determined to be of "low archaeological sensitivity," no further investigation is needed. Devens RFTA soils are generally acidic and infertile. They are subject to moderate erosion where denuded or sparsely vegetated.

LEASE IN FURTHERANCE OF CONVEYANCE

OF REAL PROPERTY AND FACILITIES ON

THE FORT DEVENS, MASSACHUSETTS,

MILITARY RESERVATION

INDEX

EXHIBITS

Exhibit Number	Title		
A	Lease Premises		
B	Memorandum of Agreement	-	Delivered at Closing
C	Survey of Condition	-	Delivered at Closing

NO ______________

DEPARTMENT OF THE ARMY
LEASE IN FURTHERANCE OF CONVEYANCE
UNDER
BASE REALIGNMENT AND CLOSURE (BRAC)
THE FORT DEVENS, MASSACHUSETTS,
MILITARY RESERVATION

WHEREAS, the United States, acting through the SECRETARY OF THE ARMY, hereinafter referred to as the "Army" or "Lessor", has made a final disposal or reuse decision with regard to property located at the Fort Devens, Massachusetts, Military Reservation (Fort Devens), dated May 9, 1996; and

WHEREAS, pursuant to the Defense Base Closure and Realignment Act of 1990 (PL 101-510), as amended, (Base Closure Law) Fort Devens must close not later than July 10, 1997; and

WHEREAS, pursuant to Chapter 498 of the Massachusetts Acts of 1993, as amended, the Government Land Bank (Land Bank), hereinafter referred to as the "Land Bank" or "Lessee", was granted the authority to oversee and implement the civilian reuse of Fort Devens in accordance with a locally-approved reuse plan; and

WHEREAS, on December 7, 1994, the Reuse Plan and associated Bylaws for Fort Devens (Reuse Plan) were approved by the towns of Ayer, Harvard and Shirley; and

WHEREAS, the Land Bank, a Local Reuse Authority, has made an application for an Economic Development Conveyance (EDC) to the

Department of the Army for the purchase of portions of the property that formerly comprised Fort Devens; and

WHEREAS, the Army, as authorized by the Base Closure Law, has determined that the Land Bank's application meets the criteria for conveyance to assist economic development and has accepted the application; and an offer to purchase/sell has been negotiated and accepted by Army and the Land Bank, in a Memorandum of Agreement (the MOA), dated May 9, 1996, regarding the transfer to the Land Bank of certain portions of Fort Devens not being retained by the Army or transferred to federal agencies, for the purpose of implementing the Reuse Plan; and

WHEREAS, due to the ongoing environmental cleanup and the unexploded ordnance (UXO) clearance process at Fort Devens being undertaken by the Army, in order to implement the intentions of the Army and the Land Bank as set forth in the MOA, certain parcels will be leased rather than conveyed pending completion of the environmental cleanup and UXO clearance by the Army, said parcels being more particularly described in Exhibit A, hereinafter referred to as the "Lease Premises."

WHEREAS, as soon as a Finding of Suitability to Transfer (FOST) is executed by the Army for the Leased Premises, or a portion of said Leased Premises, and said Leased Premises may be conveyed consistent with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9620 (h), as amended, and other legal and policy requirements, the Secretary of the Army intends to convey the same to the Land Bank by one or more quitclaim deeds, as provided for in the MOA, and the Land Bank agrees to accept such conveyance(s) as soon as the above-referenced conditions are met; and

WHEREAS, the Army and the Land Bank have agreed to a Lease pending conveyance(s) so as to provide immediate possession of the Lease Premises to the Land Bank; and

WHEREAS, the parties hereto find, acknowledge, and agree that: (a) the public interest will be served by this Lease because interim use of the Lease Premises will facilitate economic recovery and reuse of the property and create new jobs in the region, thereby helping to offset the impacts of the closure of Fort Devens in a manner that will not interfere with or delay the environmental remediation and UXO clearance of the Lease Premises; (b) the Lease will relieve the Secretary of the expense of continued care, custody, control, operation and maintenance of the property and (c) under said circumstances obtaining fair market value for leasing the Lease Premises is not compatible with the public interest.

AND WHEREAS, the Secretary has determined in accordance with the authority contained in 10 U.S.C. 2667(f), that the surplus property hereby leased would facilitate state or local economic adjustment efforts; would be advantageous to the United States and be in the public interest; and that obtaining fair market value is not compatible with the public benefit;

NOW THEREFORE,

WITNESSETH

This lease (Lease) is made as of the 9th day of May, 1996, on behalf of the United States, between THE SECRETARY OF THE ARMY (Army), by the authority of Title 10, United States Code, Section 2667, having an address for purposes of the Lease at Department of the Army, C/O Commander and Division Engineer, United States

Army Corps of Engineers, New England Division, Frederick C. Murphy Federal Building, 424 Trapelo Road, Waltham, MA 02254-9149, and THE GOVERNMENT LAND BANK (Land Bank), a Massachusetts body corporate and politic created by Chapter 212 of the Acts of 1975, as amended, having its principal office at 75 Federal Street, 10th Floor, Boston, Massachusetts 02110.

THIS LEASE is granted subject to the following terms and conditions:

ARTICLE 1
LEASE; LEASE TERM; USE OF LEASE PREMISES

1.01 To have and to hold for a term commencing May 9, 1996 and ending on May 9, 2046 (Lease Term), unless sooner terminated or conveyed in fee pursuant to the terms hereof or of the Memorandum of Agreement between the United States of America and the Government Land Bank for the Conveyance of Fort Devens, Massachusetts, dated May 9, 1996 (MOA), attached as Exhibit B, the Army hereby leases to the Land Bank, and the Land Bank hereby leases from the Army, the Lease Premises (Exhibit A herein), including all buildings, facilities and improvements thereon and rights appurtenant thereto. If due to default by the Land Bank or termination of the MOA, the Land Bank is not entitled to conveyance of the Leased Premises at the time the Army is able to convey in fee, then the Lease shall terminate on the date of execution of a Finding of Suitability to Transfer (FOST) by the Army with respect to that portion of the Leased Premises covered by the FOST. The Lessor reserves the use and occupancy of the following buildings, including all facilities and areas currently used by the Lessor in connection therewith, and the right of ingress and egress thereto, until July 10, 1997: T-204, ASP

Operations; T-3701, Administrative; P-3748, Warehouse; T-3758, TASC Warehouse; P-3759, Warehouse; P-3773, Reserve Center; P-3774, Organization Maintenance Shop; P-3775, Oil Storage Building; P-3776 Dispatch Building; P-3631 thru 3642, 3644, 3647, 3649, 3653, collectively the ASP; and Housing Units at 80 Walnut St., 822 Plum Street, and 540 Oak St. The Lessor may vacate said buildings and facilities at any time prior to July 10, 1997, after 30 days written notice to the Lessee.

