



SECOND FIVE-YEAR REVIEW REPORT

LETTERKENNY ARMY DEPOT SOUTHEASTERN AREA NATIONAL PRIORITIES LIST SITE CHAMBERSBURG, PENNSYLVANIA

FINAL



U.S. Army Corps of Engineers
Hazardous, Toxic, Radioactive Waste Branch
Baltimore, Maryland

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SOUTHEASTERN AREA
NATIONAL PRIORITIES LIST SITE
CHAMBERSBURG, PENNSYLVANIA**

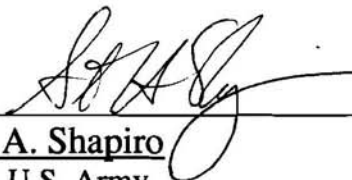
FINAL

**Letterkenny Army Depot
Chambersburg, Pennsylvania**

June 2008

This report documents completion of the second five-year review for the Letterkenny Army Depot Southeastern Area as required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in accordance with CERCLA §121 (c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCO), part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

United States Department of the Army

By: 
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Commanding
Letterkenny Army Depot

Date: 19 JUN 2008

EXECUTIVE SUMMARY

The United States (U.S.) Army, with review and input from the U.S. Environmental Protection Agency (U.S. EPA) and the Pennsylvania Department of Environmental Protection (PADEP) conducted the first five-year (statutory) review of the remedial actions implemented at the Operable Unit (OU) 1 (K–Areas), Southeastern (SE) Area, Letterkenny Army Depot (LEAD), Franklin County, Pennsylvania. The results of the first five-year review were documented in the five-year report submitted in October 2001. The remedial action was completed on September 30, 1995. The trigger for the first five-year review was the actual start of construction in August 1993. The trigger date for subsequent 5-year reviews is the date EPA concurs with the previous 5-year review. The first 5-year review was signed by the Army on 25 October 2001 (LEAD, 2001) and EPA concurred on 6 November 2001 (EPA Region III, 2001). Therefore, the trigger date for the second five-year review is 6 November 2001. The purpose of this report is to present results of the second five-year review, which was conducted between 1 September 2006 and August 2007.

Currently, there are fifteen (15) OUs established for the SE Area NPL Site. At the time of the first five-year review, there were only 12 OUs (1 through 12). Since the first review, OU 3 has been divided into two OUs (3A and 3B), and OU 13 and OU 14 have been added. Remedies have been selected for SE OU 1, SE OU 2, SE OU 3B, SE OU 4, portions of SE OU 8, SE OU 10, and SE OU 13. Remedies for the remaining OUs, including the remaining sites of which SE OU 8 is comprised, have not yet been selected.

Deficiencies were identified during the five-year review for SE OU 1, SE OU 2, and SE OU 8. Follow-up actions for mowing for cap maintenance are needed for SE OU 1; deficiencies from the first five review have been completed. The Land Use Controls Remedial Design to be prepared for SE OU 2 as specified in the ROD (Shaw, 2006a LKD.RT-284) has not yet been prepared and needs to be completed. An amendment to the LEAD Installation Master Plan needs to be completed to ensure land use controls are enforced for SE OU 2. For SE OU 8, a deficiency noted was that deeds for the Phase II road parcels do not reference land use restrictions as required by the Phase II ROD; however, a deed of correction was completed during the Five Year Review process and was recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008. Also for SE OU 8, the BRAC Environmental Coordinator (BEC) has been signing annual Land Use Control inspection reports instead of the Letterkenny Army Depot Commander; a Land Use Controls Assurance Plan Memorandum of Agreement (LUCAP MOA) amendment is in progress.

Subsequent Phase I and II deeds reviewed in early January 2008 discovered that there was no follow through on the requirement (stated in the deed/leases) to provide to the GRANTOR, EPA, and PADEP, copies of the deed or lease 14 days after the effective date of the transaction. Also, it was discovered upon review of select leases that that not all leases reference the corresponding Phase I or II deed for land use restrictions. The Army is working with LIDA and CVBP tenants to determine an effective method to make sure that the deeds/leases are sent to the specified parties. In addition, the Army needs to complete the review of leases and revise leases that do not reference the appropriate land use controls in the deed.

These deficiencies, in the short term, do not impact the protectiveness of the remedies for SE OU 1, SE OU 2, or SE OU 8 under current conditions.

The Uniform Environmental Covenant Act (UECA) is a Pennsylvania law that was passed in November 2007 and became effective on February 19, 2008. This act provides a standardized process for creating, documenting and assuring the enforceability of activity and use limitations on contaminated sites. Under UECA an environmental covenant is required whenever an engineering or institutional control is required to demonstrate the attainment of an Act 2 remediation standard for any cleanup conducted under an applicable Pennsylvania environmental law. Under §6517(b) of the Act, an instrument created prior to the effective date of UECA which establishes activity and use limitations to demonstrate attainment or maintenance of a standard is to be converted to an environmental covenant within 60 months of the effective date unless conversion is waived by the PADEP. An environmental covenant is not required for property owned by the Federal Government, only on that property transferred to a Non-Federal entity or individual. As per the UECA requirement, BRAC property that was transferred prior to effective date of the law would be required to have an environmental covenant put in place within 60 months of February 19, 2008. Environmental Covenants, in the form of deed restrictions, currently exist, where necessary, for transferred BRAC parcels. However, the Army intends to begin the process to comply with UECA with the goal for completion before the end of the 60 month period.

Overall, the remedies are functioning as designed and are being operated and maintained in an appropriate manner; however, the existing groundwater remedy for SE OU 10 does not address risks from long-term exposure through the vapor intrusion pathway (VIP). Since the issuance of the Record of Decision, new information has been developed regarding the toxicity of TCE and methods to evaluate potential vapor intrusion from volatile organic compounds (VOCs). Most buildings overlying the shallow groundwater plume have not been evaluated for this pathway because, at the time of the ROD, the VIP was determined to be an incomplete pathway based on an evaluation using methods that are now considered inaccurate for preferential pathways situations. However, the current remedy potentially could reduce the contamination to levels that are acceptable based on risk calculations for commercial/industrial use. The EPA continues to evaluate this potential pathway and the current remedy at SE OU 10 until a determination can be made regarding its effectiveness in reducing the mass of the VOCs in the site groundwater. Until analysis is complete, EPA is deferring making a protectiveness statement. EPA anticipates that analysis and validation will take approximately one year to complete (December 2008), at which time a protectiveness determination will be made.

Site Identification	
Site Name: SE Areas, Letterkenny Army Depot	EPA ID: PA6213820503
Region: 03 State: PA	City/County: Franklin
Site Status	
NPL Status: Final	
Remediation Status: Ongoing Operation	
Multiple OUs: Yes	
Construction Completion Date: September 2007	
Has the site been put into reuse?	Partial reuse
Funding Source: ER,A and BRAC	
Review Status	
Lead Agency: U.S. Army	
Who Conducted the review (EPA Region, State, Federal Agency): Federal Facility	
Author Name: Joe Petrasek	
Author Title: LEAD ER,A Project Manager	
Author Affiliation: U.S. Army	
Review Period : From: 1 September 2006	To: 30 January 2008
Date(s) of Site Inspection: 15 August and 17 August 2007	
Type of Review: Statutory	Number of Review: 2
Triggering Action Event: Remedial Action Start	
Trigger Action Date: for first review - 11 August 1993; for second review 06 November 2001(EPA concur date)	
Due Date: 6 November 2006	

FIVE YEAR REVIEW SUMMARY REPORT

Seven Minor Deficiencies Were Noted:

- Follow-up with mowing for cap maintenance (associated with SE OU 1).
- A Land Use Controls Design Plan and amendment to LEAD Master Plan need to be completed to ensure land use controls are enforced (associated with SE OU 2).
- Deeds for the Phase II road parcels do not reference land use restrictions as required by the Phase II ROD (associated with portions of SE OU 8) – deed of correction was completed during the Five Year Review process and was recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008.
- The BRAC Environmental Coordinator (BEC) has been signing annual Land Use Control inspection reports instead of the Letterkenny Army Depot Commander (associated with portions of SE OU 8) – LUCAP MOA amendment is in progress.
- Copies of deeds/leases are not being sent to the required parties as stated in the deed/lease as follows: CERCLA Remediation Section, Paragraph C.2. Deed/Lease: Within 14 days after the effective date of the transaction, GRANTEE, its successors and assigns, will provide to the GRANTOR, EPA, and PADEP, copies of the deed, lease, or other conveying instrument evidencing such transaction.
- A lease from a Cumberland Valley Business Park (CVBP) tenant was reviewed and discovered not to reference the corresponding Phase I Deed, thus confirming that not all leases reference the corresponding Phase I or II deed.
- The LEAD Master Plan does not explicitly restrict land use at SE OU 3A, SE OU 5, SE OU 7, remaining portions of SE OU 8, SE OU 9, SE OU 11, or SE OU 12 to commercial/industrial.

These deficiencies do not currently affect the protectiveness of the remedies under current conditions; however, future protectiveness may be affected if controls are not implemented.

Recommendations and Follow-up Actions:

- An Explanation of Significant Differences (ESD) was completed for SE OU 1 to implement land use controls that will restrict the use of the property and protect cap integrity. A Cap Maintenance Plan was also developed for SE OU 1 to further protect the cap integrity.
- The LUCAP MOA will also be revised to allow the BEC to sign the annual reports. Note: The deed of correction for the Phase II road parcels (SE OU 8) to provide additional legal certainty that the Land Use Restrictions are being fully implemented was completed during the Five Year Review process and was recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008.
- For SE OU 2, the Army needs to prepare a Land Use Controls Design Plan and amendment to LEAD Master Plan for LUCs.
- The Army needs to follow-through with the LUCAP MOA amendment for the signature authority.
- The Army is working with LIDA and CVBP tenants to determine an effective method to make sure that the deeds/leases are sent to the specified parties. In addition, the Army needs to complete the review of leases and revise leases that do not reference the appropriate land use controls in the deed.
- The LEAD Master Plan will be amended to include land use restrictions for SE OUs 3A, 5, 7, 8, 9, 11, and 12.

Protectiveness Statement(s):

The remedies at SE OU 1, SE OU 2, and SE OU 8 are considered short-term protective of human health and the environment. Once the stated deficiencies are addressed, these operable units will be considered protective of human

health and the environment. No Further Action RODs were signed for SE OU 4 and SE OU 13 and are considered protective of human health and the environment. A No Action ROD was signed for SE OU 3B and is considered protective of human health and the environment.

EPA is deferring making a protectiveness statement for SE OU 10 related to potential risks from long-term exposure through the vapor intrusion pathway. Most buildings overlying the shallow groundwater plume have not been evaluated for this pathway. However, the current remedy potentially could reduce the contamination to levels that are acceptable based on risk calculations for commercial/industrial use. The EPA continues to evaluate this potential pathway and the current remedy at SE OU 10 until a determination can be made regarding its effectiveness in reducing the mass of the VOCs in the site groundwater.

The remedies for the following SE OUs have not been selected at this time:

SE OU 3A (Disposal Area VOC-Contaminated Groundwater)

SE OU 5 (Areas A and B Contaminated Soils)

SE OU 6 (VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road [Off-Post, Rowe Run Drainage System])

SE OU 7 (Truck Open Storage Area)

SE OU 8 (BRAC Waste Sites) (note: remedies for portions of this OU have been selected)

SE OU 9 (Landfill J)

SE OU 11 (Northern Southeast Industrial Area VOC-Contaminated Groundwater North of Gate 6)

SE OU 12 (Landfill G)

SE OU 14 (Former Test Track Area)

Other Comments:

None

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LIST OF ACRONYMS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
ARARs	applicable or relevant and appropriate requirements
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BRAC	Base Closure and Realignment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeters
CVBP	Cumberland Valley Business Park
DA	Disposal Area
DAF	dilution attenuation factor
DCE	1,2-dichloroethene
DLA	Defense Logistics Agency
DNAPL	dense non-aqueous phase liquids
DRMO	Defense Reutilization Marketing Office
dscf	dry standard cubic foot
EE/CA	engineering evaluation/cost analysis
ESD	Explanation of Significant Differences
ESE	Environmental Science and Engineering, Inc.
FCGA	Franklin County General Authority
FFS	Focused Feasibility Study
fixated	exceeded TCLP standards for lead were treated
FOSLs	Findings of Suitability to Lease
FOST	Finding of Suitability to Transfer
ft/day	feet per day
H ₂ O ₂	hydrogen peroxide
HRS	Hazard Ranking Score
IAG	Interagency Agreement
IC	Institutional Control
IWTP	Industrial Wastewater Treatment Plant
IWWS	Industrial Wastewater Storm Sewers
LDR	Land Disposal Restriction
LEAD	Letterkenny Army Depot
LT ³	Low Temperature Thermal Treatment

LUCAP MOA	Land Use Controls Action Plan Memorandum of Agreement
LUCs	Land Use Controls
mph	miles per hour
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NSIA	Northern Southeast Industrial Area
OBP	Oil Burn Pit
OU	Operable Unit
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PCBs	polychlorinated biphenyls
PDO	Property Disposal Office
PP	Proposed Plan
ppb	parts per billion
RA	Risk Assessment
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SE	Southeastern Area
SIA	Southeast Industrial Area
SMSR	Southern Martinsburg Shale Region
SSIA	Southern Southeast Industrial Area
SSL	Soil Screening Level
SVOCs	semivolatile organic compounds
TBC	To Be Considered”
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TCLP	Toxic Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
U.S. EPA	U.S. Environmental Protection Agency
USAF	U.S. Air Force
VOCs	Volatile organic compounds
WESTON®	Weston Solutions, Inc.

1. INTRODUCTION

The United States (U.S.) Army, with review and input from the U.S. Environmental Protection Agency, Region III (U.S. EPA III) and the Pennsylvania Department of Environmental Protection (PADEP) conducted the first five-year (statutory) review of the remedial actions implemented at the Operable Unit (OU) 1 (K–Areas), Southeastern Area, Letterkenny Army Depot (LEAD), Franklin County, Pennsylvania. The first five-year review was conducted from 31 July 2001 to 31 October 2001, and the results were documented in the five-year report submitted in October 2001. The first 5-year review was signed by the Army on 25 October 2001 (LEAD, 2001) and EPA concurred on 06 November 2001 (EPA Region III, 2001) (USACE, 2001 LKD.RT-198). Therefore, both the final report date and the trigger date for the second five-year review is 06 November 2001. The purpose of this report is to present results of the second five-year review, which was conducted between 1 September 2006 and August 2007.

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 found during the review, if any, and recommendations to address them. The lead agency (U.S. Army) must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA 121(c), as amended states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

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

In addition, if after such review it is the judgment of the President that action is appropriate at such site in accordance with CERCLA §104 or §106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

Currently, there are fifteen (15) OUs established for the Southeastern Area (SE) Area NPL Site. At the time of the first five-year review, there were only 12 OUs (1 through 12). In 2002, SE OU 3 was divided into two OUs (SE OU 3A and SE OU 3B) so that the area upgradient of the VOC-contaminated groundwater from the Disposal Area source could be managed separately as SE

OU 3B. SE OU 13 and SE OU 14 have also been added. SE OU 13 encompasses the Southern Martinsburg Shale Region (SMSR), a region at LEAD that contains an area of shale bedrock surrounded by downgradient limestone bedrock. SE OU 13 was originally part of SE OU 10 and SE OU 11, but became a separate OU based on the results of groundwater sampling conducted from 1999 through 2002, which showed no VOC-contaminated groundwater. SE OU 14 was created in 2007 to track sites in Army-retained land that were formerly administered under the BRAC program and are now in the ER,A program as a result of the revised BRAC boundary. The trigger for the first five-year review was the remedial action start date for the SE OU 1 (K-Areas), as shown in U.S. EPA's CERCLIS3/WasteLAN database: 11 August 1993. In addition, this (second) review, and subsequent reviews are also triggered by other operable units for which there is a final remedial action in-place (not including No Action or No Further Action Records of Decision [RODs]). This includes portions of SE OU 8 (BRAC Phase I and Phase II property transfers completed in November 1998 and May 2002), SE OU 2 (Industrial Waste Water Sewer System, ROD signed in September 2006), and SE OU 10 (SSIA VOC-Contaminated groundwater south of gate 6 [Conococheague Drainage System], ROD signed in September 2006). Since all the OUs are contained in one 5-year review report, the actual trigger date for subsequent the second five-year review is 06 November 2001. Specifically, this five-year review is being activated by the continuing presence of contaminants at the site above levels that allow for unlimited and unrestricted use. In addition, this five-year review discusses the status of the remaining thirteen OUs.

The following subsections provide a brief discussion and current status of each OU. Documents that are referenced in this 5-Year Review and have a LEAD Administrative number (e.g., LKD.RT-001) associated with them can be viewed by clicking the following link <http://209.235.100.233/letterkennylibrary/Lib/docindex.htm>. This link will direct your web browser to LEAD's BRAC/Restoration Administrative Record.

1.1 SE OU 1—K-AREAS

The K-Areas were used for the disposal of waste solvents used in painting, paint stripping, and degreasing operations at LEAD. The K-1 Area was in use from 1957 to 1970. The K-2 area was in use from 1965 to 1970 and included five partially revetted areas used to accumulate solid waste prior to disposal into a nearby landfill. The K-3 area was in use as a drum storage area from 1965 to 1970.

An Initial Installation Assessment of LEAD was performed in 1978 and the Discovery Phase was initiated in January 1979. In 1983, Roy F. Weston, Inc. (WESTON®) completed an investigation of the Disposal Area (DA), which included areas K-1, K-2, and K-3. This investigation revealed the presence of volatile organic compounds (VOCs), including TCE, 1,2-dichloroethene (DCE), and 1,1,2,2-tetrachloroethane at elevated concentrations in K Areas. In 1992, Environmental Science and Engineering, Inc. (ESE) conducted a soil boring program to delineate the boundaries of the K Areas. This effort discovered that the K Areas contained higher levels of VOCs than originally thought. Polychlorinated biphenyls (PCBs), metals, and semivolatile organic compounds (SVOCs) were also discovered.

The Record of Decision (ROD) (LEAD, 1991 LKD.RT-061) and an Explanation of Significant Differences (ESD) for SE OU 1 were issued in 1991. The ESD was for clarification of applicable or relevant and appropriate requirements (ARARs). Based on the remedy selected in the ROD, a remedial action was initiated at SE OU 1 in 1993 and was completed in September 1995. Per the Cap Inspection Standard Operating Procedure, yearly inspections of the K-1, 2, & 3 capped areas are required (and corrective actions if necessary) to maintain protectiveness of human health and the environment.

SE OU 1 soils were treated from July 1993 to December 1994. Contaminated soil was excavated to bedrock and to the defined horizontal limits, except at area K2 where just the upper 3 feet of soil was removed, treated with LT^3 , and fixated as necessary. The soil was sampled to confirm it met both the TCE remediation criteria and the Toxicity Characteristic Leaching Procedure (TCLP) requirements for metals. All soil (including fixated material) was placed back in the original excavations upon successful treatment. A residual waste cap was installed over the treated soil areas in October 1995. The *Technology Remedial Action Report*, which documents the remedial actions conducted at the K Areas, was finalized in August 1997 (McLaren Hart, 1997).

Following the remedial action, a second ESD was issued in 2005. This ESD provided for land use controls and a Cap Inspection Plan to protect the integrity of the cap. An inspection of the cap conducted in August 2007 indicated that the vegetative cover, drainage system, and liner were intact.

1.2 SE OU 2—INDUSTRIAL WASTEWATER SEWER SYSTEM

Problems with the Industrial Wastewater Sewers (IWWS) were first identified in the 1993 Remedial Investigation (RI) Report for the Southeastern Area (ESE, 1993 LKD.RT-086). Studies of the IWWS lines showed that numerous breaks and/or leaks existed in both the IWWS and Stormwater Sewer Lines. Leak testing and sampling indicated that VOCs had leaked from the IWWS and migrated to the soil/bedrock interface. Emergency repairs were made to the IWWS beginning in October 1994 and completed in December 1995. An engineering evaluation/cost analysis (EE/CA) was prepared by LEAD to address the removal of contaminated soils associated with the leaking IWWS lines (Fluor Daniel, 1996 LKD.RT-119). LEAD conducted an emergency removal action of the IWWS-contaminated soils in summer 1997. A Proposed Plan for SE OU 2 was finalized in May 2005 (Shaw, 2005a LKD.RT-290) and a final ROD was completed in August 2006 (signed in September 2006) (Shaw, 2006a). The selected remedy for SE OU 2 was cleaning followed by abandonment of the sewer and drain lines at Buildings 37 and 57 to prevent future use of the existing sewers. The risk assessment showed that there are acceptable risks for industrial/commercial use; therefore, the remedy included land use controls to prevent the use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds. The remedial action was completed in spring 2006. Currently, the wastewater from Building 37 is pumped into aboveground storage tanks then transported for treatment to the IWTP at LEAD because it does not meet the newly established LIDA pre-treatment standards for discharge into the LIDA-owned sanitary sewer system.

Wastewater from Building 57 continues to be discharged to the LIDA-owned sanitary sewer system. The Army is currently considering whether to continue the wastewater transport to the IWTP or to install a replacement force main (in the vicinity of the abandoned force main) to direct flow from both buildings to the IWTP.

1.3 SE OU 3A—DISPOSAL AREA VOC-CONTAMINATED GROUNDWATER

SE OU 3A is associated with on-post groundwater contamination in the DA. Figure 4 is a map showing the locations of the groundwater OUs at LEAD. The K Areas and Area A Spill Area were the source of groundwater contamination consisting primarily of chlorinated solvents that are present at SE OU 3A. Although the primary sources of contamination have been addressed, VOCs are still being detected; most likely due to the presence of contaminated subsurface soils and VOC contamination within the bedrock matrix, which is continuing to act as a secondary source.

Several pilot studies and site investigations have been conducted at the site, including: A recirculation well Pilot Study, an In-situ H₂O₂ Pilot Study (April 2000), and additional investigations to verify the vertical extent of groundwater contamination as requested by EPA (2005 to 2006). The results of the additional investigations will be reported in focused feasibility study (FFS). Additionally, a vapor intrusion pilot study was conducted from July 2004 to January 2006, and a draft report was submitted to EPA and PADEP in May 2006 (WESTON, 2006a). The FFS Draft Report is expected to be produced in 2008. A remedy will be selected based on the completion of the feasibility study and documented in a ROD.

1.4 SE OU 3B—AREA UPGRADIENT OF VOC-CONTAMINATED SOURCE IN SE OU 3A

SE OU 3B addresses the area upgradient of the VOC-contaminated groundwater from the DA source. Groundwater sampling was initiated in August 2003 and a final SI Report was completed in May 2005 (WESTON, 2005a LKD.RT-265). A Proposed Plan was issued for public review in May 2005 (WESTON, 2005b LKD.RT-267). A No Action ROD (WESTON, 2006b LKD.RT-275) and a FOST (WESTON, 2006c LKD.RT-279) were completed and signed in June 2006. The ROD specifies no action for SE OU 3B groundwater and for soil associated with four parcels that consist of a portion of SE OU 8; two of these parcels are to be transferred as part of the Phase IV BRAC property transfer.

1.5 SE OU 4—STORMWATER SEWER LINES AND ASSOCIATED DRAINAGEWAYS

SE OU 4, which is located in both the BRAC and ER,A portions of LEAD, consists of the stormwater sewer system lines, associated sediments, and drainageways. Prior to installation and connection to the IWTP, industrial wastewaters from the SE Area at LEAD were discharged, untreated, to the Depot stormwater sewer system. Wastewater generated south of Gate 6 was run

through oil/water separators then to the stormwater sewers. The Southern portion of the depot was connected to the IWTP system in the 1970's. Per an EE/CA, contaminated sediments were removed and filling of associated sinkholes was completed by the spring of 1997. A total of 1,037 tons of contaminated sediment was removed from the Southeast Drainageway and the Rowe Run Drainageway and disposed of as residual waste.

A final ROD (Shaw, 2005b LKD.RT-270) was completed in July 2005 (signed August 2005). The selected remedy was No Further Action.

1.6 SE OU 5—AREA A AND B CONTAMINATED SOILS

SE OU 5 is located in the ER, A portion of LEAD. Areas A and B were initially investigated in the 1980s. Contamination detected in Areas A and B is attributed to the K Areas and the Spill Area in Area A. Contaminants detected in Area A consisted primarily of total petroleum hydrocarbons (TPH) and metals, with a small amount of VOCs. The most recent rounds of sampling to delineate the extent of contamination were completed in July 1995, when a localized spill area of elevated VOC concentrations was identified. An EE/CA was prepared and an emergency removal action was conducted in summer 1997 to excavate and dispose of the VOC-contaminated soil in the Spill Area of Area A (Fluor Daniel, 1997 LKD.RT-129). The remainder of Area A was evaluated as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) RI process. A Final RI/RA for both Area A and Area B was completed in October 2004 (IT, 2004b LKD.RT-259), which also documented the post-removal action conditions for the Spill Area of Area A. An FS will be prepared based on the findings and conclusions in the RI/RA.

Area B was a former oil burning pit (OBP). The soil in this area was found to contain TPH, metals, and a small amount of VOCs; groundwater was also found to contain VOCs. Area B was further evaluated as part of the CERCLA RI process. A Final RI/RA was completed in October 2004 (IT, 2004b LKD.RT-259), published separately as an RI and an RA. A worm study was conducted in accordance with comments from EPA Biological Technical Assistance Group (BTAG), and as a result, a draft addendum to the ecological RA was submitted in September 2006. The RA addendum is currently being revised to address EPA comments. An FS will be prepared following resolution of EPA comments on the ecological RA.

1.7 SE OU 6—VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6 AND EAST OF EAST PATROL ROAD (ROWE RUN DRAINAGE SYSTEM)

SE OU 6 includes the discharge points of 6 VOC-impacted off-post springs and off-post VOC-contaminated groundwater associated with SE OU 3A and SE OU 11, including residential drinking water wells. A final dye study, which included the placement of dye in monitor wells located near LEAD's property line and in Rowe Run (boundary trace), was initiated in September 1995 and completed in December 1995.

In addition to the springs, off-post wells were also evaluated as part of SE OU 6. Approximately 50 wells were sampled and results were analyzed for VOC and metals concentrations during a period of 2 years. The results from this sampling indicated no additional VOC-contaminated off-post wells other than those previously identified.

A third study area of the off-post groundwater impacts was an evaluation of farm animals and farm animal products located on farms near the SE Area. Samples of eggs, milk, and meat were collected from numerous farms. Results from this sampling did not indicate the presence of VOCs or metals in the various media at concentrations above literature values or regional background levels.

The following is a chronology of recent activity at SE OU 6:

- July 2002—A draft RI/RA Report for SE OU 6 was submitted.
- November 2004—A final RI was submitted in November 2004 (Shaw, 2004b LKD.RT-296).
- 2005 to 2006—Additional investigations conducted to verify the vertical extent of groundwater contamination, as requested by EPA.
- July 2004 to January 2006—A vapor intrusion pilot study was conducted and a draft summary report was submitted to EPA and PADEP in May 2006 (WESTON, 2006). EPA comments were received in August 2006.
- July 2006—A final RA was submitted in July 2006 (Shaw, 2006c).
- June 2007—Work Plan for the Evaluation of the Vapor Intrusion Pathway at SE OUs 6 and 11 finalized (WESTON, 2007a LKD.RT-297).

1.8 SE OU 7—TRUCK OPEN STORAGE AREA

Sampling of SE OU 7 was initially conducted in summer 1994. This area consisted of an open storage area for trucks and an abandoned septic system used as an oil/water separator (see Figure 3). Analytical results from this sampling have shown no significant soil contamination present at SE OU 7. The detected groundwater contamination is attributable to SE OU 10, and not SE OU 7. During the investigation of SE OU 7, an abandoned septic system was found. The abandoned septic system was used as an oil/water separator for disposal of “boiler slops” and sanitary sewage from LEAD holding tanks. A removal action was conducted in spring 1997, which consisted of characterization, solidification and removal of the tank contents, backfilling of the tank, and restoration of the site.

A supplemental investigation was conducted in 1999 for the presence of polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans), and polychlorinated biphenyls (PCBs). The results of the investigation were published in July 2000 (WESTON, 2000d LKD.RT-177) and showed that the presence of dioxins/furans in burned material was at concentrations greater

than the published (EPA Region III) industrial direct contact human health level. A time-critical removal action was completed in this area in December 2000.

A draft Current Conditions Human Health SLRA and SLERA was submitted for the TOSA/WOS site (WESTON, 2007b), which was submitted in August 2007. Regulatory review was completed in November 2007. It is expected that the site will be evaluated as protective of human health and the environment for the future intended commercial/industrial use. Both SE OU 7 and remaining sites in SE OU 8 will be included in the Phase V BRAC property transfer, which will take place following the completion of the FS, PP, ROD, and FOST for the Phase V BRAC Parcels.

1.9 SE OU 8—BRAC WASTE SITES

SE OU 8 is composed of potential waste sites identified in the to-be-excessed portion of the SE Area. SE OU 8 is being investigated under the BRAC investigation program. The locations of the SE OU 8 sites are shown in Figure 5. Additional information is provided in Section 3.

Property transfers under BRAC are being performed in phases. There are three phases of property transfer completed to date: Phase I (November 1998), Phase II (May 2002), and Phase III (January 2004). The most recent ROD was signed in August 2006 for the Phase IV BRAC Property transfer (WESTON, 2006b LKD.RT-275). A summary of the status of the phases of BRAC property transfers within the SE OU 8 area is provided in Section 3.

The BRAC boundary was revised in 2007 as a result of an agreement between LIDA and the LEAD, as sanctioned by the deputy assistant Secretary of the Army, to allow the depot to retain 225 acres of land adjoining the facility. As a result of the revised BRAC boundary, some of the sites that were administered under SE OU 8 are now administered under a new operable unit, SE OU 14, because they are to remain located in Army-retained land.

An FS is currently being prepared for the Phase V BRAC Parcels, which include 19 SE OU 8 BRAC waste sites and SE OU 7, the TOSA/WOS site. Once finalized, the Army will move toward completing the PP, ROD, and FOST for the Phase V BRAC property.

1.10 SE OU 9—LANDFILL J

SE OU 9 consists of a landfill (Landfill J) located west of Building 320. The location of Landfill J was discovered in 1995 while trenching for utilities (see Figure 3). The extent of the landfill was determined using geophysical techniques and trenching. The characteristics of the soils and groundwater were evaluated through several sampling efforts. An emergency removal action was conducted in June 2001 and a draft Removal Action Completion Report, which included the RI/RA data, was prepared in June 2002. A finalized Removal Action Summary was completed in October 2004 (Shaw, 2004c LKD.RT-261). A draft FS was completed in May 2005 (Shaw, 2005c) and is being revised to address regulatory review comments.

1.11 SE OU 10—SSIA VOC-CONTAMINATED GROUNDWATER SOUTH OF GATE 6 (CONOCOCHEAGUE DRAINAGE SYSTEM)

SE OU 10 consists of contaminated groundwater south of Gate 6. SE OU 10 was created when SE OU 3 was divided at the groundwater/surface water divide near Gate 6 (see Figure 4). The sources of the groundwater contamination for SE OU 10 are the formerly leaking IWWS lines in the vicinity of Building 37 (VOC-contaminants) and a release from a diesel tank fuel line in the vicinity of Building 37. Extensive work has been completed in the Building 37 area to design technically sound and cost-effective techniques to mitigate the contaminated on-site groundwater. An extended pilot study for enhanced bioremediation techniques to treat the groundwater, is currently underway at Building 37. The FFS Final Report was issued in September 2003 (WESTON, 2003g LKD.RT-237). A final Proposed Plan was completed in February 2005 (WESTON, 2005c LKD.RT-264), and a ROD was completed in March 2006 (WESTON, 2006d LKD.RT-274). The selected remedy for SE OU 10 was Enhanced Biodegradation with Monitored Natural Attenuation and Land Use Controls (to prevent contact with contaminated groundwater until the time the groundwater is safe for use). A final Remedial Action Work Plan was completed in April 2007 (WESTON, 2007c LKD.RT-294). The final sodium lactate injection for the selected remedy was completed at SE OU 10 in June 2007. A long-term groundwater monitoring program has been implemented for SE OU 10 and the most recent sampling event was conducted in August 2007.

1.12 SE OU 11—NSIA VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6

SE OU 11 consists of the VOC-contaminated groundwater associated with the IWTP lagoons and IWWS gravity lines. The groundwater discharges off-post (see SE OU 6). A pilot study was initiated in September 2001 to evaluate the feasibility of treating dense, non-aqueous phase liquids (DNAPL) sources and reducing off-site contaminant migration concentrations at the property line. This study was completed by January 2003. Additional investigations to verify the vertical extent of groundwater contamination, as requested by EPA, were conducted from 2005 to 2006. The results of the additional investigations will be reported in focused feasibility study (FFS).

A vapor intrusion pilot study was conducted from July 2004 to January 2006, and a draft report was submitted to EPA and PADEP in May 2006 (WESTON, 2006a). In order to address residual groundwater contamination associated with SE OUs 6 and 11 at LEAD, a final Work Plan for the Evaluation of the Vapor Intrusion Pathway at SE OUs 6 and 11 was submitted in June 2007 (WESTON, 2007a). Vapor intrusion sampling will be conducted in the winter of 2007 and in the spring/early summer of 2008 on-post at SE OU 11 and off-post (SE OU 6) in the Rowe Run Valley. The FFS Draft Report is expected to be produced in 2007. A remedy will be selected based on the completion of the feasibility study and documented in a ROD.

1.13 SE OU 12—LANDFILL G

The LEAD Installation Assessment (IA) identified this area as active from 1964 through 1978, when it was leveled to match the existing terrain. The area was used to dispose of residue from nearby trash revetments and IWTP sludge. Visibly contaminated leachate (metals) was reported to emanate from this site into a nearby drainage ditch. A 1991 SI identified several magnetic anomalies, which were cross trenched in 1993. All of the anomalies were related to buried metallic objects. This area contained empty buried drums that formerly contained caustics. Sampling indicated that these buried drums had caused no environmental problems. Another anomaly showed a large number of solvent containers, which were drummed and disposed of in this area. This site consists of contaminated soil, groundwater, and surface water. The 1995 SI follow-on identified this site as requiring an RI. A Work Plan for the RI was finalized in June 2006 (Shaw, 2006b LKD.RT-277).

The RI field work was completed in July 2006. The test trenching conducted during the first round of the RI showed that primarily municipal-type waste is present in the landfill. The analytical results for the RI indicated that additional test trenching, soil sampling, and analysis needed to be conducted to further assess elevated levels of PCBs. The additional site investigation work was conducted in July 2007. Containers of black tar-like substance, thought to be discarded adhesive material, were encountered during the second round of the RI. The material had a petroleum-like odor. The size of the area where the containers were found is approximately 10 ft by 15 ft and 6 ft deep. The containers were encountered at about 4 ft below ground surface and the depth of the affected area did not extend beyond 6 ft deep. The preliminary analytical results show that contaminants of potential concern are benzene, lead, zinc and 2-methylphenol. A removal action, performed in January 2008, consisted of the removal of containers and associated waste along with affected soils. A final fieldwork report will be submitted by Shaw Environmental after the second round of sampling is completed.

1.14 SE OU 13—SOUTHERN MARTINSBURG SHALE REGION GROUNDWATER

SE OU 13 encompasses BRAC property. The SMSR is a region at LEAD that contains an area of shale bedrock surrounded by downgradient limestone bedrock. This shale bedrock is generally more resistant to weathering than the surrounding limestone formations and therefore, forms the “highland” or elevated ridge areas in the area of the Phase III parcels. Several groundwater/surface water divides along this ridge in the SMSR cause groundwater to flow radially away from the SMSR.

The SMSR was originally considered to be part of VOC-contaminated groundwater SE OU 10 and SE OU 11. Based on its geologic and topographic setting, it was thought that the SMSR could be unaffected by the known and potential VOC sources located downgradient of the SMSR because groundwater flows from the SMSR into the lower lying valley areas underlain by limestone. Therefore, a groundwater investigation was initiated in 1999 to establish that the SMSR was not impacted by any previous industrial activities at Letterkenny. The results of four rounds of groundwater sampling, conducted in late 1999 through 2000 and in 2002, showed no

VOC groundwater contamination in the SMSR. Based on this finding, the SMSR was redefined as SE OU 13, and was included in the No Further Action ROD for the Phase III Parcels in August 2003 (WESTON, 2003e LKD-RT-239). SE OU 13 was part of the Phase III BRAC property transfer completed in January 2004.

1.15 SE OU 14—FORMER TEST TRACK AREA

SE OU 14 was created in 2007 to track sites in Army-retained land that were formerly administered under the BRAC program and are now in the ERA program as a result of the revised BRAC boundary. SE OU 14 consists of the Former Test Track in the Disposal Area and Areas E and F (AEDBR Sites LEAD-114, 033, and 049), and the Building 349 Soil Staging Area (AEDBR Site LEAD-114). The RI/RA for the Former Test Track and Areas E and F was finalized in 2004 (WESTON, 2004 LKD.RT-251); this RI/RA showed that risks are within acceptable levels for commercial/industrial use.

2. SITE CHRONOLOGY

Table 1 lists the chronology of events for the Southeastern Area site.

Table 1
Chronology of Site Events

Event	Date
Initial Discovery	1978
Pre-NPL Responses	RI/FS Completed 1983, LKD.RT-086
NPL Listing	22 July 1987
Federal Interagency Agreement	3 February 1989, LKD.RT-026
RI/FSs Complete	June 1993 (RI, SE OU 1 and SE OU 3 RI), LKD.RT-086 July 1994 (FS, SE OU 1 and SE OU 3 RI, FS), LKD.RT-95 July 1994 (RA, SE OU 1 and SE OU 3 RI, FS), LKD.RT-96 April 1998 (Phases I and II BRAC, which are portions of SE OU 8) September 1998 (SE OU 2 RI), LKD.RT-220 June 2002 (SE OU 2 RA), LKD.RT-246 2003 (Phase III BRAC, which consists of SE OU 13 and portions of SE OU 8) September 2003 (SE OU 4, Removal Action Completion Report, RI/RA), LKD.RT-241 November 2004 (SE OU 2 FS), LKD.RT-258 November 2004 (SE OU 6 RI), LKD.RT-296 May 2005 (Phase IV BRAC, SE OU 3B SI and SE OU 8 FVSA), LKD.RT-265 and -269 (latest dates shown) May 2005 (SE OU 10 FFS) LKD.RT-266a July 2006 (SE OU 6 RA), LKD.RT-298
Record of Decision (ROD) Signature	2 August 1991 (K Areas, SE OU 1), LKD.RT-061

SECTION 2 - SITE CHRONOLOGY

Event	Date
Record of Decision (ROD) Signature (cont'd)	<p>September 1998 (Phase I BRAC, BRAC Waste Sites, part of SE OU 8), LKD.RT-147</p> <p>July 2001 Phase II BRAC, BRAC Waste Sites, part of SE OU 8), LKD.RT-190</p> <p>August 2003, Phase III BRAC (Southern Martinsburg Shale Region [SMSR] groundwater, SE OU 13, and BRAC Waste Sites, part of SE OU 8) – <u>No Action ROD</u>, LKD.RT-239</p> <p>August 2005 SE OU 4 (Stormwater Sewer Lines and Associated Drainageways) – <u>No Further Action ROD</u> LKD.RT-270</p> <p>July 2006 Phase IV BRAC, BRAC Waste Sites, part of SE OU 8 soils and SE OU 3B (Area Upgradient of VOC-Contamination Source in SE OU 3A groundwater) – <u>No Action ROD</u>, LKD.RT-275</p> <p>March 2006 (cover date) August 2006 (signed Army), September 2006 (signed EPA), SE OU 10 SE OU 10 (SSIA VOC-Contaminated Groundwater South of Gate 6, Conococheague Drainage System), LKD.RT-274</p> <p>August 2006 (finalized) and September 2006 (signed), SE OU 2 (Industrial Wastewater Sewer System) LKD.RT-284</p>
Explanation of Significant Differences (ESD)	<p>2 August 1991 (K Areas, SE OU 1), LKD.RT-061</p> <p>April 2004 (SE OU 1, K-Areas) (number two, for land use controls), LKD.RT-245</p>
Remedial Design Start	25 September 1991 (K Areas, SE OU 1)
Remedial Design Complete	<p>14 June 1993 (K-Areas, SE OU 1)</p> <p>August 2002, Land Use Control Action Plan Memorandum of Agreement (LUCAP MOA), signed by BRAC Cleanup Team (BRAC Waste Sites, part of SE OU 8)</p> <p>January 2004, SE OU 1 (K-Areas) Cap Maintenance Plan</p> <p>April 2007, Final Remedial Action Work Plan for SE OU 10 (including Land Use Controls design) SE OU 10 (SSIA VOC-Contaminated Groundwater South of Gate 6, Conococheague Drainage System, LKD.RT-294</p>
Remedial Action Start	11 August 1993 (K-Areas, SE OU 1)

SECTION 2 - SITE CHRONOLOGY

Event	Date
Remedial Action Start (cont'd)	<p>November 1998, Phase I BRAC Property Transfer and Implementation of Post-Land Transfer Land Use Controls (BRAC Waste Sites, part of SE OU 8)</p> <p>May 2002, Phase II BRAC Property Transfer and Implementation of Post-Land Transfer Land Use Controls (BRAC Waste Sites, part of SE OU 8)</p> <p>June 2007, SE OU 10 (SSIA VOC-Contaminated Groundwater South of Gate 6, Conococheague Drainage System)</p>
Remedial Action Complete	<p>30 September 1995 (K-Areas, SE OU 1)</p> <p>Fall 2004 through Spring 2006 (Industrial Wastewater Sewers, abandon sewers part of SE OU 2 remedy)</p> <p>Ongoing for other OUs</p> <p>Note: No Action RODs for SE OU 3B, and portions of SE OU 8 (Phase III and IV BRAC). No further Action RODs for SE OU 4 and 13.</p>
Removal Actions	<p>1994-1995 (IWWS Emergency Repairs, SE OU 2)</p> <p>August 1996 (SE OU 2, SE OU 4)</p> <p>March 1997 (SE OU 5, SE OU 7)</p> <p>December 2000 (SE OU 7)</p> <p>July- November 2000 (SE OU 8, OVSA soils)</p> <p>July 2001 (SE OU 9)</p>

3. SITE BACKGROUND

LEAD is located on the Western side of the Cumberland Valley, in the central part of Franklin County, 5 miles North of Chambersburg, PA (Figure 1). The Depot fronts on Pennsylvania State Highway 997. Based on the 2000 Census, Chambersburg is the largest town in Franklin County, and is the county seat, with 17,862 inhabitants. Surrounding population centers with populations greater than 9,000 include Greene Township (12,284), Guilford Township (13,100), Waynesboro (9,614), and Antrim Township (12,504). LEAD is located within the boundaries of three townships: Greene, Letterkenny, and Hamilton.