1.02 As provided in paragraph 1.03 of the MOA, the Lease Premises, or portions thereof, shall be conveyed in accordance with and pursuant to the terms of the MOA to the Land Bank upon execution of a FOST by the Army.

1.03 The Land Bank and any sublessees, subtenants or licensees under this Lease (collectively "sublessees") may use the Lease Premises for all uses as may be permitted by the Reuse Plan or, upon approval of the Army, amendments to the Reuse Plan. If the Army reasonably determines any such amendment of the Reuse Plan allows a use or uses not adequately analyzed in the Fort Devens Disposal/Reuse Environmental Impact Statement (EIS), the Land Bank shall provide additional environmental analysis and documentation, at the Land Bank's expense, to the Army as the Army deems necessary to comply with the National Environmental Policy Act of 1969 and implementing regulations and other applicable environmental laws and regulations, prior to any use under such amendment. The Land Bank shall be solely responsible for complying with the Massachusetts Environmental Policy Act (MEPA).

1.04 Except as otherwise specifically provided, any reference herein to "Lessor" or "Army" shall include their duly authorized representatives. Any reference to "Lessee" or "Land Bank" shall include successors and assigns, and their duly authorized representatives.

ARTICLE 2

RENT

2.01 The Land Bank shall provide the Army as rent (Rent) hereunder, (a) protection, repair and maintenance of, and assumption of sole operating responsibility for the Lease Premises, except with regard to Army operations undertaken in furtherance of or related to the environmental clean-up or UXO clearance of the Lease Premises, and (b) payment of utility charges, as provided in the Utilities Agreement contained in the MOA. The Land Bank agrees that monetary rent received by the Land Bank from any Sublessee of the Land Bank under this Lease will be applied to costs incurred by the Land Bank for protection, maintenance, operation, repair and improvement of the Lease Premises, as may be necessary to cover such costs.

ARTICLE 3

CONDITION OF LEASE PREMISES; REPAIRS; UTILITIES; HISTORIC PRESERVATION

3.01 The Land Bank has inspected and knows and accepts the condition and state of repair of the Lease Premises. It is understood and agreed that the Lease Premises are leased in an "as is," "where is" condition, without any representation or warranty by the Army concerning the state of repair or condition of the Lease Premises, and without obligation on the part of the Army to make any alterations, repairs or additions, except as may be specifically provided herein. The Land Bank acknowledges that the Army has made no representation or warranty concerning the condition and state of repair of the Lease Premises nor any agreement or promise to alter, improve, adapt or repair the Lease Premises which has not been fully set forth in this Lease or the MOA. The parties specifically agree that the provisions of this paragraph in no way alter the indemnification and other obligations of the Army set forth in Article 5 of the MOA.

3.02 The Army and the Land Bank will jointly conduct an inventory and condition survey of the Lease Premises, to include the environmental condition, prior to lease execution by either party. The inventory and condition survey will be documented in a survey report (Survey) prepared by the Army, signed by the duly authorized representatives of both parties, and attached as Exhibit C to this Lease. The Survey will refer to and incorporate by reference the Environmental Baseline Survey (EBS), dated March 8, 1996, prepared by the Army, as well as any other environmental conditions that may not be specifically identified in the EBS. The Land Bank hereby acknowledges receipt of a copy of the EBS. At the conclusion of the Lease Term, the Army and the Land Bank will jointly conduct a close-out survey. The Army will prepare a close-out report based upon the close-out survey. The close-out survey and report will include an updated EBS prepared in accordance with Article 16.11.a of this Lease. All significant variances from the initial Survey shall be clearly documented in the close-out report. The close-out survey and report will constitute the basis for settlement by the parties for any leased property shown to be lost, damaged, contaminated, or destroyed during the lease term and restoration of the property as required under this Lease.

3.03 The Land Bank shall keep the Leased Premises in good order and in a clean, safe condition at the Land Bank's sole cost and expense. The Land Bank shall exercise due diligence in the protection of all property located on the Leased Premises against fire, casualty, or damage from any and all causes, excepting: (i) reasonable wear and tear, (ii) alterations, construction, site preparation or demolition undertaken pursuant to Article 12; and (iii) alterations or damage done in conjunction with environmental remediation or UXO clearance activities conducted by the Army or its contractors. For any Leased property that is not conveyed to the Land Bank upon termination or expiration of this lease; is not covered by the above exceptions; and that is damaged or destroyed by the Land Bank without written permission of the Army; the Land Bank shall be repair or replace said property to the reasonable satisfaction of the Army; or, in lieu of such repair or replacement, the Land Bank shall, at the Army's election, pay to the Army money in an amount sufficient to compensate for the loss sustained by the Army by reason of said damages or destruction. It is understood and agreed by the parties, however, that portions of the Lease Premises, as determined by the Land Bank, may be maintained at the minimal level necessary to prevent deterioration and diminution of value, pending reuse thereof by the Land Bank.

3.04 The Land Bank shall provide, at its sole cost and expense, janitorial, building maintenance and repair and grounds maintenance services at the Lease Premises, as may be required by the Land Bank in the operation of the Lease Premises.