Prior to the establishment of LEAD, the area consisted of agricultural and forest lands. The area was predominantly single-family farms used for both subsistence and commercial purposes.

The Letterkenny Ordnance Depot was established in January 1942 as an ammunition storage facility. In subsequent years, the following missions were added:

- Reserve storage and export, advance storage of parts, tools, supplies, and equipment for combat vehicles, artillery, small munitions, and vehicle fire control equipment (1943).
- Receipt and storage of hardware, heavy-duty trucks, and parts (1944).
- Establishment of transport and combat vehicle shops and expansion of the maintenance program (1947).
- Establishment of a rebuild system for guided missile ground control, launching, and handling equipment; missile propellant systems; and internal guidance systems (1954).
- Assignment of the special weapons mission (1958).
- Designation of the Depot as the Eastern Equipment Assembly Area (1959). This mission gave the Depot responsibility for the handling and shipment of equipment for guided missile and special weapons units to overseas locations.
- Acceptance and destruction of U.S. Air Force (USAF) missile fuel (1961).
- Letterkenny Ordnance Depot was renamed the Letterkenny Army Depot (1962).
- Disposal of explosive ordnance from the Army as well as from state and local police (1964).
- Rebuilding artillery recoil mechanisms and maintenance and storage of USAF missiles (1966).
- Receipt, storage, and dispersal of batteries and tires to Army units (1972).

- Operation of a washout facility to reclaim explosives from munitions (1973).

Current and past operations conducted at LEAD involved cleaning, stripping, plating, lubrication, demolition, chemical/petroleum transfer/storage, and washout/deactivation of ammunition. Most of the above missions/activities were accomplished using petroleum hydrocarbons and various chlorinated solvents including trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA).

During the 1970s and 1980s, LEAD undertook several construction and modernization projects. New facilities, including a Care and Preservation Building, chrome plating facility, and radiographic inspection facility, were constructed. Several large modernization projects were completed, including the Automated Storage and Retrieval System-Plus, which provides state-of-the-art support to maintenance operations. During the cold war years, new missions in the maintenance of weapon systems—particularly Hawk, Patriot, and Paladin—were added. Most recently, LEAD has expanded its product line to include the overhaul of tactical wheeled vehicles, material handling equipment (cranes), and mobile kitchen trailers. In addition, as the Center for Industrial and Technical Excellence for Mobile Electric Power Systems LEAD repairs and remanufactures power generation sets. LEAD has also expanded its capabilities to include aviation ground power units. Other vital Defense Department products LEAD supports include the Force Provider (the Army's mobile, fully-enclosed base camp/buildings that supply food, dining, heating/cooling systems, etc.), mobile power generators, and the Biological Integrated Detection System (BIDS).

As a result of the 1995 Base Realignment and Closure (BRAC) Commission's recommendation, LEAD's mission was to be realigned by transferring the towed and self-propelled howitzer mission to Anniston Army Depot and by transitioning missile guidance and control to Tobyhanna Army Depot. As a result of this realignment, property at LEAD will be excessed (turned over to the local community for reuse).

In July 1987, the Southeastern Area (SE) of LEAD was listed on the NPL with a Hazard Ranking Score (HRS) of 34.21. On March 1989, the Property Disposal Office (PDO) Area of LEAD was placed on the National Priorities List (NPL); the HRS Score was 37.51. The locations of the SE and PDO Areas at LEAD are shown in Figure 2. Major Tenant activity on Depot includes the Defense Reutilization Marketing Office (DRMO) and the Defense Logistics Agency (DLA).

On 3 February 1989, a Federal Facility Interagency Agreement (IAG), was signed by the U.S. Army, EPA, and Pennsylvania Department of Environmental Resources (PADER) [pertaining to RCRA and Clean Streams Law issues]. The IAG established the framework for the CERCLA response actions at LEAD and required the review of all documents concerning the investigation of environmental contamination at LEAD produced prior to the IAG. PADER has since changed its name to the Pennsylvania Department of Environmental Protection (PADEP).

3.1 DESCRIPTION OF THE SOUTHEASTERN AREA OPERABLE UNITS

The locations of the OUs in the SE Area are provided in Figures 3, 4, and 5. At the time the K Area Record of Decision (ROD) was signed in 1991 (LEAD, 1991), the following three Operable Units (OUs) were identified:

- SE OU 1—K Areas
- SE OU 2—Industrial Wastewater Sewer System
- SE OU 3—Disposal Area VOC-Contaminated Groundwater

In 2002, SE OU 3 was divided into two OUs (SE OU 3A and SE OU 3B) to facilitate the BRAC transfer and to allow management of the area upgradient of the VOC-contaminated groundwater from the Disposal Area source separately as SE OU 3B. The designations of the new OUs are as follows:

- SE OU 3A— Disposal Area VOC-Contaminated Groundwater
- *SE OU 3B— Area Upgradient of VOC-Contamination Source in SE OU 3A

Additional OUs were designated based on the results of the former SE OU 3 Remedial Investigation (RI) Report (ESE 1993). The four additional OUs created within the SE Area included:

- SE OU 4— Stormwater Sewer Lines and Associated Drainageways
- SE OU 5— Area A and B Contaminated Soils
- SE OU 6— Off-Post VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road [Rowe Run Drainage System]
- SE OU 7— Truck Open Storage Area

SE OU 6 originally included all off-post SE Area VOC-contaminated groundwater; however, in 2002 the portion of this OU associated with SE OU 10 (south of the groundwater divide in the vicinity of the old Gate 6) was moved to SE OU 10 in 2002 to facilitate the BRAC transfer and so that SE OU 6 is now associated only with the Rowe Run drainage.

To support the 1995 Base Closure and Realignment (BRAC) decision to realign the LEAD mission, SE OU 8 was created to deal with all waste sites within the BRAC property boundary.

- SE OU 8— BRAC Waste Sites

In February 1999, two additional OUs were created

- SE OU 9— Landfill J
- SE OU 10— Southern Southeast Industrial Area (SSIA) VOC-Contaminated Groundwater South of Gate 6 (Conococheague Drainage System)

SE OU 10 was originally part of SE OU 3 but was separated from SE OU 3 since there is a different source of contamination and due to the presence of a groundwater divide between the two areas.

In 2001, two additional OUs were created:

- SE OU 11— Northern Southeast Industrial Area (NSIA) VOC-Contaminated Groundwater North of Gate 6

*Denotes that the OU is covered under BRAC.

- SE OU 12—Landfill G

SE OU 11 was originally part of SE OU 3 and was separated from SE OU 3 since there is a different source of contamination.

- *SE OU 13—Southern Martinsburg Shale Region

In 2002, SE OU 13 was added so that the Southern Martinsburg Shale Region (SMSR) could be managed separately (originally, this was a part of SE OU 10 and SE OU 11) to facilitate the BRAC transfer.

- SE OU 14—Former Test Track Area

SE OU 14 was created in 2007 to track sites that were formerly BRAC sites and are now Army-retained land.

3.1.1 SE OU 1—K Areas

The K Areas were used for the disposal of waste generated from LEAD activities. The locations of the K Areas are shown in Figure 3. The K-1 area (or K-1 Lagoon) was used to dispose of waste solvents used in painting, paint stripping, and degreasing operations at LEAD. The K-1 Area was in use from 1957 to 1970. Its dimensions were approximately 200 ft by 50 ft. The area of VOC impacted soil was approximately 78 ft by 189 ft.

The K-2 area was in use from 1965 to 1970 and included five partially revetted areas used to accumulate solid waste prior to disposal into a nearby landfill. Its dimensions are approximately 270 ft by 75 ft. It appears that when the K-1 lagoon was closed some soil from K-1 ended up at K-2. The area impacted at K-2 was a 60-ft by 20-ft area approximately 10 ft deep.

The K-3 area was in use as a drum storage area from 1965 to 1970 and covered an overall area of approximately 100 ft by 40 ft. Based on available soil analytical data, the actual contaminated area was limited to a 50-ft by 50-ft area.

An Initial Installation Assessment of LEAD was performed in 1978 and the Discovery Phase was initiated in January 1979. This study concluded that toxic materials associated with the industrial activities at LEAD, along with uncertain past disposal practices, and the nature of the hydrogeologic regime offered significant potential for contamination by chlorinated hydrocarbons and contaminant migration. The Disposal Area (DA) where the K Areas were located was identified as a potential VOC-contamination source.

* Denotes that the OU is covered under BRAC.

In 1983, Roy F. Weston, Inc. (WESTON®) completed an investigation of the DA. As part of this effort, trenching and soil boring investigations were conducted at K-1, K-2, and K-3. This investigation revealed the presence of volatile organic compounds (VOCs) including TCE, 1,2-dichloroethene (DCE), and 1,1,2,2-tetrachloroethane in elevated concentrations in the K Areas.

In 1989, WESTON performed a comprehensive soil gas investigation in the DA. The results of the soil gas survey identified that high levels of VOCs existed in the vadose zone soils of the K Areas.

A ROD for SE OU 1 was finalized and signed in 1991 (LEAD, 1991). An Explanation of Significant Differences (ESD) for SE OU 1 was also issued in 1991; the ESD was for clarification of applicable or relevant and appropriate requirements (ARARs). The ROD indicated the selection of low-temperature thermal treatment (LT³) as an accelerated remedial action for soil contamination at SE OU 1. In 1992, Environmental Science and Engineering, Inc. (ESE) conducted a soil boring program to delineate the boundaries of the K Areas. This effort discovered that soil in the K Areas contained higher levels of VOCs and lead than originally thought. Polychlorinated biphenyls (PCBs), metals, including lead, and semivolatile organic compounds (SVOCs) were also discovered. Based on the remedy selected in the ROD, a remedial action was initiated at SE OU 1 in 1993 and was completed in September 1995. Per the Cap Inspection Standard Operating Procedure, yearly inspections of the K-1, K-2, and K-3 capped areas are required (and corrective actions if necessary) as necessary to maintain the integrity of the caps and to ensure protectiveness of human health and the environment.

The treatment of the K Area soils was conducted from July 1993 to December 1994. The contaminated soil was excavated to bedrock and to the defined horizontal limits except at area K2, where just the upper 3 feet of soil was removed, treated with LT³, and fixated as necessary. Treated soils were sampled to ensure that they met both the TCE remediation criteria and the Toxicity Characteristic Leaching Procedure (TCLP) requirements for metals. All soil (including fixated material) was placed back in the original excavations upon successful treatment. A residual waste cap was installed over the treated soil areas in October 1995. The *Technology Remedial Action Report*, which documents the remedial actions conducted at the K Areas, was finalized in August 1997.

Following the remedial action, a second ESD was issued in 2005. This ESD provided for land use controls and a cap inspection plan to protect the integrity of the cap. An inspection of the cap conducted in August 2007 indicated that the vegetative cover, drainage system, and liner were intact.

3.1.2 SE OU 2—Industrial Wastewater Sewer System

Problems with the Industrial Wastewater Sewers (IWWS) were first identified in the 1993 Remedial Investigation (RI) Report for the Southeastern Area. Studies of the IWWS lines showed that numerous breaks and/or leaks existed in both the IWWS and Stormwater Sewer lines. Leak testing and sampling indicated that VOCs had leaked from the IWWS and migrated to the soil/bedrock interface. Emergency repairs were made to the IWWS beginning in October 1994 and were completed in December 1995. An engineering evaluation/cost analysis (EE/CA)

was prepared by LEAD to address the removal of contaminated soils associated with the leaking IWWS lines (FD, 1996). LEAD conducted an emergency removal action of the IWWS-contaminated soils east of Building 370 in summer 1997.

Remedial Investigation (RI) and Risk Assessment (RA) Reports were completed in September 1998 (FD, 1998 LKD.RT-220) and June 2002 (IT, 2002 LKD.RT-246), respectively. A Final FS was completed in November 2004 (IT, 2004a LKD.RT-258), and a Proposed Plan was finalized in May 2005 (Shaw, 2005a LKD.RT-290). A final ROD for SE OU 2 (Shaw, 2006a) was completed in August 2006 (signed in September 2006). The selected remedy for SE OU 2 was cleaning followed by abandonment of the sewer and drain lines at Building 37 and 57 to prevent future use of the existing sewers. The remedial action was completed in spring 2006. Currently, the wastewater from Building 37 is pumped into aboveground storage tanks then transported for treatment to the IWTP at LEAD because it does not meet the newly established LIDA pre-treatment standards for discharge into the LIDA-owned sanitary sewer system. Wastewater from Building 57 continues to be discharged to the LIDA-owned sanitary sewer system. The Army is currently considering whether to continue the wastewater transport to the IWTP or to install a replacement force main (in the vicinity of the abandoned force main) to direct flow from both buildings to the IWTP.

The risk assessment showed that there are acceptable risks for industrial/commercial use; therefore, the remedy includes land use controls to prevent the use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds.

3.1.3 SE Area OU 3: Disposal Area VOC-Contaminated Groundwater

The SE Area OU 3, which is located in both the BRAC and ER,A portions of LEAD, addresses on-post groundwater from the SE Area. Groundwater in these areas is contaminated with chlorinated solvents. Groundwater from the IWTP lagoon area is currently being intercepted and treated by the groundwater treatment system in place; however, dye studies have shown that water from areas within OU 3 is discharging off-post at six separate springs (see SE OU 6). VOCs above applicable or relevant and appropriate requirements (ARARs) have also been detected in these springs. The source of this contamination was the faulty IWWS (which was repaired in 1994); the DA operations; the former IWTP lagoons; and the stormwater drainages. Although the primary sources of contamination have been addressed, VOCs are still being detected, most likely due to the presence of contaminated subsurface soils and VOC contamination within the bedrock matrix, which is continuing to act as a secondary source. A focused feasibility study (FFS) for the Northern SIA lagoons and DA was begun in April 1994, and an FFS for Building 37 Southern SIA, another source of groundwater contamination, was begun in October 1995.

The rehabilitation of the groundwater treatment plant was completed in August 1996. Pump tests for recovery wells located in the former lagoon area were completed; a system pump test began in late summer 1996. Step-drawdown tests were completed in the DA, and pump tests for these wells were completed in the summer of 1997.

In 2002, SE OU 3 was divided into two OUs (SE OU 3A and SE OU 3B) so that the area upgradient of the VOC-contaminated groundwater from the Disposal Area source could be managed separately as SE OU 3B to facilitate the BRAC transfer. Figure 4 shows the locations of the groundwater OUs at LEAD.

SE OU 3A—Disposal Area VOC-Contaminated Groundwater

SE OU 3A addresses on-post groundwater contamination in the Disposal Area (DA). Groundwater in the vicinity of the DA is contaminated with chlorinated solvents. Dye studies have shown that water from areas within SE OU 3A is discharging off-post (see SE OU 6). The source of this contamination was the DA. Although the primary sources of contamination have been addressed, VOCs are still being detected, most likely due to the presence of contaminated subsurface soils and VOC contamination within the bedrock matrix, which is continuing to act as a secondary source.

A Focused Feasibility Study (FFS) was initiated for the DA, which includes more recent RI data and risk assessment (RA) evaluations. A recirculation well Pilot Study has been completed. An In-situ H₂O₂ Pilot Study was completed in April 2000. Additional investigations to verify the vertical extent of groundwater contamination, as requested by EPA, were conducted from 2005 to 2006. The results of the additional investigations will be reported in the FFS. A vapor intrusion pilot study was conducted from July 2004 to January 2006, and a draft report was submitted to EPA and PADEP in May 2006 (WESTON, 2006a). The vapor intrusion sampling plan, which incorporated regulatory agency comments, was finalized in 2007 (WESTON, 2007a). Vapor intrusion sampling is being conducted in accordance with the approved Technical Plan. The results of the vapor intrusion sampling will be reported in the FFS and a remedy will be selected based on the completion of the FFS and documented in a ROD.

SE OU 3B— Area Upgradient of VOC-Contamination Source in SE OU 3A

SE OU 3B is a BRAC OU that addresses the area upgradient of the VOC-contaminated groundwater from the DA source. Groundwater sampling was initiated in August 2003 and a final SI Report was finalized in May 2005 (WESTON, 2005a). A Proposed Plan was issued for public review in May 2005 (WESTON, 2005b). A No Action ROD (WESTON, 2006b) and a FOST (WESTON, 2006c) were completed and signed in June 2006. The ROD specifies no action for SE OU 3B groundwater and for soil associated with four parcels that consist of a portion of SE OU 8; two of these parcels are to be transferred as part of the Phase IV BRAC property transfer.

3.1.4 SE OU 4—Stormwater Sewer Lines and Associated Drainageways

SE OU 4, which is located in both the BRAC and ER,A portions of LEAD, consists of the stormwater sewer system and associated sediments. Prior to installation and connection to the IWTP, industrial wastewaters from the SE Area at LEAD were discharged, untreated, to the Depot stormwater sewer system. An EE/CA was prepared to cover the removal of contaminated sediment from the Southeast Drainage Way (between the headwall and Salem Road) and Rowe Run (between the headwall and State Route 997) and to address the emergency repair of associated sinkholes. An emergency removal of the sediments and filling of the sinkholes was

completed by the spring of 1997. A total of 1,037 tons of contaminated sediment was removed and disposed of as residual waste.

A Removal Action Summary Report for SE OU 4 was finalized in September 2003 (Shaw, 2003 LKD.RT-241). A Proposed Plan was issued for public review in November 2004 (Shaw, 2004a LKD.RT-255), and a final ROD (Shaw, 2005b) was completed in July 2005 (signed August 2005). The selected remedy was no further action.

3.1.5 SE OU 5—Areas A and B Contaminated Soils

SE OU 5 is located in the ER, A portion of LEAD. Areas A and B were initially investigated in the 1980s. Contamination detected in Area A consisted primarily of total petroleum hydrocarbons (TPH) and metals, with a small amount of VOCs. The most recent rounds of sampling to delineate the extent of contamination were completed in July 1995, when a localized spill area of elevated VOC concentrations was identified. An EE/CA was prepared and an emergency removal action was conducted in summer 1997 to excavate and dispose of the VOC-contaminated soil in the Spill Area of Area A (FD, 1997 LKD.RT-129). The remainder of Area A was evaluated as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) RI process.

Area B was a former OBP. The soil in this area was found to contain TPH, metals, and a small amount of VOCs; groundwater was also found to contain VOCs. Area B was further evaluated as part of the CERCLA RI process.

VOC contamination at Areas A and B is attributed to the K Areas (SE OU 1) and the Spill Area in Area A. A Draft RI/RA Report was completed in July 2000. An addendum to the RI/RA was submitted in July 2003, and a Final RI/RA was completed in October 2004 (IT, 2004b), published separately as an RI and an RA. A worm bio-uptake study was conducted in accordance with comments from EPA Biological Technical Assistance Group (BTAG), and as a result, a draft addendum to the ecological RA was submitted in September 2006. The RA addendum is currently being revised to address EPA comments. An FS will be prepared following resolution of EPA comments on the ecological RA.