3.05 In accordance with and if authorized by the Utilities Agreement contained in the MOA, the Land Bank may request, and the Army shall provide to the Lease Premises, electricity, natural gas, water, sewer, and telephone services, on a reimbursable basis during the period that the Army retains operation of said systems. Furthermore, if the Land Bank obtains utility services from sources other than the Army, the charges and method of payment for each utility or service will be determined by the appropriate supplier of said utility or service in accordance with applicable laws or regulations, on such basis as the appropriate supplier and the Land Bank may agree.

3.06 The Lease Premises include historic buildings eligible for listing on the National Register of Historic Places, as described in the Programmatic Agreement attached to the MOA (Exhibit B herein). These buildings will be maintained by the Lessee in accordance with the Secretary of the Interior's Standards for Rehabilitation and Illustrated Guidelines for Rehabilitating Historic Buildings (U.S. Department of the Interior, National Park Service 1992)(hereinafter Secretary's Standards). Lessee will notify the Army and the State Historic Preservation Officer (SHPO) of any proposed rehabilitations, structural or landscape alterations to these buildings prior to undertaking said rehabilitations/ alterations. If the Lessee does not receive a written objection from the Army or SHPO within 30 days, the Lessee may proceed with the proposed rehabilitations or alterations. Any approved rehabilitations, structural or landscape alterations to these buildings must adhere to the Secretary's Standards.

ARTICLE 4
COMPLIANCE WITH LAWS

4.01 Throughout the term of the Lease, the Land Bank shall, with regard to the Lease Premises, at its own cost and expense, promptly observe and comply with all applicable laws, orders, regulations, rules, ordinances, and requirements of the federal, state, county and local governments and of all of their administrative departments, bureaus and officials and of the Devens Enterprise Commission established pursuant to Chapter 498 of the Massachusetts Acts of 1993, as amended. The Land Bank shall pay all costs, expenses, claims, fines, penalties and damages that may in any manner arise out of or be imposed because of the failure of the Land Bank to comply with said laws. The provisions of this paragraph shall (a) in no way compromise the Army's obligation under applicable legal requirements to complete the environmental clean-up of the Lease Premises or the clearance of UXO thereon, or to indemnify the Land Bank, as provided for in the MOA; (b) not obligate the Land Bank to complete the environmental clean-up of the Lease Premises being undertaken by the Army as required under CERCLA, the National Contingency Plan (NCP), the FFA, the MOA, and deeds from the Army to the Land Bank.

ARTICLE 5
INDEMNIFICATION OF THE ARMY

5.01 The indemnification provided by the Land Bank to the Army under this Article 5 is subject to the indemnification provided by the Army to the Land Bank under Article 5 of the MOA and in the event of conflict or inconsistency between the provisions of Article 5 of this Lease and said provisions of Article 5 of the MOA, said provisions of Article 5 of the MOA shall control.

5.02 The Army shall not be responsible for damages to property or injuries or death to persons which may arise from or be attributable or incident to the condition or state of repair of the Lease Premises, or the use and occupation of them, or for damages to the property of the Land Bank, or for damages to the property or injuries or death to the person of the Land Bank's officers, agents, contractors, servants or employees, or others who may be on the Lease Premises at their invitation or the invitation of any one of them. This paragraph shall not apply to damage to property or injuries or death to persons caused by or attributable to the actions of the United States in conducting environmental remediation or other activities on the Lease Premises.

5.03 The Land Bank agrees to assume all risks of loss or damage to property and injury or death to persons by reason of or incident to its possession and/or use of the Lease Premises or the activities conducted under this Lease. The Land Bank expressly waives all claims against the United States for any such loss, damage, personal injury or death caused by or occurring as a consequence of such possession and/or use of the Lease Premises by the Land Bank, or the conduct of activities or the performance of responsibilities under this Lease by the Land Bank. The Land Bank further agrees, to the extent permitted under state law, to indemnify and hold harmless the Army, its officers, agents and employees, from and against all suits, claims, demands or actions, liabilities, judgments, costs and attorneys' fees 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 possession and/or use of the Lease Premises by the Land Bank. The indemnification obligations of the Land Bank contained herein do not extend to damages, claims, suits, liabilities, judgments, costs and attorney's fees arising out of, caused by or predicated upon (a) the gross negligence or willful misconduct of the Army or its officers, agents or employees, without contributory fault on the part of the Land Bank or any other person, firm, or corporation, or (b) activities undertaken by the Army in relation to the CERCLA clean-up or UXO clearance of the Lease Premises. The Army will give the Land Bank notice of any claim against it covered by this indemnity as soon after learning of such claim as practicable.

5.04 The Land Bank shall indemnify and hold harmless the United States from any costs, expenses, liabilities, fines, or penalties resulting from discharges, releases, emissions, spills, storage, disposal, or any other action by the Land Bank giving rise to United States liability, civil or criminal, or responsibility under Federal, state or local environmental laws.

5.05 This Article 5 and the obligations of the Land Bank hereunder shall survive the expiration or termination of the lease and the conveyance of the Leased Premises to the Land Bank. The Land Bank's obligation hereunder shall apply whenever the United States incurs costs or liabilities for the Land Bank's actions giving rise to liability under this Article.

ARTICLE 6
ASSIGNMENT; SUBLETTING

6.01 Without the prior written consent of the Army through the Corps of Engineers, New England Division, the Land Bank shall not sublease, license, or grant any interest under this lease, except as provided for in Article 9 (Mortgaging). The Army's consent shall not be unreasonably withheld or delayed and shall be deemed granted if a response is not received by the Land Bank within twenty-one (21) days of the receipt by the Army of a written request for consent. Every sublease shall specifically identify and require compliance with the Environmental Protection provisions set out in Article 16 of this Lease and shall state that it is subject to the terms and conditions of this lease and that, in case of any conflict between the instruments, this lease will control. The Land Bank shall provide each sublessee with, and make available as appropriate to licensees, a copy of this Lease and MOA.