3.1.6 SE OU 6—VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road (Rowe Run Drainage System)

SE OU 6 includes the discharge points of 6 VOC-impacted off-post springs and off-post VOC-contaminated groundwater associated with SE OU 3A and SE OU 11, including residential drinking water wells. A final dye study, initiated in September 1995, included the placement of dye in on-post monitor wells located near LEAD's property line and in Rowe Run (boundary trace). This study was completed in December 1995.

In addition to the springs, off-post wells were also evaluated as part of SE OU 6. Approximately 50 wells were sampled and results were analyzed for VOC and metals concentrations during the

past 2 years. The results from this sampling indicated no additional VOC-contaminated off-post wells other than those previously identified.

A third study area of the off-post groundwater impacts was an evaluation of animals and animal products located on farms near the SE Area. Samples of eggs, milk, and meat were collected from numerous farms. VOCs and metals were detected at concentrations within the literature values or regional background levels for the media sampled.

A final RI Report for SE OU 6 was submitted in November 2004 (Shaw, 2004b). The final human health RA was submitted in July 2006 (Shaw, 2006c). In January 2008 the Army obtained EPA approval to conduct invertebrate sampling to assess potential effects to ecological receptors. This sampling is planned for spring 2008. The ecological RA will be published separately and will include the results of the invertebrate sampling. Additional investigations to verify the vertical extent of groundwater contamination, as requested by EPA, were conducted from 2005 to 2006, the results of which will be included in the SE OU 6 FS. A vapor intrusion pilot study was conducted from July 2004 to January 2006, and a draft summary report was submitted to EPA and PADEP in May 2006 (WESTON, 2006). EPA's comments on the draft report were received in August 2006. In order to address residual on- and off-post VOC-contaminated groundwater associated with SE OUs 6 and 11 at LEAD, a final Work Plan for the Evaluation of the Vapor Intrusion Pathway at SE OUs 6 and 11 was submitted in June 2007 (WESTON, 2007a). Vapor intrusion sampling will be conducted in the winter of 2007 and in the spring/early summer of 2008 on-post at SE OUs 6 and 11 and off-post in the Rowe Run Valley.

The Army expects to submit a draft FS for SE OU 6 for regulatory review in 2008.

3.1.7 SE OU 7—Truck Open Storage Area

Sampling of SE OU 7 was initially conducted in summer 1994. This area consisted of an open storage area for trucks and an abandoned septic tank and leach field system formerly used as an oil/water separator (see Figure 3). Analytical results from this sampling have shown no significant soil contamination present at SE OU 7. The detected groundwater contamination is attributable to SIA sources, such as the formerly leaking IWWS gravity lines associated with Building 37. Groundwater at SE OU 7 is addressed under SE OU 10. During the investigation of SE OU 7, an abandoned septic system was found. The septic system was used as an oil/water separator for the disposal of sanitary sewage from LEAD holding tanks. A removal action was conducted in spring 1997, which consisted of characterization, solidification and removal of the tank contents, backfilling of the tank, and restoration of the site.

A supplemental investigation was conducted in 1999 for the presence of polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans), and polychlorinated biphenyls (PCBs). The results of the investigation were published in July 2000 (WESTON, 2000d) and showed that the presence of dioxins/furans in burned material was at concentrations greater than the published (EPA Region III) industrial direct contact human health level. A time-critical removal action was completed in this area in December 2000.

A draft Current Conditions Human Health SLRA and SLERA was submitted for the TOSA/WOS site in August 2007 (WESTON, 2007b). The document is undergoing regulatory

review, however, it is expected that the site will be evaluated as protective of human health and the environment for the future intended commercial/industrial use. Both SE OU 7 and remaining sites in SE OU 8 will be included in the Phase V BRAC property transfer, which will take place following the Army's completion of the FS, PP, ROD, and FOST for the Phase V BRAC Parcels. The process leading to FOST completion is expected to begin in 2008.

3.1.8 SE OU 8—BRAC Waste Sites

The SE OU 8 area is composed of potential waste sites identified in the to-be-excessed portion of the SE Area. SE OU 8 is being investigated under the BRAC investigation program. The locations of the SE OU 8 sites are shown in Figure 5.

Findings of Suitability to Lease (FOSLs) have been signed for the following SE areas: Buildings 6, 9, 19, 412, 416, 500, 522, 2291, 7, 8, and 42. Two FOSLs were also signed that covered the remainder of the BRAC buildings in the SE area (Phase II FOSL, February 2000 [WESTON, 2000c LKD.RT-168] and 2002 FOSL, October 2002 [WESTON, 2002e LKD.RT-226]). Property transfers under BRAC are being performed in phases. The following is a summary of the status of property transfers within the SE OU 8 area:

- Phase I — Properties within the SE portion included Parcels 1 through 13, Parcels 16 through 28, and Parcel 31. A ROD for the Phase I areas was signed in September 1998 (WESTON, 1998b LKD.RT-143). A Finding of Suitability to Transfer (FOST) was signed in October 1998 (WESTON, 1998g LKD.RT-148). Phase I BRAC Property Transfer was completed in November 1998. The ROD for Phase I documented selection of land use controls to prevent contact with contaminated groundwater and to ensure that the land use remains commercial/industrial.
- Phase II — Properties within the SE portion included Parcels 2-35 through 2-77 (with the exception of Parcel 2-73), consisting of structures and property above the seasonal high groundwater table. A ROD for the Phase II areas was signed in July 2001 (WESTON, 2001b LKD.RT-190). A FOST for the Phase II parcels was finalized in November 2001 (WESTON, 2001c LKD.RT-200). Phase II BRAC Property Transfer was completed in May 2002. The ROD for Phase II documented selection of land use controls to prevent contact with contaminated groundwater and to ensure that the land use for certain areas remains commercial/industrial.
- Phase III — Phase III parcels are located within an area referred to as Southern Martinsburg Shale Region (SMSR). A No Action ROD for Phase III was signed in August 2003 (WESTON, 2003e). A FOST for the Phase III parcels was signed in August 2003 (WESTON, 2003f LKD.RT-238). Properties within the SE portion include the following:
 - Parcels 3-89, 3-90, and 3-91. These parcels are located in both SE and PDO areas.
 - Parcels 2-53L, 2-54L, 2-70L, 2R-80L-3, 2R-84L-3, and 2R-86L-3. These parcels represent the subsurface property deeper than 8 ft of the Phase II parcels located within the SMSR. During the Phase II Property Transfer completed in May 2002,

only the upper 8 ft of the properties were transferred. These parcels are entirely located in the SE area.

- Parcels 24, 27, and 28. These represent that groundwater restrictions could be lifted for these Phase I parcels located within the SMSR.
- Phase IV - A Proposed Plan was issued for public review in May 2005 (WESTON, 2005b). The Phase IV Parcels ROD (WESTON, 2006b) and FOST (WESTON, 2006c) were signed in June 2006. Phase IV comprises approximately 60 acres (parcels 4-92 and 4-93). Note that parcels 4-94, and 4-95 are discussed in the Phase IV documents; however, these parcels are now to be retained by the Army, as discussed below. The ROD specified that no further remedial action is necessary for soil (SE OU 8) and groundwater (SE OU 3B) to protect human health and the environment.
- Phase V – An FS is currently being prepared for the Phase V BRAC Parcels, which includes 19 SE OU 8 BRAC waste sites and SE OU 7, the TOSA/WOS site. The process leading to FOST completion is expected to begin in the fall of 2007.

The BRAC boundary was revised in 2007 as a result of an agreement between LIDA and the LEAD, as sanctioned by the deputy assistant Secretary of the Army, to allow the depot to retain 225 acres of land adjoining the facility. As a result of the revised BRAC boundary, some of the sites that were administered under SE OU 8 are now administered under a new operable unit, SE OU 14, because they are to remain located in Army-retained land.

There are two remaining phases of BRAC property transfer planned for LEAD, Phase VI and VII. Each BRAC property transfer phase will be completed after a group of areas is deemed suitable for transfer after the CERCLA process is completed for the sites, which includes an RI/RA, FS, or Decision Document (as appropriate), PP, and ROD. In addition, a FOST will be prepared in accordance with the U.S. Army requirements.

3.1.9 SE OU 9—Landfill J

SE OU 9 consists of a landfill (Landfill J) located west of Building 320. The location of Landfill J was discovered in 1995 while trenching for utilities (see Figure 3). The extent of the landfill was determined using geophysical techniques and trenching. The characteristics of the soils and groundwater were evaluated through several sampling efforts. An emergency removal action was conducted in June 2001. A draft Removal Action Completion Report, which included the RI/RA data, was prepared in June 2002. A finalized Removal Action Summary Report was completed in October 2004 (Shaw, 2004c). A draft FS was completed in May 2005 (Shaw, 2005c) and is currently being revised to address regulatory review comments.

3.1.10 SE OU 10—SSIA VOC-Contaminated Groundwater South of Gate 6 (Conococheague Drainage System)

SE OU 10 consists of contaminated groundwater south of Gate 6. SE OU 10 was created when SE OU 3 was divided at the groundwater/surface water divide near Gate 6 (see Figure 4). The sources of the groundwater contamination for SE OU 10 are the formerly leaking IWWS lines in the vicinity of Building 37 (VOC-contaminants) and a release from a diesel tank fuel line in the vicinity of Building 37. Extensive work has been completed in the Building 37 area to design technically sound and cost-effective techniques to mitigate the contaminated on-site groundwater. An extended pilot study for enhanced bioremediation techniques to treat the groundwater is currently underway at Building 37. The FFS Final Report was issued in September 2003 (WESTON, 2003g). A final Proposed Plan was completed in February 2005 (WESTON, 2005c), and a ROD was completed in March 2006 (WESTON, 2006d). The selected remedy for SE OU 10 is Enhanced Biodegradation with Monitored Natural Attenuation and Land Use Controls (to prevent contact with contaminated groundwater until the time the groundwater is safe for use). A final Remedial Action Work Plan was completed in April 2007 (WESTON, 2007c). The final sodium lactate injection for the selected remedy was completed at SE OU 10 in June 2007. A long-term groundwater monitoring program has been implemented for SE OU 10 and the most recent sampling event was conducted in August 2007.

3.1.11 SE OU 11—NSIA VOC-Contaminated Groundwater North of Gate 6

SE OU 11 consists of the VOC-contaminated groundwater associated with the IWTP lagoons and IWWS gravity lines. The groundwater discharges off-post (see SE OU 6). A pilot study was initiated in September 2001 to evaluate the feasibility of treating DNAPL sources and reducing off-site contaminant migration concentrations at the property line. This study was completed by January 2003. Additional investigations to verify the vertical extent of groundwater contamination, as requested by EPA, were conducted from 2005 to 2006. The results of the additional investigations will be reported in focused feasibility study (FFS).

A vapor intrusion pilot study was conducted from July 2004 to January 2006, and a draft report was submitted to EPA and PADEP in May 2006 (WESTON, 2006a). EPA's comments on the draft report were received by the Army in August 2006. In order to address residual groundwater contamination associated with SE OUs 6 and 11 at LEAD, the Work Plan for the Evaluation of the Vapor Intrusion Pathway at SE OUs 6 and 11 was finalized in June 2007 (WESTON, 2007a). Vapor intrusion sampling will be conducted in the winter of 2007 and in the spring/early summer of 2008 on-post at SE OUs 6 and 11 and off-post in the Rowe Run Valley. The FFS Draft Report is expected to be produced in 2007. A remedy will be selected based on the completion of the feasibility study and documented in a ROD.

3.1.12 SE OU 12—Landfill G

The LEAD Installation Assessment (IA) identified this area as active from 1964 through 1978, when it was leveled to match the existing terrain. The area was used to dispose of residue from nearby trash revetments (K-2) and IWTP sludge. Visibly contaminated leachate (metals) was

reported to emanate from this site into a nearby drainage ditch. A 1991 SI identified several magnetic anomalies, which were cross trenched in 1993. All anomalies were related to buried metallic objects. This area contained empty buried drums that formerly contained caustics. Sampling indicated that these buried drums had caused no environmental problems. Another anomaly showed a large number of solvent containers, which were drummed and disposed of in this area. This site consists of contaminated soil, groundwater, and surface water. The 1995 SI follow-on identified this site as requiring an RI. A Work Plan for the RI was finalized in June 2006 (Shaw, 2006b).

The initial round of the RI field work was completed in July 2006. The test trenching conducted during the RI showed that primarily municipal-type waste is present in the landfill. The analytical results for the RI indicated that additional test trenching, soil sampling, and analysis needed to be conducted to further assess elevated levels of PCBs. The additional site investigation work was conducted in July 2007. Containers of black tar-like substance, thought to be discarded adhesive material, were encountered during the second round of the RI. The material had a petroleum-like odor. The size of the area where the containers were found is approximately 10 ft by 15 ft and 6 ft deep. The containers were encountered at about 4 ft below ground surface and the depth of the affected area did not extend beyond 6 ft deep. The preliminary analytical results show that contaminants of potential concern are benzene, lead, zinc and 2-methylphenol. A removal action is planned for this landfill to remove the containers and associated waste and affected soils.

3.1.13 SE OU 13— Southern Martinsburg Shale Region Groundwater

SE OU 13 encompasses BRAC property. The Southern Martinsburg Shale Region (SMSR) is a region at LEAD that contains an area of shale bedrock surrounded by downgradient limestone bedrock. This shale bedrock is generally more resistant to weathering than the surrounding limestone formations and therefore, forms the “highland” or elevated ridge areas in the area of the Phase III parcels. Several groundwater/surface water divides along this ridge in the SMSR cause groundwater to flow radially away from the SMSR.

The SMSR was originally considered to be part of VOC-contaminated groundwater SE OU 10 and SE OU 11. Based on its geologic and topographic setting, it was thought that the SMSR would be unaffected by the known and potential VOC sources located downgradient of the SMSR because groundwater flows from the SMSR into the lower lying valley areas underlain by limestone. Therefore, a groundwater investigation was initiated in 1999 to establish that the SMSR was not impacted by any previous industrial activities at Letterkenny. The results of four rounds of groundwater sampling, conducted in late 1999 through 2000 and in 2002, showed no VOC groundwater contamination in the SMSR. Based on this finding, the SMSR was redefined as SE OU 13, and a no further action ROD was signed for SE OU 13 in August 2003 (WESTON, 2003e). SE OU 13 was part of the Phase III BRAC property transfer completed in January 2004.

3.1.14 SE OU 14—Former Test Track Area

SE OU 14 was created in 2007 to track sites in Army-retained land that were formerly administered under the BRAC program and are now in the ER,A program as a result of the

revised BRAC boundary. SE OU 14 consists of the Former Test Track in the Disposal Area and Areas E and F (AEDBR Sites LEAD-114, 033, and 049), and the Building 349 Soil Staging Area (AEDBR Site LEAD-114). The RI/RA for the Former Test Track and Areas E and F was finalized in 2004 (WESTON, 2004); this RI/RA showed that risks are within acceptable levels for commercial/industrial use. The RI for the Building 349 Soil Staging Area was submitted to EPA and PADEP in 2003. Future plans are to resubmit the RI/RA, with the risk assessment based on likely future use of commercial/industrial, along with completion of the CERCLA process (FS, Proposed Plan, ROD).

3.2 PHYSICAL CHARACTERISTICS

3.2.1 Climatology

The climate at LEAD is moderate, with an average annual temperature of 11.2° C (52° F). Summers average 22.3° C (72° F) and winters average 0° C (32° F). Rainfall averages 98.2 centimeters (cm) (38.7 inches). The moderate climate results in an average of 15 days above 32° C (90° F) per year and mild winters with temperatures below 0° C (32° F) occurring less than 100 days per year. Winds are generally from the southwest, with an average velocity of 10 miles per hour (mph). During the period from July to mid-September, the area experiences warm periods lasting 4 to 5 days, during which time there is high relative humidity and only slight wind movement.

3.2.2 Site Topography and Surface Drainage

LEAD is located in the Great Valley section of the Valley Ridge Province of the eastern United States, and referred to locally as the Cumberland Valley. The Cumberland Valley trends northeast to southwest through central Pennsylvania and is bordered to the west by the Appalachian Mountain Province. The South Mountain section of the Blue Ridge Province is situated east of Chambersburg and marks the eastern edge of the Cumberland Valley.

The Cumberland Valley is characterized by southwest-trending limestone ridges and valleys. The valley floors are filled with rocks of the Martinsburg Formation. Weathering of the folded and faulted underlying geologic formations imparts a gently rolling aspect to the local topography. The majority of LEAD is located within the Martinsburg Shale terrain, except for bands of carbonate rocks along the eastern and western edges of LEAD. The PDO Area and the SIA of LEAD are underlain by limestone. Surface elevations throughout LEAD range from approximately 600 to 750 ft above mean sea level (msl), except for the northwest portion of LEAD, where the elevation increases abruptly to more than 2,300 ft above msl in the vicinity of Broad Mountain (EA, 1991).

Streams cutting through the limestone terrain flow through broad, open valleys and are usually intermittent. In contrast to this, streams cutting through the upper shale units of the Martinsburg Formation usually meander in small, steep-walled valleys and are perennial. Surface drainage at

LEAD is divided into two watersheds, the Susquehanna River to the northeast and the Potomac River to the southwest. Both the Susquehanna and Potomac Rivers eventually drain into the Chesapeake Bay.

Two major stormwater drain systems serve the southeast portion of LEAD and contribute to local surface drainage. One system serves the area north of Coffey Avenue and discharges near the IWTP into the industrial wastewater plant outfall (located north of the IWTP), which discharges to Rowe Run. The other system serves the southeast warehouse area. Water drains into the storm drain system, is discharged through the storm drain outfall, and joins other surface runoff flowing southward to Conococheague Creek (USATHAMA, 1980). Figure 7 illustrates the drainage system and drainage divides at LEAD.

3.2.3 Soils

Surface soils present at LEAD are predominantly shaley to very shaley silt loams that developed through weathering of the Martinsburg Shale and the interbedded siltstones and sandstones. According to the Soils Survey Bulletin of Franklin County, these soils have been classified as part of the Weikert-Berks-Bedington Association (see Figure 8). Soils on the eastern edge of LEAD associated with the limestone have been identified as part of the Hagerstown-Duffield Association. These soils are deep, level or sloping, somewhat poorly drained, and mostly rocky, silty, clay loams. Along the western side of LEAD, outside of the BRAC area, are soils of both the Laidig-very stony Land-Buchanan Association (formed from sandstone) and the Morrill-Laidig Association (formed on the foot of mountain slopes) (USATHAMA, 1980).

3.2.4 Geology

LEAD straddles two major structural features; the South Mountain anticlinorium to the east and the Massanutten synclinorium to the west. The eastern portion of the Depot (underlain by carbonate rocks) is part of the anticlinorium, whereas the western portion of the Depot (underlain by shale) is part of the synclinorium. These structures resulted from folding that occurred during the close of the Paleozoic era. High-angle reverse faulting accompanied the folding of rocks in the eastern portion of LEAD. Several major faults that strike north to northeast and dip to the southeast at fairly steep angles cross the PDO Area (WESTON, 1984).

In the vicinity of LEAD, the Great Valley is floored by Ordovician age carbonate rock, as well as Ordovician age shale and greywacke of the Martinsburg Formation. The five formations occurring at LEAD are the shales of the Martinsburg Formation, the limestones of the Chambersburg Formation and the St. Paul Group, the limestones and dolomites of the Rockdale Run Formation, and the dolomites of the Pinesburg Station Formation. These geologic formations are fractured and deformed to varying degrees from past geologic activity (ESE, 1993). Figure 9 shows the geologic units of the eastern part of LEAD.

Several faults extend through LEAD, including the Pinola and Letterkenny Faults. Although an east-to-west cross fault was identified between these two faults, both the position and surface trace are open to question (Becher and Taylor, 1982). Northeast of LEAD, the Pinola Fault truncates the Letterkenny Fault, indicating that the latter fault is older.

The Letterkenny Fault is one of the few faults in the region that parallels the tectonic grain, yet is an early formed, westward-dipping thrust that moved material from within the syncline to the west up onto the anticline to the east (EA, 1991).

The Pinola Fault, located to the west of the Letterkenny Fault, is considered to be an east-dipping, high-angle thrust fault (based on the fact that older beds are to the east of the fault). Because it is almost impossible to trace faults through the Martinsburg terrain, the fault trace is projected through the Martinsburg Formation on the basis of a ridge-forming unit that extends through it (Becher and Taylor, 1982).

3.2.5 Hydrogeology

The regional surface water flow system of Franklin County controls the general groundwater flow patterns within LEAD. The surface water drainage divide, discussed previously, also divides the groundwater flow system into two basins. Groundwater elevation contours within LEAD generally reflect surface topography. The water table is located at moderate depth in areas of topographic highs and is shallow near stream valleys and other topographic lows (ERM, 1995).