6.02 The Land Bank may not assign this Lease without the prior written consent of the Army, which consent shall not be unreasonably withheld or delayed, and no assignment shall be valid unless the assignee shall, by an instrument in a form sufficient for recording, enter into an assumption agreement and assume all of the Land Bank's obligations under this Lease. A duplicate original of that assumption agreement will be delivered to the Army within thirty (30) days after the making of the assignment. Upon compliance with the foregoing condition, but not otherwise, the Land Bank shall be released and discharged from any and all liability under the Lease that may accrue from and after the date of the assignment. The assignee shall have no rights under the MOA and shall not be entitled to a conveyance of the Leased Premises upon execution of a FOST by the Army for the Leased Premises or a portion thereof.

6.03 Upon request of the Lessee, the Lessor shall consider attorning to a particular sublease, where the terms of said sublease are consistent with standard Government lease terms and applicable law, regulation, and policy.

ARTICLE 7
TAXES

7.01 The Land Bank shall pay to the proper authority, when and as the same become due and payable, all taxes, assessments and similar charges, which at any time during the term of this Lease, may be taxed, assessed or imposed upon the Property or interest of the Land Bank with respect to or upon the Lease Premises.

ARTICLE 8
DEFAULTS

8.01 The following shall be deemed a default by either the Army or the Land Bank and a breach of the Lease: a party's failure to observe or perform any of its obligations under the terms, covenants or conditions of the Lease, which failure persists after the expiration of ninety (90) days from the date the aggrieved party gives written notice to the party calling attention to the existence of that failure. However, if the default is one relating to a matter that exposes occupants or the public to an imminent danger to safety or health of which the public authorities have giver due notice to the party, then such shorter notice to the party, whether written or otherwise, shall be sufficient notice of default under this Lease.

8.02 In the event of a default, as provided in 8.01, the aggrieved party may, at its option, following the expiration of applicable notice and grace periods: (a) seek injunctive relief, monetary damages, or both; (b) take such measures as the aggrieved party deems reasonable to mitigate the effects of or cure such default, and assess all costs incurred for such mitigation to the defaulting party; (c) terminate this Lease; or (d) avail itself of any combination of said remedies.

8.03 Any action taken by either party under this Article 8 shall not waive any right that the party would otherwise have against the other party who shall remain responsible for any loss and damage suffered by reason of the default or breach.

8.04 If the Land Bank shall have made any sublease hereunder and if any Sublessee thereunder shall have given to the Army a notice (Sublessee Notice), specifying the name and address of the Sublessee, the Army shall give to the Sublessee a copy of each notice of default by the Land Bank at the same time as and whenever any such notice of default shall thereafter be given by the Army to the Land Bank, addressed to the Sublessee at the address last furnished to the Army. No notice of default by the Army shall be deemed to have been given to the Land Bank unless and until a copy thereof shall have been so given to the Sublessee. The Sublessee shall then have a period of ten (10) days more, after service of the notice upon it, for remedying the default or causing it to be remedied, than is given the Land Bank hereunder after service of such notice upon it, except in the case of imminent danger to safety or health.

8.05 The Army will accept performance by any Sublessee hereunder of any covenant, condition or agreement to be performed under the Lease by the Land Bank, with the same force and effect as though performed by the Land Bank.

8.06 From and after receiving a Sublessee Notice, the Army and the Land Bank will not materially modify or amend the Lease without giving each Sublessee that gave a Sublessee Notice to the Army hereunder thirty (30) days written notice thereof.

8.07 Other than under the provisions of this Article 8, the Army shall have no legal responsibility or obligation to the Land Bank's sublessees or licensees.

ARTICLE 9

MORTGAGING

9.01 The Land Bank or any Sublessee may make a mortgage or mortgages on its interest in the Lease. The provisions of this Article 9 shall be fully applicable to Sublessees of the Land Bank.

9.02 If the Land Bank shall have made any mortgage (sometimes referred to as a Leasehold Mortgage) and if a Leasehold Mortgagee (the holder of any Leasehold Mortgage) shall have given to the Army a notice (Leasehold Mortgagee's Notice) specifying the name and address of the Leasehold Mortgagee, the Army shall give to the Leasehold Mortgagee a copy of each notice of default by the Land Bank at the same time as and whenever any such notice of default shall thereafter be given by the Army to the Land Bank, addressed to the Leasehold Mortgagee at the address last furnished to the Army. No notice of default by the Army shall be deemed to have been given to the Land Bank unless and until a copy thereof shall have been so given to the Leasehold Mortgagee. The Leasehold Mortgagee shall then have a period of ten (10) days more after service of notice upon it, for remedying the default or causing it to be remedied, than is given the Land Bank under paragraph 8.01 herein, except in case of imminent danger to safety or health. The Leasehold Mortgagee, in case the Land Bank shall be in default, shall, within the period provided for in this paragraph 9.02 and, if applicable, 9.04, have the right to remedy the default or cause it to be remedied.

9.03 The Army will accept performance by the Leasehold Mortgagee of any covenant, condition, or agreement to be performed under the Lease by the Land Bank with the same force and effect as though performed by the Land Bank.

9.04 Except where the default is one relating to a matter that exposes occupants or the public to an imminent danger to safety or health of which the public authorities have given due notice to the Land Bank, whether written or otherwise, the time of the Leasehold Mortgagee to cure any default by the Land Bank that reasonably requires the Leasehold Mortgagee be in possession of the Lease Premises to do so, shall be deemed extended to include the period of time required by the Leasehold Mortgagee to obtain possession and foreclose expeditiously and with due diligence.

9.05 From and after receiving the Leasehold Mortgagee's Notice, the Army and the Land Bank will not materially modify or amend the Lease in any respect without the prior consent of the Leasehold Mortgagee, which consent shall not be unreasonably withheld or delayed. In the event the Leasehold Mortgagee fails to respond to a notice of material modification or amendment of the Lease within thirty (30) days after service of notice, the Leasehold Mortgagee will be deemed to have given its consent.

9.06 No Leasehold Mortgagee shall become liable under the Lease unless a Leasehold Mortgagee becomes the owner of the leasehold estate, and in such event shall be liable only for as long as such Leasehold Mortgagee remains the owner of the leasehold estate.