The shale and carbonate rock that underlie LEAD have been disturbed and faulted during deformational events that ultimately formed the Great Valley. The two major faults located within the confines of LEAD (the Pinola Fault and the Letterkenny Fault) influence groundwater flow. Where faulting is present and dissimilar rocks have been brought into contact, the fault tends to act as a barrier to groundwater movement, occasionally forcing water within the formation to discharge as a fault spring (i.e., Rocky Spring). The groundwater movement may be only minimally affected where similar rocks, such as two limestone units, are in contact along a fault (ERM, 1995).

Fracture systems within the Martinsburg Formation are small and well connected, thus allowing groundwater to generally follow a regional flow path. Groundwater flow within the limestone of the Chambersburg Formation and St. Paul Group is more complex because it occurs predominantly through individual fractures and solution cavities typical of karst terrain. Fractures in the limestones are mostly aligned with the regional northeast tectonic grain and are much more irregular and widely spaced than those in the adjacent shales. Where solution cavities are present in the limestone, groundwater flow more closely resembles open channel flow rather than the fracture flow described above. The quantity and density of fractures within the limestone units increase with proximity to the bedrock surface. During seasonal periods when the water table is at its highest (early spring, late autumn), water levels commonly rise above the bedrock/surface material contact. Leaching or resuspension of any materials or potential contaminants buried in the surficial sediments may be enhanced during high water table conditions. Table 2 presents a description of the water-bearing characteristics of the geologic units present at LEAD (ERM, 1995).

Groundwater recharge occurs primarily through precipitation. Recharge areas occur throughout the central part of LEAD, wherever sandstone, siltstone, or joints are close to the surface. Actual

points of recharge for the limestone aquifers have not been determined; however, the many faults, joints, and sinkholes present at LEAD are the most likely routes (ERM, 1995).

Groundwater underlying LEAD generally occurs under unconfined conditions, with local areas of artesian conditions. These artesian conditions occur along a moderately steep slope located near the northwest edge of LEAD in the Ammo Area.

A groundwater study completed for the USACE Baltimore District in the 1950s concluded that there was not a viable source of groundwater available within LEAD boundaries to supply the depot's industrial mission (Acker, 1955). The only use of groundwater in the area is outside LEAD, where some individual homes depend on groundwater for their domestic supply. Any homes on well water that were determined to be impacted by the groundwater contamination at LEAD (exceed maximum contaminant levels [MCLs] for VOCs) were initially supplied with bottled water, but are now connected to public water. Off-post VOC-contaminated groundwater is used to water livestock and produce.

Table 2

Description and Water Bearing Characteristics of the Geologic Units at Letterkenny Army Depot

System	Geologic Unit	Thickness (ft)	Character of Rocks	Water-Bearing Characteristics
Quaternary	Colluvium	0-250	Mixture of clay, silt, sand, pebbles, cobbles, and boulders overlying a thick residual clay layer.	Yields domestic supplies commonly at the contact with bedrock. Provides extra storage for underlying limestone. Maximum reported yield is 30 gpm from sand and gravel. Calculated maximum sustained yield is 110 gpm.
Ordovician	Martinsburg Formation	1,500-3,000	Thin basal unit of platy limestone; thick medial unit of graywacke; bulk of formation is black carbonaceous and fissile shale. Formation is thinner to west.	Good aquifer. Maximum reported yields are 150 gpm from shale and 50 gpm from graywacke. Calculated maximum sustained yield is 100 gpm for shale and graywacke. No data are available for basal limestone. Only 3% of wells need standby storage to supply minimum domestic needs.
	Chambersburg Formation	300-750	Dark-gray, thin-bedded limestone that characteristically weathers into cobblestone shapes. Thinner to west. Abundantly fossiliferous.	Fair Aquifer. Maximum reported yield is 225 gpm. Calculated maximum sustained yield is 160 gpm. Approximately 30% of wells require standby storage to supply minimum domestic needs.
	St. Paul Group	800-1,000	Light-gray limestone; minor interbeds of dolomite containing black chert. Thinner to west. Abundantly fossiliferous.	Fair aquifer. Maximum reported yield is 225 gpm. Calculated maximum sustained yield is 160 gpm. Approximately 30% of wells require standby storage to supply minimum domestic needs.
	Pinesburg Station Formation	250-800	Medium-gray dolomite; some interbeds of limestone. Black chert and white quartz.	Fair aquifer. Maximum reported yield is 30 gpm. Calculated maximum sustained yield is 150 gpm. About 25% of wells require standby storage for minimum domestic supply.

Source: Becher, A.E. and L.E. Taylor. 1982. *Groundwater Resources in the Cumberland and Contiguous Valleys of Franklin County, Pennsylvania*. Pennsylvania Geological Survey Water Resources Report 53. Harrisburg, PA.

3.3 CONTAMINATION ASSESSMENT

3.3.1 SE OU 1—K Areas

The K Areas are located in the Disposal Area (DA) of LEAD and consist of Areas K-1, K-2, and K-3. The K-1 lagoon, which was closed in the 1970s, was used to dispose of waste industrial solvents. The Remedial Action, which consisted of removal of VOC-contaminated soil, was completed at the site in 1995. Contaminants in the soils in this area were at concentrations of up to 5.5% total VOCs. The most common VOCs were:

- trans-1,2-Dichloroethene
- Methylene chloride
- 1,1,1-Trichloroethane
- Trichloroethene

The groundwater in the SE Area is contaminated with the same VOCs as the soils from the K Area, with historical data indicating concentrations in groundwater were detected at up to 20,000 micrograms per liter ($\mu\text{g/L}$). In soils, lead was detected at concentrations up to 1.5%. TAL metals contamination of the groundwater is not an issue due to the binding properties of the clay soil. Response is complete at this site. VOC-contaminated groundwater associated with the DA is addressed under SE OU 3A.

3.3.2 SE OU 2—Industrial Wastewater Sewer System

The IWWS collection system malfunctioned soon after it was installed in the mid 1950s. This allowed VOC-contaminated wastewater to infiltrate directly into the soils and bedrock, causing VOC groundwater contamination. RI Field Work in 1992 and 1993 led to emergency repairs in 1994 and 1995. An emergency removal of IWWS VOC-contaminated soils was conducted in 1997.

Soils surrounding the IWWS were contaminated with VOCs contributing to Onpost and Offpost VOC groundwater contamination. Although the emergency repairs to the IWWS eliminated the primary source of chemical release, the affected underlying soils were a source of chemical release to receiving media such as groundwater, surface water/sediment, and ambient air.

The following chemicals were identified as COPCs:

- 1,1-Dichloroethene
- 1,2-Dichloroethene, total
- Methylene chloride
- Tetrachloroethene
- Trichloroethene
- 1,1,1-Trichloroethane

**SE OU 2—IWWS Sewers
Chemicals of Potential Concern in Soil**

Chemical	Max. Conc. (mg/kg)
<u>VOCs</u> Trichloroethene	1,700
<u>SVOCs</u> Benzo (a) pyrene	0.5
<u>Metals</u> Antimony	3.5
Barium	1,050
Beryllium	4.6
Chromium	226
Lead	2,090
Nickel	83
Thallium	18

3.3.3 SE OU 3A—Disposal Area VOC-Contaminated Groundwater

Past data have indicated that groundwater at SE OU 3A was contaminated with up to 20,000 ppb of total VOCs. The source of this VOC groundwater contamination is Area K-1 (see SE OU 1 above) and the former Spill Area in Area A (see SE OU 5 below). Both of these areas have been remediated. This onpost VOC-contaminated groundwater migrates offpost (see SE OU 6).

The most common VOCs in the DA are:

- 1,2-dichloroethene
- trichloroethene
- tetrachloroethene
- vinyl chloride

3.3.4 SE OU 3B—Area Upgradient of VOC-Contamination Source in SE OU 3A

SE OU 3B is a BRAC OU that addresses the area upgradient of the VOC-contaminated groundwater from the DA source. Two rounds of groundwater sampling, August 2003 and March 2004, were conducted as part of the site investigation. The site investigation report concluded there were no contaminants of concern (COCs) in groundwater at SE OU 3B. The risk to human health from groundwater exposure in this OU was determined to be within acceptable levels for the intended future use (commercial/industrial) of the property as well as for unrestricted use (i.e., residential or daycare).

3.3.5 SE OU 4—Stormwater Sewer Lines and Associated Drainageways

SE OU 4 consists of the stormwater sewer system and associated downstream sediments in the Rowe and Southeast drainageways. Based on the results of the RI investigations conducted in 1994 and 1995, the following COCs were identified in sediments:

SE OU 4—Drainageway Sediments Chemicals of Potential Concern in Sediment

Chemical	Max. Conc. (mg/kg)
<u>Polychlorinated biphenyls (PCBs)</u>	7.3
<u>SVOCs</u>	
<u>Naphthalene</u>	6
<u>Phenanthrene</u>	35
<u>Metals</u>	
<u>Cadmium</u>	81.9
<u>Chromium</u>	448
<u>Lead</u>	3,070
<u>Manganese</u>	6,340
<u>Zinc</u>	1,520

Approximately 1,030 tons of contaminated sediments were removed from drainageways at SE OU 4 during an Emergency Removal Action, which was completed in 1997. The post-removal results are summarized below because the post-removal data was used for the risk assessment and to support the findings in the ROD.

**SE OU 4—Drainageway Sediments
Chemicals of Potential Concern in Sediment
(Post-Removal)**

Chemical	Max. Conc. (mg/kg)
<u>Polychlorinated biphenyls (PCBs)</u>	0.039
<u>SVOCs</u>	
<u>Naphthalene</u>	ND
<u>Phenanthrene</u>	0.15
<u>Metals</u>	
<u>Cadmium</u>	0.88
<u>Chromium</u>	33.5
<u>Lead</u>	42.7
<u>Manganese</u>	1,580
<u>Zinc</u>	60.9

3.3.6 SE OU 5—Areas A and B Contaminated Soils

SE OU 5 consists of three areas:

Area A: Waste Disposal Trench Area. Area A is approximately 5 acres in size and was used to dispose of sand blasting abrasive and organic liquid/sludge.

The COCs were:

- SVOCs
- lead

Spill Area in Area A: Formerly thought to be the site of a spill/release of TCE. It was discovered during a 1997 emergency removal that the site contained laboratory containers of VOCs.

The COCs were:

- lead
- trichloroethene

Area B: Clay-Lined Oil Burn Pit (OBP), used to burn waste oil. An RI has determined that the OBP is not a source of VOCs to the groundwater.

The COCs are:

- SVOCs
- lead

The COCs are summarized below.

**SE OU 5—Areas A and B
Chemicals of Potential Concern in Soil**

Chemical	Max. Conc. (mg/kg)
<u>VOCs</u>	
1,2-Dichloroethene	3
Benzene	0.4
Chlorobenzene	50
Methylene Chloride	0.08
Trichlorethene	0.2
Vinyl Chloride	0.2
<u>SVOCs</u>	
4-Methylphenol	10
Naphthalene	90
<u>Metals</u>	
Antimony	160
Cadmium	80
Copper	190,000
Lead	4,590
Thallium	52

3.3.7 SE OU 6—VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road (Rowe Run Drainage System)

SE OU 6 includes off-post VOC-contaminated groundwater at LEAD associated with SE OU 3A and SE OU 11. To the north of Gate 6 is the Rowe Run Drainage Area. The on-post sources for this area of groundwater contamination are the IWWS, IWTP Lagoons, and the DA (Area K-1 and the Area A Spill Area). Six VOC-contaminated springs exceeded ARARs. Residential groundwater exceedances up to 2 miles Offpost (all homes with a groundwater ARARs exceedance have been placed on a public water supply). A summary of the COCs is summarized below.

**SE OU 6—VOC-Contaminated Groundwater North of Gate 6 and East of East
Patrol Road (Rowe Run Drainage System)
Chemicals of Potential Concern in Groundwater (1994-2006)**

Chemical	Max. Conc. (µg/L)
<u>VOCs</u>	
1,1-Dichloroethene	270
1,1,1-Trichchloroethane	4.4 J
Trichloroethene	410
1,2-Dichloroethene	270
<u>SVOCs</u>	
None	—
<u>Metals</u>	
Iron	44,600
Manganese	1,530
Lead	78.3
Zinc	3,700

J = estimated value

3.3.8 SE OU 7—Truck Open Storage Area/Waste Oil Sump

A former open storage area, with an abandoned septic tank and leaching field, was used to dispose of “boiler slops” and septage. The initial COCs identified were SVOCs and PCBs in the sludge in the septic tank. A removal action for the septic tank was completed in spring 1997. In 1999, polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (dioxins/furans) were discovered at low concentrations at the site in a limited area of shallow (0-1 foot) soils. A time-critical removal action for the dioxin-contaminated soils was performed in December 2000.

In order to evaluate the current conditions of the TOSA/WOS site and to document the nature and extent of any risk related to the transfer of the site, a draft Current Conditions SLRA and SLERA was completed for SE OU 7 in August 2007. Results of the SLRA indicated that human health risk at the TOSA/WOS site was driven by TCE via the groundwater ingestion pathway (maximum concentration 7.9 micrograms per liter [µg/L]) and arsenic (maximum concentration 5.2 milligrams per kilogram [mg/kg]) via the direct contact/soil ingestion pathway. Results of the SLERA indicated site ecological risk was driven by Aroclor 1260, 2,3,7,8-TCDD TEQ for mammals 1.63E-05, and 2,3,7,8-TCDD TEQ for birds (maximum concentrations 1.33E-02 µg/kg and 1.68E-02 µg/kg, respectively). Although future drafts will require regulatory review, it is expected that the site will be evaluated as protective of human health and the environment for the future intended commercial/industrial use. A finalized version is expected to be produced in 2008.

3.3.9 SE OU 8—BRAC Waste Sites

The SE OU 8 area is composed of the to-be-excessed (BRAC) portion of the SE Area. Portions of the SE OU 8 are still being investigated. The contaminants of potential concern (COPCs) for these sites include:

- VOCs
- SVOCs
- TAL metals
- dioxins

The sites within the SE OU 8 are listed in the following table.

SE OU 8 Sites

AEDBR Site ID	Site Name
001	Building 57 Site ⁽²⁾
002	Building 37 Site ⁽²⁾
008	Building T-228 Battery Acid Disposal Pit ⁽²⁾
011	Backwash Discharge Area from the Water Treatment Plant ⁽¹⁾
023	Building 51 RAD Storage Area ⁽²⁾
055/125	Former Transfer Area Near Building 98 ⁽²⁾
060	Lot 29 Ingot Storage Area ⁽²⁾ Lot 48 Ingot Storage Area ⁽²⁾
072	Southeast Storm Drainage System Discharge Area
073	Southeast Drainageway Sediment Pile Areas ⁽²⁾
074	IWWS System Lines ⁽²⁾
092	Buildings 16 and 17 Area ⁽²⁾
110 and 114	Open Vehicle Storage Area ⁽¹⁾⁽²⁾ Former Vehicle Storage Area North of the Test Track ⁽¹⁾
115	Tank Farm Storage Area ⁽¹⁾
116	Radioactive Materials Storage at Building 441
118	Building 400 Series Fire Training Area ⁽¹⁾ Building 422 North ⁽²⁾ Building 433 West ⁽²⁾ Building 433 Defueling Point ⁽²⁾ Former Storage Area West of Building 446 ⁽²⁾ ASTs at Golf Course Storage Buildings ⁽²⁾
126	Building 425 UST Removal Site ⁽²⁾ Building 437 UST Removal Site ⁽¹⁾⁽²⁾ Gate 1 Guardhouse ⁽¹⁾
127	IWWS Force Main Breaks
130	Former Storage Shed Near Building S38-1/S-38-2 ⁽²⁾

Notes:

- ⁽¹⁾ Final Remedial Investigation/Risk Assessment (RI/RA) reports were published for these sites. The conclusion was that there are no unacceptable risks exist based on unrestricted use for the Phase III

and Phase IV sites (Open Vehicle Storage Area, Backwash Discharge Area, Building 400 Series Fire Training Area, Test Track Area (WESTON, 2005e), Former Vehicle Storage Area West of the Test Track, and Former Tank Farm Storage Area) and for the intended commercial/ industrial property use for the other sites. RI/RA reports for these sites are: (a) Backwash Discharge Area (WESTON, 2002b); (b) Open Vehicle Storage Area (WESTON, 2003d); (c) Building 400 Series Fire Training Area (WESTON, 2002a); (d) Building 437 UST Removal Site (WESTON, 2003c); (e) Gate 1 Guardhouse, Building 511(WESTON, 2001f); (f) Former Vehicle Storage Area North of the Test Track (WESTON, 2005h); (g) Test Track Area (WESTON, 2005e); and (h) Former Tank Farm Storage Area (WESTON, 2005d).

⁽²⁾These sites will be part of the Phase V BRAC property transfer. An FS, PP, ROD, and FOST for the Phase V BRAC Parcels are expected to be completed in fall 2007.

⁽³⁾A non-time critical removal action was performed at the Open Vehicle Storage Area as reported in the *Property Disposal Office Area Operable Unit 6 Southeast Area, Operable Unit 8 – Removal Action Completion Report PAH-Contaminated Soils at the Open Vehicle Storage Area (OVSA), Letterkenny Army Depot (IT, 2001)*.

3.3.10 SE OU 9—Landfill J

Landfill J is an abandoned landfill located behind Building 320. Additional investigation occurred in 2000 and an emergency removal action was conducted in June 2001. The COPCs include:

SE OU 9—Area J Chemicals of Potential Concern in Soil

Chemical	Max. Conc. (mg/kg)
<u>VOCs</u>	
1,2-Dichloroethene	180
Trichloroethene	6,100
Tetrachloroethene	440
Vinyl Chloride	3
<u>SVOCs</u>	
Naphthalene	105
1,2-Dichlorobenzene	180
1,4-Dichlorobenzene	46
n-Nitrosodiphenylamine	3
Pentachlorophenol	22
Benzo (a) pyrene	287
Benzo (b) fluoranthene	238
Chrysene	283
Pyrene	556
<u>Metals</u>	
Lead	199,000
Cobalt	2,370
Antimony	1,370
Cadmium	77
Mercury	17
Thallium	16
Zinc	44,500

3.3.11 SE OU 10—Southern Southeast Industrial Area (SSIA) VOC-Contaminated Groundwater South of Gate 6 (Conococheague Drainage System)

The source of the VOCs in groundwater at SE OU 10 is the Building 37 IWWS gravity lines. RI field work in 1992 and 1993 led to emergency repairs in 1994 and 1995. The COCs include VOCs (TCE, TCA, and associated breakdown products) and SVOCs related to a diesel fuel release at Building 37. The selected remedy documented in the ROD for SE OU 10 was Enhanced Biodegradation with Monitored Natural Attenuation and Land Use Controls (WESTON, 2006d). A final Remedial Action Work Plan was completed in April 2007 and the final sodium lactate injection for the Enhanced Biodegradation occurred in June 2007. Monitoring of the natural attenuation processes and land use controls will remain in place until chemical concentrations in groundwater are protective of human health and the environment.

3.3.12 SE OU 11—NSIA VOC-Contaminated Groundwater North of Gate 6

The original unlined lagoon was constructed in 1954 and operated until 1967. The lagoon was used as a settling/equalization basin for the IWTP. Over time, this process led to the generation of a sludge layer in the lagoon. Losses of sludge and untreated wastes from the unlined lagoon had been occurring for an unspecified time. In 1967 a concrete-lined, two-cell lagoon was built over the existing bare earth lagoon. In 1992 the soil in the Lagoon Area was excavated and treated. The groundwater below the lagoon area is contaminated with VOCs. Onpost VOC-contaminated groundwater migrates offpost (see SE OU 6).

The most common VOCs in the Lagoon Area are:

- chloroform
- 1,2-dichloroethane
- 1,1-dichloroethene
- *cis-*, *trans-*, and total 1,2-dichloroethene
- methylene chloride
- trichloroethene
- vinyl chloride

**SE OU 11—NSIA VOC-Contaminated Groundwater North of Gate 6
Chemicals of Potential Concern in Groundwater**

Chemical	Max. Conc. (µg/L)
<u>VOCs</u>	
Chloroform	15
1,2-Dichloroethane	1.8
1,1-Dichloroethene	20
1,2-Dichloroethene (total)	9,900
Methylene Chloride	3.3
Trichloroethene	12,000
Vinyl Chloride	2,200
<u>SVOCs</u>	
None	—
<u>Metals</u>	
None	—

3.3.13 SE OU 12—Landfill G

The LEAD IA identified this area active from 1964 through 1978, when it was leveled to match the existing terrain. This area was used to dispose of residue from nearby trash revetments (K-2) and IWTP sludge. Visibly contaminated leachate (metals) was reported to (and continues to) emanate from this site into a nearby drainage ditch. Leachate containing metals emanates from this site into a small wetland area that has formed in a nearby drainage ditch, where the metals are precipitated out. The drainage ditch ultimately discharges to Muddy Run. Aerial photographs from 1965 do not reveal landfilling activities at this site, however, aerial photographs from 1970 confirm disposal activities here. A former LEAD worker had identified this area as containing buried drums. A 1991 SI has identified several magnetic anomalies. In 1993 these anomalies were cross-trenched. The anomalies were related to buried metallic objects. This area contained empty buried drums that formerly contained caustics. Sampling indicated that these buried drums had caused no environmental problems. Another anomaly showed a large number of solvent containers. These were drummed and disposed of in this area. The 1995 SI follow-on identified this site as requiring an RI. An RI is underway. This site consists of contaminated soil, groundwater and surface water. The COPCs for this site are summarized in the following tables:

**SE OU 12—Landfill G
Chemicals of Potential Concern in Soil and Sediment**

Chemical	Max. Conc. (mg/kg)
<u>VOCs</u> none	—
<u>SVOCs</u> Benzo(a)pyrene	1.7
<u>PCBs</u> Aroclor 1016 Aroclor 1254	24,000 110
<u>Metals</u> Lead	1,450

**SE OU 12—Landfill G
Chemicals of Potential Concern in Surface Water**

Chemical	Max. Conc. (µg/L)
<u>VOCs</u> Carbon Disulfide	500
<u>SVOCs</u> None	—
<u>Metals</u> Aluminum Iron Manganese Lead Zinc	5,080 11,900 679 2.6 72.8

**SE OU 12—Landfill G
Chemicals of Potential Concern in Groundwater**

Chemical	Max. Conc. (µg/L)
<u>VOCs</u> Carbon Disulfide	24
<u>SVOCs</u> None	—
<u>Metals</u> Iron Manganese Nickel	114,000 2,670 206

Cross trenching was conducted at SE OU 12 in July 2007. Six 5-gallon containers of a black tar-like substance were encountered and some containers were punctured as a result of the trenching activities. The containers were removed from the trench along with the soil that had been freshly covered with this tar like substance, which had a petroleum-like odor. The containers were encountered at about 4 ft below ground surface and the depth of the affected area did not extend beyond 6 ft deep. A Form U sample was collected to allow LEAD to perform a waste characterization on this material. A removal action, performed in January 2008, consisted of the removal of containers and associated waste along with affected soils. COPCs associated with the tar-like substance are provided in the following table:

**SE OU 12—Landfill G
Chemicals of Potential Concern in Waste Material
Form U Sample Results**

Chemical	Max. Conc. (mg/kg)
<u>VOCs</u> <i>None</i>	—
<u>SVOCs</u> <i>None</i>	—
<u>PCBs</u> <i>None</i>	—
<u>Metals</u>	
Arsenic	4.9
Barium	6.5
Cadmium	1.4
Chromium	180
Copper	4.3
Lead	8,540
Nickel	2.0
Zinc	20,000

TCLP Sample Analysis

Chemical	Max. Conc. (ug/L)
<u>VOCs</u>	
Benzene	150
<u>SVOCs</u>	
2-Methylphenol	25
<u>PCBs</u>	
Aroclor 1260	160
<u>Metals</u>	
Lead	8,540
Zinc	20,000

3.3.14 SE OU 13—Southern Martinsburg Shale Region Groundwater

An extensive study conducted in the SMSR, as reported in the *Summary Report on the Groundwater Quality in the Southern Martinsburg Shale Region, Letterkenny Army Depot* (WESTON, April, 2003b) and the RI/RA Report for the OVSA (WESTON, April 2003d) indicated that groundwater in this region is not contaminated (i.e., risk calculated based on unrestricted use due to exposure to groundwater are within acceptable levels), which supported the recommendation for the no further action ROD for the Phase III BRAC Property Transfer. The SMSR area groundwater was originally part of SE OU 10 and SE OU 11.

3.3.15 SE OU 14—Former Test Track Area

As discussed in Subsection 3.1.14, The RI/RA for the Former Test Track and Areas E and F was finalized in 2004; this RI/RA showed that risks are within acceptable levels for commercial/industrial use. The RI for the Building 349 Soil Staging Area was submitted to EPA and PADEP in 2003. Future plans are to resubmit the RI/RA, with the risk assessment based on likely future use of commercial/industrial, along with completion of the CERCLA process (FS, Proposed Plan, and ROD).

4. REMEDIAL ACTIONS

4.1 SE OU 1—K-AREAS

4.1.1 Remedy Selection

The ROD for the Southeastern Area OU 1: K Areas was signed on 2 August 1991. The remedial action objective was:

- Minimize the deterioration of groundwater by providing source control of the contaminated soils.

The remedial actions at SE OU 1 were:

- Excavation of 8,000 cubic yards of contaminated soils in the K Area.
- Thermal treatment of contaminated soils at a temperature not greater than 450 °F.
- Destruction of volatilized contaminants by adsorption of volatilized contaminants onto activated carbon.
- Analysis of representative samples of treated soils and comparison with treatment criteria.
- Return of treated soils to original excavation.

An Explanation of Significant Differences (ESD) for the Southeastern Area OU 1: K Areas was signed on 2 August 1991 as a result of comments provided by EPA to the Army following signature of the ROD by the Army. The ESD clarifies that the appropriate ARARs for any metals found in soils during the remediation at the SE Area are the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*, Land Disposal Restrictions promulgated at 40 C.F.R. Part 268, and that the Pennsylvania proposed regulations on residual waste management are “To Be Considered” (TBC) in implementing the proposed remedy.

4.1.2 Remedy Implementation

The remedial design for the site was started in September 1991 and completed in June 1993. The plans called for the Army to excavate all soils in the K-Areas that contained 225 parts per billion (ppb) of trichloroethene or greater. The soils were to be treated using Low Temperature Thermal Treatment (LT³). Excavation to bedrock (the limits of mechanical excavation) yielded approximately 14,100 yd³ of soil from Areas K-1, K-2, and K-3 to be treated. Mobilization began in August 1993.

4.1.2.1 *LT³ Treatment*

The LT³ system was required to remove TCE from the impacted soils down to a residual concentration level of 50 ppb as well as remove other target organic contaminants to the residual Land Disposal Restriction (LDR) concentration limits specified in 40 CFR 268.41. In addition, the LT³ system was required to comply with all applicable air emissions standards to include a particulate matter concentration of less than 0.08 grains per dry standard cubic foot (dscf) and a 99% removal efficiency of target organic compounds. LT³ technology was previously used to successfully treat impacted soil at LEAD's Industrial Wastewater Treatment Plant (IWTP) lagoons.

The following performance requirements were required:

▪ Trichloroethene	50 ppb
▪ Acetone	160,000 ppb
▪ Benzene	3,700 ppb
▪ Carbon Tetrachloride	5,600 ppb
▪ Chlorobenzene	5,700 ppb
▪ O-Dichlorobenzene	6,200 ppb
▪ 1,1,1-Trichloroethane	5,600 ppb
▪ 1,1,2-Trichloroethane	7,600 ppb
▪ Tetrachloroethene	5,600 ppb
▪ Ethyl Benzene	6,000 ppb
▪ Toluene	28,000 ppb
▪ Xylene (Total)	28,000 ppb

4.1.2.2 *Stabilization*

Following LT³, approximately 4,000 yd³ of soil that exceeded TCLP standards for lead were treated (fixated) to meet the TCLP regulatory requirements of 5 ppm.

4.1.2.3 *Backfilling*

LT³ treated and stabilized soil was returned to the area from which it was excavated. These soils were placed into all of the excavations in 8-inch lifts and compacted. The K Areas were returned to their pre-remediation contours or, where necessary, modified to promote surface water drainage and prevent ponding or collection of surface water. Slopes associated with final grading were constructed and maintained to ensure permanent stability, control erosion, and to allow for the placement of the soil and vegetative cover.

4.1.2.4 Construction of Class III Residual Waste Landfill

The cover system placed on the K Areas was required to meet all final cover requirements of the PADER Title 25 Residual Waste Management Regulations, Chapter 288, pertaining to class III residual waste landfills.

A minimum of 12 inches of the intermediate cover layer was installed in no greater than 8-inch lifts. A 40-mil geomembrane was installed onto the completed intermediate layer. The drainage layer consisted of a Geotextile over a Geonet layer. Cover soil was placed on the drainage layer in a manner that prevented damage to and wrinkling of the Geotextile and Geonet. Topsoil was installed over the cover soil. The topsoil layer was then seeded and mulched.

4.1.2.5 Project Schedule

August 1993 -	Began Mobilization and Excavation Shoring activities
September 1993 -	Completed Mobilization activities
November 1993 -	Received PADER Exemption Approval for LT ³ system
November 1993 -	Continued Excavation/Treatment/Backfill activities
January 1994 -	Suspension of Work pending regulatory approval of the Solidification/Stabilization Treatability report
April 1994 -	Resumed Excavation/Treatment/Backfill activities
October 1994 -	Completed Excavation/Treatment/Backfill activities
November 1994 -	Began Final Cap/Site Restoration activities
September 1995 -	Completed Capping and Site Demobilization activities

4.1.2.6 Cost

The total cost of the Remedial Action was \$4,295,578.

The contract cost of the Remedial Action was \$3,905,256.

Excavation costs were \$24.77 per yd³.

LT³ treatment costs were \$74.70 per yd³.

TCLP soils stabilization costs were \$17.13 per yd³.

4.1.3 Operation and Maintenance

The operation and maintenance plan and schedule for the capped areas in the K Area is documented in the SE OU 1 (K-Areas) *Vegetative Cover Preventative Maintenance and Corrective Action Standard Operating Procedure* (USACE, 2004).

4.1.4 Current Status

The Army has conducted visual inspections of the capped areas yearly. The most current inspection was conducted on 16 August 2007 and indicated that the vegetative cover, the under drainage system, and the liner are intact. The U.S. Navy installed two test-monitoring wells in December 1997 as part of a Three-Dimensional Seismic Technology Demonstration effort. Such wells were installed on the toe of the cap and did not penetrate the liner.

In spring 1999 the Army installed four in situ hydrogen peroxide injectors to support a pilot study. These injectors did not penetrate the liner. Polyethylene boots were attached to the liner and clamped to the injector casing, maintaining liner integrity. This effort supports the SE OU 3A FFS that addresses the VOC groundwater contamination caused by the K Areas.

4.2 SE OU 2—INDUSTRIAL WASTEWATER SEWER SYSTEM

4.2.1 Remedy Selection

The selected remedy for SE OU 2 is cleaning and abandonment of the sewer lines in the parcels transferred to the public. Also, because the risk assessment showed that there are acceptable risks for commercial/industrial use, the remedy includes land use controls to prevent residential use of the property. The remedial action objectives for SE OU 2 consist of specific goals for protection of human health and the environment, and, more specifically are to:

- Prevent potential future releases from the sewers; and
- Prevent residential land use exposure.

As discussed in the ROD for SE OU 2, this remedial action alternative protects human health and the environment, is cost effective, technically and administratively feasible, and its implementation will not present any risks to site workers, the surrounding community, or the environment. The following documents support the selection of the remedy for SE OU 2:

- *SE OU 2, Industrial Wastewater Sewers, Risk Assessment Report, Final.* (IT, 2002)
- *Summary Report on the Emergency Removal of Contaminated Soils from the Industrial Wastewater Sewer System at the Letterkenny Army Depot, Chambersburg, PA.* (Weston, 1998h)
- *Data Validation Plan for Historical Analytical Data.* (Weston and MSTI, 1999)

- *Engineering Evaluation/Cost Analysis (EE/CA) for the Industrial Wastewater Sewer System Contaminated Soils for Southeastern Area Operable Unit 2, Letterkenny Army Depot, Chambersburg, PA. Final Report.* (Fluor Daniel, 1996)
- *Remedial Investigation for Southeastern Area Operable Unit 2 Industrial Wastewater Sewer Lines and Associated Contaminated Soils at Letterkenny Army Depot. Draft.* (Fluor Daniel, 1998)
- *SE OU2 Industrial Wastewater Sewers Feasibility Study Report Final* (Shaw, 2004d)
- *Proposed Plan for Southeastern Area Operable Unit 2* (Shaw, 2005a)
- *Record of Decision for Southeastern Area Operable Unit 2.* (Shaw, 2006a).

4.2.2 Remedy Implementation

The selected remedy for SE OU 2 includes the following elements:

- Abandonment of the sewer lines in the BRAC parcel (was completed and reported as part of SE OU 8 investigations); and
- Implementation of land use controls to restrict land use to commercial/industrial.

4.2.2.1 Sewer Lines

The selected remedy for SE OU 2 consisted of the cleaning and abandonment of the IWWS force main, and gravity drain lines servicing Buildings 37 and 57 to prevent future use of the existing sewers. The IWWS gravity lines in the Army-retained portion of the installation will remain in use. The sewer abandonment activities that were associated with the parcels transferred or to be transferred to the public are shown on Figures 10 through 16. The sewer abandonment portion of the SE OU 2 remedy was implemented as part of the remedial investigation activities for the IWWS under SE OU 8 and is reported in the draft SE OU 8 RI/RA report for Building 37 and IWWS (Weston, 2007d).

The IWWS system flushing/cleaning, testing and abandonment activities were conducted from fall 2004 through spring 2006. Work conducted to date includes abandonment of the industrial wastewater force main that extended from Building 57 to Manhole 140 A, and reconnections were made for the sanitary sewer as discussed below.

The IWWS force main extends from the Building 57 to Building 360 (the IWTP). The IWWS force main was abandoned from Building 57 to Manhole 140 A. The Building 57 gravity line and parts of the Building 37 gravity line, wet wells, and lift stations remain in use. This section of the force main is approximately 5,000 ft long and varies in diameter from 4 inches at Building 57 to 6 inches at Lift Station No. 2 to manhole 140A. The system was designed to discharge wastewater to this force main via gravity flow at Buildings 57, 37, 227, and 228 and pressurized

flow at Building 12 and a portion of Building 57. All IWWS lines and associated fixtures (e.g., lift stations, cleanouts, ARMs, sumps, and listening posts) that were not rerouted to the sanitary sewer were abandoned after they were cleaned and leak tested. The IWWS force main was abandoned from Cleanout No. 1 (downgradient of LS 4) to Manhole No. 140A (near Building 102). The existing force main was plugged at Cleanout No. 1, directly upgradient and downgradient of LS 1 and LS 2, cleanouts, ARMs, and at Manhole No. 140A. LS 2 and all listening posts along the force main were also abandoned. Figures 10 through 13 show the IWWS force main associated with Buildings 57, 37, 227 and 228, and 12, respectively, the points at which the line was plugged, and the abandonment of all listening posts, cleanouts, ARMs, and manholes.

Three sections of the IWWS force main near Buildings 37 and 57 were tested and abandoned as shown in Figure 14, 15 and 16. The active portion of the IWWS system (i.e., that received wastewater from new missions at Buildings 37 and 57), was rerouted to the Franklin County General Authority (FCGA) sanitary sewer at LEAD, and the remaining unused portion of the IWWS system force main in this area was abandoned. Currently, the wastewater from Building 37 is pumped into aboveground storage tanks then transported for treatment to the IWTP at LEAD because it does not meet the newly established LIDA pre-treatment standards for discharge into the LIDA-owned sanitary sewer system. Wastewater from Building 57 continues to be discharged to the LIDA-owned sanitary sewer system. The Army is currently considering whether to continue the wastewater transport to the IWTP or to install a replacement force main (in the vicinity of the abandoned force main) to direct flow from both buildings to the IWTP.

4.2.2.2 Land Use Controls

The selected remedy for SE OU 2 also includes land use controls to prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities, and playgrounds. Implementation of this remedy will maintain the industrial use of the property by the development and enforcement of environmental deed restrictions. These restrictions will become a permanent part of the real estate documentation and will be required to be included in any subsequent sales, transfers, and/or lease agreements. According to the description of the selected remedy in the ROD, “within 90 days after the last signature on this ROD, the Army will prepare and submit to EPA for review and approval a Land Use Control (LUC) Remedial Design as the land use component of the Remedial Design; this LUC Remedial Design shall contain LUC implementation and maintenance actions, including periodic inspections.” Appropriate land use controls are to be contained in the Land Use Control Remedial Design document including any explicit prohibitions that may be deemed necessary. The land use controls will be maintained until the concentrations of hazardous substances in the soil are at levels that allow for unrestricted use and unlimited exposure. It was determined during the 5-Year review that the Land Use Control Remedial Design document has not been prepared and this is a deficiency that needs to be addressed. The document is currently in progress and a draft is expected to be completed by the end of September 2008. The remedy will be implemented as discussed below.

Land use controls for property that has been transferred to the public, which are located in the Phase I and Phase II parcels (Figure 6) were implemented via deed restrictions at the time of

property conveyance. The land use controls also include zoning restrictions and enforcement provisions as summarized below. Deed restrictions were included upon transfer of the property to LIDA and include a covenant to use the area solely for non-residential purposes. The deed restrictions do not preclude additional remediation to residential standards; however, the restrictions require USEPA and PADEP approval prior to any residential use of the property. Residential use as defined in the deed restriction includes, but is not limited to, housing, daycare facilities, schools (excluding educational and training programs for persons over 18 years of age), assisted living facilities, and outdoor recreational activities (excluding recreational activities by employees and their families incidental to authorized commercial and industrial uses on the property). A Land Use Control Assurance Plan Memorandum of Agreement (LUCAP MOA) was developed and signed by the BRAC Cleanup Team in August 2002. The LUCAP MOA documents the land use controls and mechanisms, the enforcement and the annual reporting requirements, and ensures that the land use restrictions for the Phase I and Phase II BRAC property transfer remain in-place. The LUCAP MOA and its land use control provisions last until 2012, when the Army, USEPA and PADEP may consult and, if necessary, make other provisions for ensuring the effectiveness of the institutional controls on the Phase I and II property. In addition, the existing Greene Township zoning ordinances restricts the property to non-residential use.

For parcels related to SE OU 2 currently retained for military use at LEAD, the LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 2 to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. A statement that prohibits residential use at SE OU 2, including residential housing, elementary and secondary schools, child care facilities, and playgrounds will be included in the LEAD Master Plan, along with the figure showing the locations of the sewer lines. Some of the parcels associated with SE OU 2 are to be transferred to LIDA in the future (will be Phase V BRAC, see Figure 17); the land use controls for these parcels will be implemented via deed restrictions, analogous to what was done for the Phase I and II BRAC parcels as was previously described. The details for land use restrictions for the sewers in Phase V BRAC parcels will be specified in the Land Use Control Remedial Design document, which is expected to be completed by the end of September 2008. In the interim, land use in SE OU 2 is restricted to commercial/industrial through the requirement for health and safety and dig permits to perform work at the site. Security patrols are also being utilized to prevent unauthorized activity at the site.

In addition, the removal of contaminants from groundwater through enhanced bioremediation was conducted for SE OU 2 as part of the SE OU 10 remedial action (see Subsection 4.11).

4.2.3 Operation and Maintenance

The land use controls portion of the SE OU 2 remedy requires O&M to prevent future residential use of the property. Portions of SE OU 2 are located in Army retained land, and portions are located in within BRAC parcel and the land will ultimately be transferred to LIDA. As stated in

the ROD, the long-term effectiveness of the land use controls will be contingent upon enforcement of use restrictions initially by the Army through the LEAD Master Plan, and after transfer, through enforcement of zoning restrictions and environmental deed restrictions.

The LUCAP MOA ensures that the land use restrictions for the Phase I and Phase II BRAC property transfer remain in-place. The monitoring and enforcement provisions of the LUCAP MOA include ongoing inspections by the Army as part of day-to-day activities at LEAD. The Army will provide written notification to PADEP and USEPA within three working days after observing or being informed of institutional controls violations. Annual requirements stated in the LUCAP MOA include: annual inspection of the CVBP; annual notification of land use controls to LIDA, Greene Township, Letterkenny Township, and CVBP; and annual status report of land use controls to PADEP and EPA. Other institutional control mechanisms are deed restrictions, zoning restrictions and the CVBP Declaration of Covenants, Conditions and Restrictions. LIDA's Health and Safety Plan and the CVBP Declaration of Covenants, Conditions, and Restrictions ensure that the land is used solely for commercial/industrial purposes. Additionally, all of the Phase I and Phase II BRAC parcels are located in the portion of Greene Township that has zoning restrictions prohibiting residential use of the land. The Army, with USEPA and PADEP approval, may arrange with other entities such as LIDA to maintain the institutional controls as long as the Army will remain ultimately responsible for the effectiveness of the institutional controls. Greene Township will have enforcement authority for the local zoning restrictions.