9.07 If a Leasehold Mortgagee acquires the Land Bank's interest in the Lease as a result of a sale under its Leasehold Mortgage pursuant to a judgment of foreclosure and sale, or through any transfer in lieu of foreclosure, or through settlement of or arising out of any pending or contemplated foreclosure action, the following provisions of this paragraph shall apply, namely:

a. The Leasehold Mortgagee must assume the Lease and the Leasehold Mortagee shall have no right with respect to the Lease Premises unless said Leasehold Mortgagee assumes and delivers to the Army a duplicate original of the assumption agreement (to be executed in form for recording) within ten (10) days after said Leasehold Mortgagee acquires title to all or a portion of the Land Bank's interest in the Lease.

b. The Leasehold Mortgagee may transfer its interest in the Lease to a nominee or a wholly-owned subsidiary corporation without the prior consent of the Army, provided, however, that the Leasehold Mortgagee shall deliver to the Army in due form for recording within ten (10) days after the date of the transfer a duplicate original of the instrument of assignment and an instrument of assumption by the transferee of all of the Land Bank's obligations under the Lease, and provided further that the Army shall be given prior written notice of such transfer, and that the transferee shall use the Lease Premises in a manner that conforms to the Reuse Plan. The Leasehold Mortgagee shall be relieved of any further liability under the Lease after the transfer.

9.08 Any purchaser at a foreclosure sale must assume the Lease and said purchaser shall have no right with respect to the Lease Premises unless said purchaser so assumes and delivers to the Army a duplicate original of the assumption agreement (to be executed in form for recording) within ten (10) days after said purchaser acquires title to all or a portion of the Land Bank's interest in the Lease.

ARTICLE 10

QUIET ENJOYMENT

10.01 The Land Bank, upon performing its obligations under the Lease shall and may, at all times during the Lease Term, peaceably and quietly have, hold, and enjoy the Lease Premises, subject to the rights of the Army under this Lease and the MOA.

ARTICLE 11

SUCCESSORS AND ASSIGNS

11.01 The covenants and agreements contained in the Lease inure to the benefit of and are binding upon the parties to the Lease, their successors and assigns, but this Article does not modify the provisions governing assignment, as elsewhere provided for in the Lease.

ARTICLE 12

IMPROVEMENTS; RESTORATION

12.01 The Land Bank shall have the right to make improvements to the Lease Premises, which improvements may include, without limitation, the demolition of existing buildings and the construction of new buildings and facilities, as provided for in the Reuse Plan and that do not violate the terms of this Lease. If the lease expires or terminates without conveyance of the Lease Premises to the Land Bank pursuant to the terms of the MOA, all improvements to the Lease Premises will become the property of the United States, and the Land Bank shall not be entitled to any compensation therefor.

12.02 If, on or before the date of expiration of this Lease or its termination by the Land Bank or the Army in accordance with the terms hereof, the Land Bank shall vacate the Lease Premises, the Land Bank will remove any personal property of the Land Bank therefrom, and restore the Lease Premises to as good order and condition as that existing upon the date of commencement of the term of this Lease, except for: (a) alterations, site preparation, improvements or demolition undertaken -- (i) pursuant to this Article 12, Article 16, or otherwise hereunder by the Army in conjunction with environmental remediation or UXO clearance activities, or (ii) with the permission of the Army; or (b) due to fair wear and tear. If this Lease is terminated by the Army in accordance with the terms hereof, the Land Bank shall vacate the Lease Premises, remove personal property therefrom, and restore the Lease Premises to the condition aforesaid within such reasonable time as the Army may designate. In either event, if the Land Bank does not remove said personal property and so restore the Lease Premises, then, at the option of the Army, said personal property shall either become the property of the United States, without compensation therefor, or the Army may cause it to be removed and the Lease Premises to be restored at the expense of the Land Bank, and no claim for damages against the United States or its officers or agents shall be created by or made on account of such removal and/or restoration work.

ARTICLE 13

NOTICES

13.01 All notices to the parties shall be addressed to them at the respective addresses first given for them in this Lease, or to such other address of which either of them, as the case may be, shall notify the other in the manner stated in this Article 13 for giving notice. Notices must be given by either registered mail, return receipt requested, or by certified mail, return receipt requested. The service of the notice shall be deemed complete upon the receipt of said notice, or the refusal thereof, by the applicable party.

ARTICLE 14
NO WAIVER

14.01 The failure of the Army or the Land Bank to insist in any one or more instances, upon a strict performance of any of the covenants of the Lease, or to exercise any option contained in the Lease, shall not be construed as a waiver of or relinquishment for the future of the performance of that covenant, or the right to exercise that option, but the same shall continue and remain in full force and effect.

ARTICLE 15
REMEDIES CUMULATIVE

15.01 The rights and remedies given to the Land Bank or the Army upon the breach of any of the terms of the Lease are distinct, separate and cumulative remedies, and no one of them, whether exercised or not, shall be deemed to be in exclusion of any of the others.

ARTICLE 16

ENVIRONMENTAL AND SAFETY PROVISIONS

16.01 The parties acknowledge that Fort Devens has been identified as a National Priorities List Site under CERCLA. The Land Bank acknowledges that the Army has provided it with a copy of the FFA and will provide the Land Bank with a copy of any amendments thereto. The Land Bank agrees to abide by the applicable terms of the FFA and any documents originating therefrom, and further agrees that should any conflict arise between the terms of the FFA, as it may be amended, and the Lease, the FFA shall take precedence. The Land Bank further agrees that, except as provided in the provisions of Article 5 of the MOA, the Army assumes no liability to the Land Bank should implementation of the FFA interfere with the Land Bank's use of the Leased Premises, provided, however, that the Army shall, to the extent reasonable, practical, and without additional costs, minimize interference with such use. The Land Bank shall have no claim on account of any such interference against the Army or any officer, agent, employee or contractor thereof, other than for abatement of rent.