The LUCAP MOA documents the land use controls and mechanisms, the enforcement and the annual reporting requirements. Letterkenny has submitted annual inspection reports to the EPA and PADEP for calendar years 1999 thru 2006. One requirement under the LUCAP MOA is the development by the BCT of a notification letter for the LIDA. The notification letter was finalized by the BCT in May 2006, signed by the BRAC Environmental Coordinator on June 16, 2006 and delivered to LIDA. LIDA will in turn distribute this notification letter on an annual basis to the Cumberland Valley Business Park landowners and tenants.

The sewer abandonment portion of the SE OU 2 remedy does not specifically necessitate O&M since the specified abandonment activities associated with Building 37 and 57 have been completed. The Army has plans to continue using Buildings 37 and 57 under a lease agreement after the property is transferred to LIDA. The Army also plans to use portions of the IWWS lines at Buildings 37 and 57. Therefore, the Army is currently considering whether to continue transporting the wastewater to the IWTP or install a new force main (in the vicinity of the abandoned force main) to direct flow from both buildings to the IWTP. These future activities will be maintained by the LEAD Public Works Department and are outside of the scope of the SE OU 2 ROD.

4.3 SE OU 3A—DISPOSAL AREA VOC-CONTAMINATED GROUNDWATER

4.3.1 Remedy Selection

The remedy for SE OU 3A has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 3A will be protective of human health and the environment. In the

interim, exposure pathways that could result in unacceptable risks are being controlled through the use of the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. The LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 3A to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. Buildings that could potentially be affected by the vapor intrusion pathway are currently being evaluated to determine whether the pathway is complete.

4.3.2 Remedy Implementation

Not applicable.

4.3.3 Operation and Maintenance

Not applicable.

4.4 SE OU 3B— AREA UPGRADIENT OF VOC-CONTAMINATION SOURCE IN SE OU 3A

4.4.1 Remedy Selection

A ROD and a FOST were completed and signed in June 2006. The ROD (Weston, 2006b) specifies No Action for SE OU 3B groundwater and for soil associated with four parcels that consist of a portion of SE OU 8; two of these parcels are to be transferred as part of the Phase IV BRAC property transfer. See Section 4.9.1 for additional discussion.

4.4.2 Remedy Implementation

The risk associated with groundwater in SE OU 3B is within acceptable levels based on unrestricted use (see Subsection 4.9.1). The Phase IV ROD (WESTON, 2006b) concluded that No Action is required for SE OU 3B.

4.4.3 Operation and Maintenance

Not applicable (selected remedy was No Action).

4.5 SE OU 4—STORMWATER SEWER LINES AND ASSOCIATED DRAINAGEWAYS

4.5.1 Remedy Selection

A ROD was completed in July 2005 (signed in August 2005) (Shaw, 2005b). The ROD contains the supporting information and documents that no further action is necessary for SE OU 4 to be protective of human health and the environment.

4.5.2 Remedy Implementation

Not applicable (selected remedy was no further action).

4.5.3 Operation and Maintenance

Not applicable (selected remedy was no further action).

4.6 SE OU 5—AREA A AND B CONTAMINATED SOILS

4.6.1 Remedy Selection

The remedy for SE OU 5 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 5 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 5 to commercial/industrial; however, the document will be amended to address this deficiency. Potential risks to ecological receptors are currently in the risk management decision process.

4.6.2 Remedy Implementation

Not applicable.

4.6.3 Operation and Maintenance

Not applicable.

4.7 SE OU 6— VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6 AND EAST OF EAST PATROL ROAD (ROWE RUN DRAINAGE SYSTEM)

4.7.1 Remedy Selection

The remedy for SE OU 6 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 6 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. To eliminate the possibility for direct contact with and ingestion of contaminated groundwater, residents affected by groundwater contamination have received bottled water and/or have been connected to the public water supply line and the public has been notified through public meetings and publicly-available documents about the contaminated groundwater. In addition, the Greene Township code Chapter 101 contains a provision for requiring additional analysis of a water supply if the township has reason to suspect that harmful substances are present in amounts that are significantly adverse to human health and safety. Also, the Greene Township code (*Code of the Township of Greene Pennsylvania, Part II General Legislation, V3 Updated through 12-15-2002, Chapter 85, Subdivision and Land Development, and Chapter 101, Water*) also applies to SE OU 6 which is located entirely within Greene Township. The Greene Township code requires connection to public water supply for specified areas and situations as defined in Chapters 85 and 101 of the 2005 Code of the Township of Greene. Chapter 85 states that if any part of a proposed subdivision, mobile home park, or land development is located within 500 feet of an existing or planned public water system, it shall be connected to said water system and shall serve every lot, dwelling unit or other occupancy within the proposed subdivision. Chapter 101 of Greene Township code requires connection to public water supply for existing structures located within 150 feet of a public water system where the existing individual or semipublic water supply becomes nonfunctional or inadequate, as defined by the code.

The vapor intrusion pathway is currently being evaluated at SE OU 6 to determine whether this pathway is complete and whether this pathway presents any unacceptable risk to human health or the environment in SE OU 6.

4.7.2 Remedy Implementation

Not applicable.

4.7.3 Operation and Maintenance

Not applicable.

4.8 SE OU 7—TRUCK OPEN STORAGE AREA

4.8.1 Remedy Selection

The remedy for SE OU 7 has not been selected at this time. The selected remedy for SE OU 7 will be documented in the FS, Proposed Plan, and ROD for the Phase V BRAC property transfer. It is anticipated that all remedial actions selected for SE OU 7 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 7 to commercial/industrial; however, the LEAD Master Plan will be amended to address this deficiency.

4.8.2 Remedy Implementation

Not applicable.

4.8.3 Operation and Maintenance

Not applicable.

4.9 SE OU 8—BRAC WASTE SITES

4.9.1 Remedy Selection

A Proposed Plan (PP) (WESTON, 1998a) was approved and a ROD (WESTON, 1998b) was signed in September 1998 for the Phase I Parcels. The ROD specified land use controls as the final remedy for soils and the interim remedy for groundwater. The following areas comprise the SE portions of Phase One: Parcels 1 and 2, Parcels 3 and 4, Parcel 5, Parcel 6, Parcel 7, Parcel 8, Parcel 9, Parcels 10 through 13, Parcels 16 through 21, Parcels 22 and 31, Parcel 23, Parcel 24, Parcel 25, Parcel 26, and Parcel 27. The locations of these parcels in the SE Area are shown in Figure 6.

The following documents were completed and approved to support the ROD for the Phase I Parcels in the SE Area.

- *Decision Document for BRAC Parcels 1 and 2, Letterkenny Army Depot* (WESTON, 1998c).
- *Decision Document for BRAC Parcels 8 through 13, Letterkenny Army Depot* (WESTON, 1998d).
- *Decision Document for BRAC Parcel 24, Letterkenny Army Depot* (WESTON, 1998e).

- *Decision Document for BRAC Railroad Parcels, Letterkenny Army Depot* (WESTON, 1998f).

The remedial action objectives for the Phase I Parcels in SE OU 8 are to:

- Prevent direct contact and ingestion of soil under residential and other nonindustrial exposure scenario.
- Prevent direct contact and ingestion of groundwater under any scenario.
- Prevent exposure levels of contaminants that produce unacceptable risk.

The remedial actions for the Phase I Parcels in SE OU 8 are:

- To restrict the property for commercial and industrial use only.
- To not permit soil excavation activities below a depth of 3 ft above the water table without prior approval of the Army, EPA, and PADEP.
- To not permit the construction of any subsurface structure for human occupation, without prior approval of the Army, EPA, and PADEP.
- To restrict access or use of the groundwater underlying the property without the prior written approval of the Army, EPA, and PADEP.
- To institute through an amendment to LEAD's Master Plan for the Phase I Parcels to reflect the land use controls until the date of transfer.
- To implement the restrictions through the appropriate deed restrictions at the time of transfer.
- To establish periodic inspection procedures to ensure adherence to the land use controls.

As stated in the ROD, the long-term effectiveness of the land use controls will be contingent upon enforcement of use restrictions initially by the Army through the LEAD Master Plan, and after transfer, through enforcement of the environmental deed restrictions. The Army, with USEPA and PADEP approval, may arrange with other entities such as LIDA to maintain the land use controls as long as the Army will remain ultimately responsible for the effectiveness of the land use controls.

Implementation of this remedy will maintain the industrial use of the property and reduce the future risk of exposure to groundwater by the development and enforcement of environmental deed restrictions. These restrictions will become a permanent part of the real estate documentation and will be required to be included in any subsequent sales, transfers, and/or lease agreements.

A Proposed Plan (PP) (WESTON, 2001a) was approved and a ROD (WESTON, 2001b) was signed in July 2001 for the Phase II Parcels. The ROD specified land use controls as the final

remedy for soils and the interim remedy for groundwater. The following areas comprise the SE Portions of Phase II: Parcels 2-35 through 2-77 (with the exception of Parcel 2-73). The locations of these parcels in the SE Area are shown in Figure 6.

Because the groundwater beneath the Phase II parcels is known to be or potentially is contaminated with VOCs, the Army and LIDA have defined the Phase II parcels to exclude the groundwater. To expedite transfer, the Phase II parcels are defined to include only the surface structures and soil to a depth of 8 feet below ground surface (ft bgs), which is above the seasonal high groundwater table.

The following documents were completed and approved to support the ROD for the Phase II Parcels in the SE Area:

- *Final Decision Document, Former PCB Transformer Sites in Southeastern (SE) Area, Operable Unit (OU) 8, (DSERTS Site LEAD-125)* (WESTON, 2000a).
- *Final Termination Survey Report for Building 441 at Letterkenny Army Depot* (WESTON, 2000b).
- *Remedial Investigation and Risk Assessment Report for the Gate 1 Guardhouse, Building 511, Southeastern Area (SE) Operable Unit (OU) 8, Letterkenny Army Depot. Final Report* (WESTON, 2001c).
- *Groundwater Vapor Intrusion Risk Assessment, Letterkenny Army Depot. Final Report* (WESTON, 2001d).
- *Feasibility Study Report for the Gate 1 Guardhouse, Building 511, Southeastern Area (SE) Operable Unit (OU) 8, Letterkenny Army Depot. Final Report* (WESTON, 2001e).
- *Seasonally High Groundwater Determination for the Phase 2 BRAC Parcels, Letterkenny Army Depot. Final Report* (EPSYS, 2001).

The remedial action objectives for the Phase II Parcels in SE OU 8 are to:

- Prevent direct contact and ingestion of soil under residential and other nonindustrial exposure scenario.
- Prevent direct contact and ingestion of groundwater under any scenario.
- Prevent exposure to levels of contaminants that produce unacceptable risk.

The remedial actions for the Phase II Parcels in SE OU 8 are:

- To restrict the Gate 1 Guardhouse (Building 511 Area) to commercial and industrial use.
- To prohibit soil excavation activities below a depth of 3 ft above the water table without prior approval of the Army.
- To prohibit the construction of any subsurface structure for human occupation, without the prior approval of the Army, EPA and PADEP.

- To prohibit access to or use of the groundwater underlying the Phase II Parcels without the prior written approval of the Army, EPA and PADEP.
- To amend LEAD's Master Plan for the Phase II Parcels to reflect the land use controls until the date of transfer.
- To implement the restrictions through the appropriate deed restrictions at the time of transfer.

In addition, upon transfer of the property, the Army, in consultation with EPA and PADEP, will establish periodic inspection procedures as described in the Land Use Control Assurance Plan and the Land Use Control Implementation Plan to ensure adherence to the land use controls. By means of the Land Use Control Assurance Plan (which is a Memorandum of Agreement with EPA and PADEP), LEAD, on behalf of the Department of the Army, will agree to implement Depot-wide, certain periodic site inspection, condition certification, and agency notification procedures designed to ensure the maintenance by Army personnel (or other approved designee) of any site-specific land use controls deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of the agreement will be that through the Army's substantial good-faith compliance with the procedures called for therein, reasonable assurances would be provided to EPA and PADEP as to the permanency of those remedies that included the use of specific land use controls. The Army, with EPA and PADEP approval, may arrange with other entities such as LIDA to maintain land use controls. The Army remains ultimately responsible for protecting human health and the environment through this remedy.

A Proposed Plan (WESTON, 2003a) was approved, and a No Action ROD (WESTON, 2003e) was signed in August 2003 for the Phase III Parcels. All Phase III parcels are located in SMSR. An extensive study conducted at the SMSR and the BRAC sites indicated that the soil and groundwater in this region are not contaminated. Consequently, it was determined in the ROD that no further remedial action is necessary to protect public health or welfare or the environment from the soil or groundwater at the Phase III parcels, and the properties can be transferred for unrestricted use. In addition, through the No Action ROD, groundwater restrictions were lifted for the Phase I BRAC parcels located within the SMSR area. Phase III BRAC transfer in the SE Area consists of: (1) Parcels 3-89, 3-90, and 3-91 located in both SE and PDO Areas; (2) Parcels 24, 27, and 28 (groundwater of the Phase I parcels located within the SMSR); and (3) Parcels 2-53L, 2-54L, 2-70L, 2R-80L-3, 2R-84L-3, and 2R-86L-3 (subsurface property deeper than 8 ft of the Phase II parcels located within the SMSR). Locations of these parcels are shown in Figure 6.

The following documents related to SE OU 8 were completed and approved to support the ROD for the Phase III Parcels in the SE OU 8 area:

- *Remedial Investigation and Risk Assessment Report for the Building 400 Series Fire Training Area* (WESTON 2002a).
- *Remedial Investigation and Risk Assessment Report for the Backwash Discharge Area* (WESTON 2002b).
- *Summary Report on the Groundwater Quality in the Southern Martinsburg Shale Region* (WESTON 2003b).

- *Remedial Investigation and Risk Assessment Report for the Open Vehicle Storage Area* (WESTON, 2003d).

There are no remedial action objectives or remedial actions associated with Phase III parcels.

A Proposed Plan (WESTON, 2005b) was approved, and a No Action ROD (WESTON, 2006b) was signed in 2006 for the Phase IV Parcels. The Army and EPA, in consultation with the PADEP, determined that no further CERCLA remedial action is necessary to protect public health or welfare or the environment from the soil at the BRAC Phase IV parcels or groundwater associated with these parcels (SE OU 3B). Phase IV BRAC transfer in the SE Area consists of Parcels 4-92, 4-93, 4-94, and 4-95. A Finding of Suitability to Transfer (FOST) was approved and these parcels will be transferred without any restrictions. Parcels 4-94 and 4-95 are now going to be retained by the Army. As of the date of this report, the parcels have not yet been transferred. The No Action Remedy is protective of human health and the environment.

The following documents related to SE OU 8 were completed and approved to support the ROD for the Phase IV Parcels in the SE OU 8 area:

- *Remedial Investigation (RI) and Risk assessment (RA) Report for the Tank Farm Storage Area, southeastern (SE) Area Operable Unit (OU) 8 (DSERTS Site LEAD-115), Letterkenny Army Depot.* Final (WESTON, 2005d).
- *Remedial Investigation (RI) and Risk Assessment (RA) Report for the Test Track Area, Southeastern (SE) Area Operable Unit (OU) 8, (DSERTS Site LEAD-016), Letterkenny Army Depot.* Final (WESTON, 2005e).
- *Report for the Groundwater Site Investigation (SI) in the Southeastern (SE) Area Operable Unit (OU) 3B, AEDBR Sites LEAD-016, LEAD-114, and LEAD-115, Letterkenny Army Depot.* Final (WESTON, 2005f).
- *Screening Level Ecological Risk Assessment for Southeastern (SE) Area Drainageways for BRAC Sites Operable Unit (OU) 8, Letterkenny Army Depot.* Final (WESTON, 2005f)
- *Screening Level Risk Assessment for Unrestricted Use of the Former Vehicle Storage Area North of the Test Track (FVSA), PDO OU 6 and SE OU 8, AEDBR LEAD-110 and LEAD-114, Letterkenny Army Depot.* Final (WESTON, 2005h)

There are no remedial action objectives or remedial actions associated with Phase IV parcels.

4.9.2 Remedy Implementation

Land use controls were adopted by the Letterkenny Industrial Development Authority (LIDA) in October 1998 at the time of the Phase I Properties transfer. The land use controls mechanisms consist of permanent deed restrictions placed on the property, Greene Township zoning

restrictions, and the Cumberland Valley Business Park (CVBP) Declaration of Covenants, Conditions, and Restrictions. The land use controls consist of the following: restricting the use of the property to industrial and commercial; prohibiting the excavation of soil deeper than 3 ft above the water table without the prior approval of the Army; prohibiting access to groundwater underlying the property without the prior written approval of the Army, PADEP, and EPA; and prohibiting construction of subsurface structures without the prior approval of the Army. The same approach was adopted at the time of property transfer of the Phase II Parcels in May 2002.

Phase III parcels are located within the SMSR, therefore, the risk associated with soil and groundwater of these parcels, based on unrestricted use, is within acceptable levels (see Subsection 4.9.1). The Phase III ROD (WESTON, 2003e) concluded that no action will be necessary for the parcels identified in the ROD. Phase III ROD includes Phase III parcels, as well as the groundwater portions of Phase I in the SMSR area that were previously transferred with restrictions on groundwater use, and the lower portion of the Phase II parcels located within the SMSR had not been previously transferred. Based on the results of the SMSR investigation, it was concluded in the Phase III ROD that there is an acceptable level of risk at the sites, and therefore no action will be necessary. In accordance with the Phase III ROD, the following parcels require no action:

- Soil and groundwater at Parcels 3-89, 3-90, and 3-91.
- Groundwater at Phase I parcels 24, 27, and 28 (previous groundwater restrictions can be removed).
- Subsurface property deeper than 8 ft (denoted with an “L” in the parcel number) at Phase II Parcels 2-53L, 2-54L, 2-70L, 2R-80L-3, 2R-84L-3, and 2R-86L-3. These parcel numbers were assigned in the Phase II ROD.

Phase IV parcels are located within the groundwater operable unit SE OU 3B, therefore, the risk associated with soil and groundwater of these parcels, based on unrestricted use, is within acceptable levels (see Subsection 4.9.1). The Phase IV ROD (WESTON, 2006b) concluded that no action will be necessary for the parcels identified in the ROD. Phase IV ROD includes Phase IV parcels and SE OU 3B. In accordance with the Phase IV ROD, parcels 4-92, 4-93, 4-94, and 4-95 require no action.

4.9.3 Operation and Maintenance

A Land Use Control Memorandum of Agreement (LUCAP MOA) for the LEAD BRAC parcels was signed by the Army, EPA and PADEP in July and August of 2002 to ensure that the soil and groundwater use restrictions for the Phase I and Phase II BRAC property transfer remain in-place. Annual requirements stated in the LUCAP MOA include: annual inspection of the CVBP; annual notification of land use controls to LIDA, Greene Township, Letterkenny Township, and CVBP; and annual status report of land use controls to PADEP and EPA. Other institutional control mechanisms are deed restrictions, zoning restrictions and the CVBP Declaration of Covenants, Conditions and Restrictions. The Phase I and II parcels are located in the CVBP where a potable water supply/distribution system is already in-place (that does not use groundwater from the LEAD Site). LIDA’s Health and Safety Plan and the CVBP Declaration of

Covenants, Conditions, and Restrictions ensure that the land is used solely for commercial/industrial purposes and that the users of the site are protected from exposure to VOC-contaminated groundwater. Additionally, all of the Phase I and Phase II BRAC parcels are located in the portion of Greene Township that has zoning restrictions prohibiting residential use of the land.

A LUCAP MOA was developed and signed by the BRAC Cleanup Team in August 2002. The LUCAP MOA documents the land use controls and mechanisms, the enforcement and the annual reporting requirements. Letterkenny has submitted annual inspection reports to the EPA and PADEP for calendar years 1999 thru 2006. The 2007 inspection report is in progress and will be submitted in the spring of 2008. One requirement under the LUCAP MOA is the development by the BCT of a notification letter for the LIDA. The notification letter was finalized by the BCT in May 2006, signed by the BRAC Environmental Coordinator on June 16, 2006 and delivered to LIDA. LIDA will in turn distribute this notification letter on an annual basis to the Cumberland Valley Business Park landowners and tenants.

4.10 SE OU 9—LANDFILL J

4.10.1 Remedy Selection

The remedy for SE OU 9 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 9 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 9 to commercial/industrial; however, the document will be amended to address this deficiency. In addition, a soil layer covers nearly all of the landfill, preventing direct contact with landfill contents.

4.10.2 Remedy Implementation

Not applicable.

4.10.3 Operation and Maintenance

Not applicable.

4.11 SE OU 10— SOUTHERN SOUTHEAST INDUSTRIAL AREA VOC-CONTAMINATED GROUNDWATER SOUTH OF GATE 6 (CONOCOCHEAGUE DRAINAGE SYSTEM)

4.11.1 Remedy Selection

A final Proposed Plan was completed in February 2005, and a ROD was completed in March 2006 (signed by the Army in August 2006 and by EPA in September 2006). The selected remedy for SE OU 10 included enhanced biodegradation, monitored natural attenuation of contaminants in groundwater, and implementation of land use controls to restrict site use. The timeline for the selected remedy is presented in subsections 4.11.2.1 through 4.11.2.3.