16.02 The United States' rights under this Lease specifically include the right for United States officials to inspect, upon reasonable notice, the Leased Premises for compliance with environmental, safety, and occupational health laws and regulations, whether or not the United States is responsible for enforcing them. Such inspections are without prejudice to the right of duly constituted enforcement officials to make such inspections. The United States normally will give the Lessee twenty-four (24) hours prior notice of its intention to enter the Leased Premises unless the United States determines earlier entry is required for safety, environmental, operations, or security purposes. The Lessee shall have no claim on account of any entries against the United States, the Commonwealth, or any officer, agent, employee, or contractor thereof.

16.03 The Land Bank shall not construct or make or permit its sublessees to construct or make any substantial alterations, additions, or improvements to or installations upon or otherwise modify or alter the Leased Premises in any way which may adversely affect the cleanup, human health, or the environment without the prior written consent of the Army. Such consent may include a requirement to provide the Army with a performance and payment bond satisfactory to it in all respects and other requirements deemed necessary to protect the interests of the United States. For construction or alterations, additions, modifications, improvements, or installations in the proximity of operable units that are part of a National Priorities List (NPL) site, such consent may include a requirement for written approval by the United States' Remedial Project Manager.

16.04 The Army, EPA and the Massachusetts Department of Environmental Protection (DEP), their officers, agents, employees, contractors and subcontractors have the right, upon reasonable notice to the Land Bank, and to parties in possession, to enter upon the Leased Premises for purposes consistent with the applicable provisions of the FFA, and for the following purposes:

a. to conduct investigations and surveys, including, where necessary, drilling, soil and water sampling, test pitting, soil boring tests and other activities required under the FFA;

b. to inspect field activities of the Army and its employees, agents, contractors and subcontractors in implementing the FFA;

c. to conduct any test or survey required by EPA or DEP relating to the implementation of the FFA or environmental conditions at the Leased Premises, or to verify any data submitted to the EPA or DEP by the Army relating to such conditions; and

d. to construct, operate, maintain or undertake any other response or remedial action as required or necessary under the FFA, including, but not limited to, monitoring wells, soil removal, pumping wells and treatment facilities;

provided that the Leased Premises are restored in a reasonable manner to their condition prior to the exercise of the above rights, and provided further that any such inspection, survey, investigation or other response or remedial action will, to the extent reasonable, practical and without significant additional cost, be coordinated with a representative of the Land Bank and be performed in a manner that will minimize interference with the operations of the Land Bank. The Land Bank agrees to comply with the provisions of any health or safety plan in effect during the course of the above-described response or remedial actions.

16.05 The Land Bank or any agent or contractor of the Land Bank shall not undertake subsurface excavation, drilling, digging or other substantial disturbance of the surface of the ground, or construction, alterations, additions, modifications, improvements or installations that may adversely affect the clean up being undertaken on the Leased Premises or other portions of the Fort Devens NPL site, without: (a) seven (7) days prior written notice to the Army, EPA and DEP; and (b) prior written consent of the Army, which consent shall not be unreasonably withheld or delayed, and which consent may include a requirement for written approval by the EPA and DEP. Such consent may involve a requirement to provide the Army with a performance and payment bond satisfactory to it in all respects and other requirements deemed necessary to protect the interests of the Army. No groundwater will be extracted for any purpose.
Excavation of garbage or landfill materials is prohibited.

16.06 The Land Bank hereunder shall be solely responsible for obtaining, at its cost and expense, any environmental permits required for its operations under the Lease, independent of any existing permits, provided however, that the Army shall, where permitted by applicable law or regulation, and at no cost to the Army, assign any such permits to the Land Bank, if so requested by the Land Bank, except where such assignment is prohibited by regulations or written policy of the Army.

16.07 The Land Bank shall have a plan approved by the Army for responding to hazardous waste, fuel and other chemical spills prior to commencement of operations on the Leased Premises, which approval shall not be unreasonably withheld or delayed. Such plan shall be independent of Fort Devens or its successors and shall not rely on use of installation personnel or equipment. Should the Army provide any personnel or equipment, spill containment, either on request of the Land Bank, or because the Land Bank was not, in the reasonable opinion of the Army, conducting timely cleanup actions, the Land Bank agrees to reimburse the Army for its costs.

16.08 The Land Bank shall comply with: (i) the requirement of 10 U.S.C. § 2692 to obtain the necessary Army approval for any storage of toxic or hazardous materials on the Leased Premises and (ii) the hazardous waste permit requirements under the Resource Conservation and Recovery Act (RCRA) and its Massachusetts equivalent. Except as specifically authorized by the Army in writing, the Land Bank must provide, at its own expense, any hazardous waste management facilities, required by applicable laws and regulations. Hazardous waste management facilities of the Army will not be available to the Land Bank.

16.09 Any Army accumulation points for hazardous and other wastes will not be used by the Land Bank. The Land Bank will not permit their hazardous waste to be commingled with hazardous waste of the Army.

16.10 The Land Bank acknowledges that the Leased Premises are being leased subject to a Finding of Suitability to Lease (FOSL), dated March 28, 1996, which has been provided to the Land Bank.

The parties hereto acknowledge and agree that the Leased Premises consist of parcels identified by the Army and EPA as parcels that require further environmental remediation, or documentation of the completion of remediation, by the Army, and include areas designated as Areas of Contamination, Study Areas, and Areas Requiring Environmental Evaluation.

16.11 Notices

a. Preceding expiration, revocation or termination of this lease, the Lessee shall fully fund the Army's preparation of an updated EBS that will document the environmental condition of the property at that time in conjunction with the close-out survey and report, as described in Article 3.02 of this Lease. The updated EBS will serve to support the FOST for the transfer or conveyance of the property or, if the termination is not for purposes of conveying said property, a comparison of the initial and close-out surveys will assist the Division Engineer in determining any environmental restoration requirements, to be completed by the Lessee in accordance with the condition Article 12 of this Lease.

b. NOTICE OF HAZARDOUS SUBSTANCES. To the extent such information is available on the basis of a complete search of Army files, notice regarding hazardous substances stored for one year or more, known to have been released, or disposed of on the Leased Premises is provided in the notice attached to the MOA (Exhibit B herein). The Land Bank should consult the EBS for more detailed information.

c. NOTICE OF THE PRESENCE OF ASBESTOS. The Leased Premises are known to contain certain amounts of asbestos, such as in, but not limited to, the floor tile, linoleum and associated mastic, asbestos-containing pipe and tank insulation, heating, ventilating and air conditioning vibration joint cloths, exhaust flues, acoustic ceiling treatment, siding, and roofing materials.

The Lessee covenants and agrees that in its use and occupancy of the property, it will comply with all applicable laws relating to asbestos, and the Army assumes no liability for damages for personal injury, illness, disability, or death to the Lessee, 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, alteration, renovations, use, disposition or other activity causing or leading to contact of any kind whatsoever with asbestos on the property described in this Lease, regardless of whether the Lessee, its successors, or assigns, have properly warned or failed to properly warn the individual(s) injured.

d. NOTICE OF THE PRESENCE OF LEAD-BASED PAINT. The Lessee is hereby informed and does acknowledge that all buildings on the Lease Premises, which were constructed or rehabilitated prior to 1978, are presumed to contain lead-based paint. Lead from paint, paint chips, and dust can pose health hazards if not managed properly. Lead exposure is especially harmful to young children and pregnant woman. Before renting pre-1978 housing (target housing) lessors and sublessors must disclose to sublessees the presence of lead-based paint and/or lead-based paint hazards in the dwelling. "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.

(1) 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, dated March 8, 1996, and the Finding of Suitability to Lease, dated March 28, 1996,

which have been provided to the Lessee. All lessees and sublessees must also receive the federally approved pamphlet on lead poisoning prevention. The Lessee hereby acknowledges receipt of the information described in this paragraph.

(2) The Lessee and its sublessees, successors, and assigns, shall not permit the occupancy of any target housing without complying with this section 16.07d and all applicable federal, state, and local laws and regulations pertaining to lead-based paint and/or lead-based paint hazards. Prior to permitting the occupancy of target housing, if required by law or regulation, the Lessee will abate and eliminate lead-based paint hazards by treating any defective lead-based paint surface in accordance with all applicable laws and regulations.

e. NOTICE OF THE PRESENCE OF RADON. Buildings on the Lease Premises may contain unhealthy levels of radon. Available and relevant radon assessment data pertaining to the Lease Premises are in the EBS. Prior to the use of any building for residential use or 24-hour per day occupancy, the Lessee, at its expense, must take appropriate measures to reduce the radon level to safe levels, in accordance with EPA guidelines.

f. NOTICE OF THE PRESENCE OF UXO. Certain portions of the Lease Premises, as designated as A2, A21, and A22 in Exhibit A herein (UXO Parcels), are subject to further UXO clearance by the Army, which clearance shall be undertaken by the Army promptly and at Army expense, subject to availability of funds. The Army will inform the Land Bank in writing when the clearance has been completed.

16.12 Each sublease, tenancy or license agreement made by the Land Bank hereunder shall contain provisions that will ensure the continuing compliance of the Land Bank, and the grantee thereunder, with the FFA, CERCLA, and this Article 16. Furthermore, the Land Bank shall provide to the EPA and DEP, by certified mail, a copy of each sublease or license of the Leased Premises (as the case may be) within fourteen (14) days after the effective date of such transaction. The Land Bank may delete the financial terms and any other proprietary information from the copy of any sublease or license furnished pursuant to this paragraph.

16.13 The Lessee shall not occupy or use parcels A.1 and A.20 of the Leased Premises as described in Exhibit A without the written consent of the Army.

16.14 As contemplated in 40 CFR 51.853 (c)(xix) and 93.153(c)(xix) governing the conduct of General Conformity determinations, implementing Clean Air Act § 176(c), this lease is in furtherance of the transfer of the property through an EDC application and, as soon as the Finding of Suitability to Transfer (FOST) is issued and said property can be conveyed in accordance the requirements of the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9620(h)(3), as amended, and other legal and policy requirements, the Army is legally obligated to convey to the Land Bank by one or more quitclaim deeds, the Lease Premises. The Army does not intend to and does not retain continuing authority to control air pollutant emissions associated with activities conducted on the Leased Premises pending the conveyance(s) within the meaning of 40 CFR 51.853(c)(xix) and 91.153(c)(xix).

ARTICLE 17
DISPUTES CLAUSE

17.01 Except as provided in the Contract Disputes Act of 1978 (41 U.S.C. 601-613) (the Act), all disputes arising under or relating to this lease shall be resolved under this clause and the provisions of the Act.

17.02 "Claim", as used in this clause, means a written demand or written assertion by the Land Bank seeking, as a matter of right, the payment of money in a sum certain, the adjustment of interpretation of lease terms, or other relief arising under or relating to this lease. A claim arising under this lease, unlike a claim relating to this lease, is a claim that can be resolved under a lease clause that provides for the relief sought by the Land Bank. However, a written demand or written assertion by the Land Bank seeking the payment of money exceeding $100,000 is not a claim under the Act until certified as required by section 17.04 below.

17.03 A claim by the Land Bank shall be made in writing and submitted to the Division Engineer for a written decision. A claim by the United States against the Land Bank shall be subject to a written decision by the Division Engineer.

17.04 For Land Bank claims exceeding $100,000, the Land Bank shall submit with the claim a certification that (i) the claim is made in good faith; and (ii) supporting data are accurate and complete to the best of the Land Bank's knowledge and belief; (iii) and the amount requested accurately reflects the lease adjustment for which the Land Bank believes the United States is liable.

17.05 The certification shall be executed by (i) a senior company official in charge of the Land Bank's location involved; or (ii) an officer or general partner of the Land Bank having overall responsibility of the conduct of the Land Bank's affairs.

17.06 For Land Bank claims of $100,000 or less, the Division Engineer must, if requested in writing by the Land Bank, render a decision within 60 days of the request. For Land Bank-certified claims over $100,000, the Division Engineer must, within 60 days, decide the claim or notify the Land Bank of the date by which the decision will be made.

17.07 The Division Engineer's decision shall be final unless the Land Bank appeals or files a suit as provided in the Act.

17.08 At the time a claim by the Land Bank is submitted to the Division Engineer or a claim by the United States is presented to the Land Bank, the parties, by mutual consent, may agree to use alternative means of dispute resolution. When using alternate dispute resolution procedures, any claim, regardless of amount, shall be accompanied by the certificate described in section 17.04 of this Article, and executed in accordance with section 17.05 of this clause.

17.09 The United States shall pay interest or the amount found due and unpaid by the United States from (1) the date the Division Engineer received the claim (properly certified if required), or (2) the date payment otherwise would be due, if that date is later, until the date of payment. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Division Engineer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

17.10 The Land Bank shall proceed diligently with the performance of the lease, pending final resolution of any request for relief, claim, or action arising under the lease, and comply with any decision of the Division Engineer.

ARTICLE 18
MISCELLANEOUS

18.01 Both parties acknowledge and agree that a Notice of Lease will be recorded in the public records, which Notice shall be signed by the parties hereto and identify the Lease Premises.

18.02 The Lease is subject to all existing easements and rights of way of record.

18.03 The provisions of this Lease are not subject to 10 U.S.C. §2662.

18.04 This Lease contains the entire agreement between the parties regarding the lease of the Lease Premises to the Land Bank, and any agreement hereafter made shall not operate to change, modify or discharge this Lease in whole or in part unless that agreement is in writing and signed by the party sought to be charged with it.

18.05 No member or delegate to Congress or Resident Commissioner shall be admitted to any share or part of this Lease or to any benefit to arise therefrom. Nothing herein contained, however, shall be construed to extend to any incorporated company, if the Lease be for the general benefit of such corporation or company.

18.06 Nothing contained in this Lease will make or will be construed to make the parties hereto partners or joint venturers with each other, it being understood and agreed that the only relationship between the Army and the Land Bank hereunder is that of lessor and lessee. Neither will anything in this Lease render or be construed to render either of the parties hereto liable to any third party for debts or obligations of the other party hereto.

18.07 The brief headings or titles preceding each Article are merely for purposes of identification, convenience and ease of reference and will be completely disregarded in the construction of this Lease.

18.08 This Lease is executed in two (2) counterparts, each of which is deemed an original of equal dignity with the others and which is deemed one and the same instrument as the other.

18.09 All personal pronouns used in this Lease, whether used in the masculine, feminine or neuter gender, will include all other genders.

18.10 This Lease shall terminate upon the transfer of all of the Lease Premises to the Land Bank in fee, or otherwise as provided for herein.

18.11 If any provision of this Lease is declared or found to be illegal, unenforceable or void, then both parties shall be relieved of all obligations under that provision. The remainder of this Lease shall remain enforceable to the fullest extent permitted by law.

18.12 Discrimination.

a. The Lessee shall not discriminate against any person or persons or exclude them from participation in the Lessee's operations, programs or activities conducted on the Leased Premises, because of race, color, religion, sex, age, handicap, or national origin.

b. The Lessee, by acceptance of this lease, is receiving a type of Federal assistance and, therefore, hereby gives assurance that it will comply with the provisions of Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. § 2000d); the Age Discrimination Act of 1975 (42 U.S.C. § 6102); and the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794). This assurance shall be binding on the Lessee, its agents, successors, transferees, sub-lessees and assignees.

Article 19
Insurance

19.01. At the commencement of this lease, the Land Bank shall obtain, from a reputable insurance company, or companies, comprehensive liability insurance. The insurance shall provide an amount not less than a combined single limit of $1,000,000 for any number of persons or claims arising from any one incident with respect to bodily injuries or death resulting therefrom, property damage, or both, suffered or alleged to have been suffered by any person or persons resulting from the operations of the Lessee under the terms of this lease.

19.02 The liability insurance policy shall insure the hazards of the demised premises and operations conducted in and on the demised premises, independent contractors, contractual liability (covering the indemnity included in this leases agreement), and shall name the United States as an insured party. Each policy will provide that any losses shall be payable notwithstanding any act or failure to act or negligence of the Land Bank or the United States or any other person; provide that the insurer will have no right of subrogation against the United States; and be reasonably satisfactory to the United States in all respects. Under no circumstances will the Land Bank be entitled to assign to any third party rights of action that it may have against the United States arising out of this Lease. The Land Bank shall require that the insurance company give the Division Engineer thirty (30) days written notice of any cancellation or change in such insurance. The Division Engineer may require closure of any or all of the Lease Premises during any period for which the Lessee does not have the required insurance coverage. The Land Bank shall require its insurance company to furnish to the Division Engineer a copy of the policy or policies, or if acceptable to the Division Engineer, certificates of insurance evidencing the purchase of such insurance. The minimum amount of liability insurance coverage is subject to revision by the Division Engineer every three years or upon renewal or modification of this lease.

19.03 It is the Buyer/Lessee's option to obtain insurance on the structures and improvements of the Lease Premises, for such periods as the Lessee is in possession of the Lease Premises pursuant to this lease, to protect its interest. Nothing herein contained shall be construed as an obligation upon the United States to repair, restore or replace the Lease Premises or any part thereof should it be diminished in value, damaged or destroyed. The purchase price will not be altered should such damage occur and the Lessee has failed to obtain insurance. Any proceeds paid to the United States shall be applied to the purchase price.

19.04 The Land Bank shall maintain worker compensation and employer's liability insurance as required by the Commonwealth of Massachusetts.

IN WITNESS WHEREOF, the parties have executed the Lease as of the day and year first above written.

UNITED STATES OF AMERICA

By: Paul W. Johnson

Paul W. Johnson
Deputy Assistant Secretary of the Army
(Installations and Housing)

THE GOVERNMENT LAND BANK

By: Michael P. Hogan

Michael P. Hogan
Executive Director