4.11.2 Remedy Implementation

As stated above, the selected remedy for SE OU 10 included enhanced biodegradation, monitored natural attenuation of contaminants in groundwater, and implementation of land use controls to restrict site use. The following Subsections provide details on each of these remedial actions.

4.11.2.1 *Enhanced Biodegradation*

Enhanced biodegradation technology was shown to be effective at the site based on the results of bench-scale and full-scale field pilot tests, and was selected for SE OU 10 based on the nine CERCLA evaluation criteria. The selected remedial alternative was subsequently incorporated into the final Proposed Plan for the site (Weston, 2005c LKD-RT-264).

Continuation of the enhanced biodegradation program on a full-scale basis was implemented in November 2000 and concluded in June 2007. Preliminary indications suggest that the enhanced bioremediation program was an effective remedial strategy for reducing the mass and toxicity of the VOCs in the site groundwater.

4.11.2.2 *Monitored Natural Attenuation*

Since implementation of the remedial action in November 2000, a long-term groundwater and surface water sampling has been implemented at SE OU 10 on a tri-annual basis (April, August and December) at 4 locations to track the monitored natural attenuation of the benzene, toluene, ethylbenzene, and xylene (BTEX) portion of the plume. The rationale for each of the 4 sampling locations is discussed in detail in the Remedial Action Work Plan for SE OU 10 (WESTON, April 2007). Samples are analyzed for VOCs in accordance with EPA's CLP requirements. All data packages are subject to independent, third party data validation. Annual reports summarizing the results of the MNA program and the status of the institutional controls have been and will continue to be submitted to the agencies by the end of the 1st quarter of each year.

4.11.2.3 Land Use Controls

The land use control objectives for SE OU 10 are follows:

- A. Reduce risks to human health by: preventing bathing with, showering with and drinking VOC-contaminated groundwater throughout SE OU 10; prohibiting people from digging into, drilling into or otherwise disturbing soil below the water table in on-post areas (Army-retained and BRAC property); and prohibiting people from building subsurface structures designed for human occupation in on-post areas (Army-retained and BRAC property); and
- B. Maintain the integrity of any current or future remedial or monitoring system associated with SE OU 10 remedial actions, such as monitoring wells.

4.11.3 Operation and Maintenance

No operation or maintenance for the enhanced biodegradation program is currently necessary; the program was concluded in June 2007, which is when the final nutrient injection occurred.

The continued need for land use controls within SE OU 10 is evaluated as part of the CERCLA 5-year review process for the SE Area of LEAD. Assessment of the need for land use controls at SE OU 10 is included in Section 6.

When a part of the property in SE OU 10 is transferred, the land use controls will be implemented through appropriate use restrictions in the deed, which will be recorded at the time of transfer. In addition, upon transfer of the property, the Army, in consultation with EPA and PADEP, will make arrangements to maintain the land use controls. The Army, with USEPA and PADEP approval, may arrange with other entities such as LIDA to maintain the land use controls as long as the Army will remain ultimately responsible for the effectiveness of the land use controls. In addition, the Greene Township code (*Code of the Township of Greene Pennsylvania, Part II General Legislation, V3 Updated through 12-15-2002, Chapter 85, Subdivision and Land Development, and Chapter 101, Water*) also applies to SE OU 10 which is located entirely within Greene Township. The Greene Township code requires connection to public water supply for specified areas and situations as defined in Chapters 85 and 101 of the 2005 Code of the Township of Greene. Chapter 85 states that if any part of a proposed subdivision, mobile home park, or land development is located within 500 feet of an existing or planned public water system, it shall be connected to said water system and shall serve every lot, dwelling unit or other occupancy within the proposed subdivision. Chapter 101 of Greene Township code requires connection to public water supply for existing structures located within 150 feet of a public water system where the existing individual or semipublic water supply becomes nonfunctional or inadequate, as defined by the code. On-post water is supplied by the Franklin County General Authority (FCGA) from the Letterkenny Reservoir located in Roxbury, PA.

In the off-post portion of SE OU 10, the Army has already hooked residences with VOC-contaminated groundwater at levels above MCLs to public water. Also, as described above, existing codes are in place and implemented by Greene Township that require connection to

public water supply for specified areas and situations as defined in Chapters 85 and 101 of the 2005 Code of the Township of Greene. In addition, the Greene Township code Chapter 101 contains a provision for requiring additional analysis of a water supply if the township has reason to suspect that harmful substances are present in amounts that are significantly adverse to human health and safety. The Army will be responsible for providing off-post sampling results to Greene Township and the public through annual reporting until ARARs are met and maintained throughout SE OU 10; however, there are no restrictions to excavation depths and no construction prohibitions off-post. The Greene Township Zoning Officer is responsible for implementing, enforcing, and internal reporting of the Greene Township existing codes and ordinances which are the land use controls for off-post areas of SE OU 10.

4.12 SE OU 11—NSIA VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6

4.12.1 Remedy Selection

The remedy for SE OU 11 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 11 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The Army has an existing water supply and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 11 to commercial/industrial; however, the document will be amended to address this deficiency.

4.12.2 Remedy Implementation

Not applicable.

4.12.3 Operation and Maintenance

Not applicable.

4.13 SE OU 12—LANDFILL G

4.13.1 Remedy Selection

The remedy for SE OU 12 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 12 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 12 to commercial/industrial; however, the document will be amended to address this deficiency.

4.13.2 Remedy Implementation

Not applicable.

4.13.3 Operation and Maintenance

Not applicable.

4.14 SE OU 13—SOUTHERN MARTINSBURG SHALE REGION GROUNDWATER

4.14.1 Remedy Selection

A no further action decision was implemented in the ROD for the Phase III BRAC parcels, which included all of SE OU 13. The Army and EPA, in consultation with the PADEP, determined that no further CERCLA remedial action is necessary to protect public health or welfare or the environment from the soil or groundwater at the Southern Martinsburg Shale Region (SMSR) (SE OU 13), otherwise known as the BRAC Phase III parcels. These parcels were transferred without any restrictions in January 2004. The no further action remedy is protective of human health and the environment.

4.14.2 Remedy Implementation

Not applicable (selected remedy was No Further Action).

4.14.3 Operation and Maintenance

Not applicable (selected remedy was No Further Action).

4.15 SE OU 14—FORMER TEST TRACK AREA

4.15.1 Remedy Selection

This OU was created in 2007 to track sites in Army-retained land that were formerly administered under the BRAC program but are now in the ER,A program as a result of the 2007 revised BRAC boundary. RI/RAs for the Building 349 Staging Area and for the Former Test Track and Areas E and F were submitted to EPA in 2003 and 2004, respectively. Future plans are to resubmit the RI/RA, with the risk assessment based on likely future use of commercial/industrial, along with completion of the CERCLA process (FS, Proposed Plan, ROD).

4.15.2 Remedy Implementation

Not Applicable.

4.15.3 Operation and Maintenance

Not Applicable.

5. FIVE-YEAR REVIEW PROCESS

The following tasks were conducted as part of the five-year review process: document review, interviews, site inspection, ARARs review, and data review. There were no significant changes in the ARARs or site contaminants for OUs with final RODs; therefore, site risks were not recalculated.

5.1 FIVE-YEAR REVIEW TEAM

The 5-year review was led by Joe Petrasek, ER,A Project Manager, LEAD. The following team members assisted in the analysis and/or review:

- Bryan Hoke, BRAC Environmental Coordinator, LEAD
- Ruth Bishop, PADEP Regional Project Manager
- Rob Thomson/Curtis Callahan, Project Managers, EPA Region III
- Paul R. Stone III, Technical Manager, USACE

The community was informed of the five-year review in August 2007 via an email to RAB members from B. Hoke, LEAD BRAC Coordinator. In addition, the purpose and requirement of a CERCLA five-year review was discussed at the February 2007 RAB meeting in a discussion about the Property Disposal Office (PDO) 5-year review.

5.2 INTERVIEWS

Interviews were conducted with Joseph Petrasek, ER,A Project Manager, Letterkenny Army Depot in 2001, 2003 and 2007. The interview summaries are presented in Appendix A of this document.

An interview was conducted with John Van Horn, Executive Director of the Letterkenny Industrial Development Authority. The interview is presented in Appendix A of this document. An interview was also conducted with Bryan Hoke, Letterkenny Army Depot, BRAC Environmental Coordinator. Additional interviews were conducted in conjunction with the ongoing update to the LEAD Community Relations Plan, including with a local government official (Ruth Bishop - PADEP Environmental Cleanup Regional Program Manager), tenants of the Cumberland Valley Business Park and an adjacent neighbor of Letterkenny Army Depot

5.3 SITE INSPECTION

Inspections are conducted throughout the calendar year during construction events. These inspections are included in the annual letter that is submitted to EPA and PADEP that documents the status of the land use controls. The annual inspection letter can be found in the Letterkenny Administrative Record File containing regulatory correspondence. The annual inspection letters can be found on the Letterkenny Army Depot Environmental Website, Administrative Records,

Regulatory Correspondence, at <http://209.235.100.233/padep/testrunsearch2.htm>. In addition, backup information for inspections since 1999 can be found in the Construction Inspection yearly office files. A table summarizing the inspections is enclosed in Appendix D. Table includes inspection location, date of inspection, reason for inspection, inspector(s), inspection activities, results and findings, and inspection report/data location.

In addition the following documents and data were reviewed for the 5-year review report:

- *Proposed Plan for Phase I Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). March 1998. LKD.RT-133.
- *Record of Decision for Phase I Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). September 1998. LKD.RT-143.
- *Finding of Suitability to Transfer (FOST) for Phase I Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). Final Report. October 1998. LKD.RT-148.
- *Proposed Plan for Phase II Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). February 2001. LKD-RT-181.
- *Record of Decision for Phase II Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). July 2001. LKD-RT-190.
- *Finding of Suitability to Transfer (FOST) for the Phase II BRAC Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). February 2002. LKD-RT-200.
- *Proposed Plan for Phase III Parcels, Letterkenny Army Depot*. WESTON (Roy F. Weston, Inc.). April 2001.
- *Record of Decision for the Phase III BRAC Parcels*. Final. WESTON (Roy F. Weston, Inc.). August 2003. LKD-RT-239.
- *Finding of Suitability to Transfer (FOST) for the Phase III BRAC Parcels*. September 2003. Final. WESTON (Roy F. Weston, Inc.). LKD-RT-238.
- *Land Use Control Assurance Plan Memorandum of Record, Phase I & II Parcels, Letterkenny Army Depot*. August 2002. LKD.RT-257.
- *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Explanation of Significant Differences (ESD) Two: Letterkenny Army Depot National Priorities List Southeastern Area EPA ID number PA 6213820503 Operable Unit One K-Areas*. LEAD (Letterkenny Army Depot). April 2004. LKT.RT-245.
- *SE OU 2, Industrial Wastewater Sewers (IWWS) and Contaminated Soils, Proposed Plan, Final, AEDBR Site LEAD-083 Report Number SEOU2ROD0405*. Shaw Environmental. April 2005. LKD.RT-290.

- *SE OU 2 Industrial Wastewater Sewers and Associated Contaminated Soils Record of Decision AEDBR Site LEAD-083, Report Number SEOU2ROD0806.* Shaw Environmental. August 2006. LKD.RT-284
- *SE OU 4, Stormwater Sewers and Associated Sediments, Proposed Plan.* Shaw Environmental. October 2004. LKD.RT-255
- *SE OU 4, Stormwater Sewer Lines and Contaminated Sediments, Record of Decision, Final, AEDBR Site LEAD-036, Report Number SEOU4ROD0605.* Shaw Environmental. June 2005. LKD.RT-270.
- *SE OU One (K Areas) Vegetative Cover Preventive Maintenance and Corrective Action Standard Operating Procedure.* Letterkenny Army Depot (LEAD). January 2004.

Bryan Hoke reviewed the most recent property deeds and leases for the Phase I and Phase II BRAC parcels, located in the Chambersburg Court House files, on 15 August 2007. The deeds were reviewed to verify that the land use restrictions specified in the ROD were recorded with the respective parcels at the time of property transfer. Letters documenting the review of the most current deeds and leases, as well as copies of typical deed and lease language, are provided in Appendix F.

Annual land use control letter reports and construction inspection office files from 1999 to 2007 were also reviewed as part of the 5-year review.

Additionally, the Greene Township Codes were reviewed via the internet to verify water use restrictions are still in place that are part of the land use controls for SE OU 10 remedy (Greene Township, 2007).

Subsequent Phase I and II deeds reviewed in early January 2008 discovered the following requirement in the CERCLA Remediation Section, Paragraph C.2. Deed/Lease: Within 14 days after the effective date of the transaction, GRANTEE, its successors and assigns, will provide to the GRANTOR, EPA, and PADEP, copies of the deed, lease, or other conveying instrument evidencing such transaction. It was found during this review that the copies referenced above were not being sent to the three parties as stated in the deed/lease.

Select leases from the Letterkenny Industrial Development Authority (LIDA) were reviewed on January 28, 2008 and confirmed that the leases reference the corresponding Phase I or Phase II Deed. It was verified with LIDA representative Kip Feldman that all LIDA leases follow the same format and therefore reference the corresponding Phase I and II deeds. In late January 2008, a lease from the Letterkenny Business Park was reviewed and discovered not to reference the corresponding Phase I Deed, thus confirming that not all leases reference the corresponding Phase I or II deed.

5.4 COMMUNITY INVOLVEMENT

The community's concerns were reviewed based on the minutes of the ongoing Restoration Advisory Board (RAB) meetings and interviews conducted as part of the ongoing Community

SECTION 5—FIVE-YEAR REVIEW PROCESS

Relations Plan update. The purpose and requirement of the five-year review process was presented at the February 2007 RAB meeting and discussed in an email to the RAB members in August 2007. The findings of the five-year review will be presented at a future RAB meeting in November 2007. The community will be notified when the 5-year review is completed and a draft community notice is enclosed in Appendix C).

6. ASSESSMENT

6.1 SE OU 1—K-AREAS

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

6.1.1.1 Remedial Action Performance

The Low Temperature Thermal Treatment was effective in meeting the remedial action objectives, which are to prevent direct contact and ingestion of soil; and reduce exposure levels of contaminants that produce unacceptable risk. The 1991 ROD for SE OU 1 (K-Areas) specified that the soil contaminant concentration at SE OU 1 be reduced to levels below the cleanup criteria of 225 µg/kg, and that the thermal treatment unit be operated at or above 99.95% efficiency. Based on a review of the remedial action data and the information presented in Appendix B, it was determined that the performance requirements of the selected remedy (Alternative 4A) were met.

The remedy selected for SE OU 1 remains protective of human health and the environment based on continued industrial use. This determination is supported by the conclusions presented in this section.

6.1.1.2 System Operations/O&M

An inspection of the cap conducted in August 2007 indicated that the vegetative cover, drainage system, and liner are intact. The Cap Inspection Plan recommends yearly inspections of the K-Area caps. Continued inspections of the liner (and repairs if needed) are necessary to maintain protectiveness of human health and the environment. There was some accidental vehicle traffic noted in August 2007 across K-3 which has not damaged the cover. The Army has posted new “Please Keep Off” signs in early September 2007 as part of cap maintenance. The capped areas (K-1, K-2, and K-3) are included in the Depot’s mowing and landscape plan. The last few years this work has been performed by contractors; at a reduced level of effort. K-3 has not been mowed for several years. The Army will mow the area this fall. Mowing at a minimum frequency of once per year is needed to prevent the growth of woody plants that could possibly compromise the integrity of the cover.

6.1.1.3 Opportunities for Optimization

Not applicable (project is complete).

6.1.1.4 Early Indicators of Potential Remedy Problems

There have been no early indicators of potential remedy problems as documented by the findings of the yearly cap inspections, other than infrequent mowing at K-3. Mowing will be done at a minimum frequency of once per year to prevent the growth of woody plants that could possibly compromise the integrity of the cover.

6.1.1.5 Implementation of Land Use Controls and Other Measures

A deficiency was identified during the production of the first five-year review, which was completed in October 2001 (USACE, 2001). Neither the 1991 ROD nor the first Explanation of Significant Differences (ESD) identified the necessary land use controls needed to limit future use of the capped areas and to maintain the long-term integrity of the capped areas. To remedy this deficiency, significant additions were made to the remedy selected in the 1991 ROD via the second ESD (LEAD, 2004), including land use controls to limit the future use of the three capped areas K-1, K-2, and K-3, and a Cap Maintenance Plan to maintain the long-term integrity through yearly inspections (the most recent cap inspection occurred in August 2007) of the three capped areas K-1, K-2, and K-3 (USACE, 2004). The implementation of land use controls was carried out through amendments to the LEAD Master Plan. The following was added to the *Environmental Constraints* section of the Letterkenny 2010 Master Plan:

“Two areas of the installation contain remediated soils covered with synthetic caps. They include the industrial waste treatment plant lagoons (IWTP) (See SE OU 11) and the K areas west of the ore piles. Intrusive activities are prohibited in these areas.” The cap boundaries at the K Areas are shown in Appendix E.

ANSWER A SE OU 1: Yes – The remedy is functioning as intended by the 1991 ROD for SE OU 1 (K-Areas)

6.1.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.1.2.1 Changes in Standards and TBCs

At the time of the ROD for SE OU 1, there were no ARARs for soil. The following could be considered to be ARARs at this point in time:

- PADEP Medium-specific concentrations (MSCs), Residential, Soil Direct Contact and Soil to Groundwater Used Aquifer, TDS<2,500 (Title 25 PA code, Chapter 250, Administration of Land Recycling Program).

- PADEP Residential MSCs for Groundwater, Used Aquifer, TDS<2,500 (Title 25 PA code, Chapter 250, Administration of Land Recycling Program).

Comparison of the data that was used for the risk assessment used to support the ROD (ESE, 1988a) to the PADEP criteria indicates that the detected concentrations of contaminants of concern in soil are below the current PADEP direct contact MSCs. The COCs for the SE OU 1 specified in the ROD were TCE and 1,1-DCE. These COCs were identified due to contamination that had migrated to offpost groundwater (see SE OU 6) and to prevent further migration of contaminants from soil to groundwater that could occur in the future. The risk assessment for SE OU 1 showed that the risks to onpost workers were within acceptable levels for the pathways evaluated. Therefore, the cleanup goal for the SE OU 1 (TCE) stated in the ROD was a site-specific goal developed for protection of soil-to-groundwater pathway and was calculated for TCE only because the groundwater ARAR (MCL) for TCE is lower than that for 1,1-DCE. The cleanup goal was 225 parts per billion (ppb, equivalent to 225 micrograms per kilogram [$\mu\text{g}/\text{kg}$]).

The following table provides a list of COCs at SE OU 1 along with the original cleanup goals and risk-based criteria, and the current applicable standards:

Groundwater COCs	EPA MCL and PADEP MSC - ARAR used to derive Soil Cleanup Goal	Current EPA MCLs/PADEP MSC
TCE	5 $\mu\text{g}/\text{L}$	5 $\mu\text{g}/\text{L}$
1,1-DCE	7 $\mu\text{g}/\text{L}$	7 $\mu\text{g}/\text{L}$

Soil COC	Exposure Pathway	Original Benchmarks (PADEP MSCs)	Current Benchmarks PADEP MSCs
TCE	Soil Cleanup Goal	225 $\mu\text{g}/\text{kg}$	--
TCE	Residential Soil	190,000 $\mu\text{g}/\text{kg}$	190,000 $\mu\text{g}/\text{kg}$
TCE	NonResidential Soil	970,000 $\mu\text{g}/\text{kg}$	970,000 $\mu\text{g}/\text{kg}$
TCE	Soil-to-Groundwater Residential, Generic Value, TDS<2500	170 $\mu\text{g}/\text{kg}$	170 $\mu\text{g}/\text{kg}$

Note that although the PADEP soil-to-groundwater MSC is lower than the soil cleanup goal, this value has not changed over time. In addition, the PADEP number is a statewide generic number under Act 2, and Act 2 allows calculation of a site-specific number. The evaluation provided in Appendix B supports that the site-specific number is protective and also supports that the overall conclusion for the site is that the Federal and State standards for the contaminants of concern have not changed in a manner that affects the protectiveness of the remedy. For example, Appendix B states that the Removal Areas delineated in the K Areas were delineated to non-detect, not 225, as a conservative measure.

6.1.2.2 Changes in Exposure Pathways

Exposure pathways evaluated at SE OU 1 were skin absorption, incidental ingestion of soil, and vapor inhalation. Since the first SE 5-Year Review, it has been determined that the vapor intrusion pathway (VIP) will need to be evaluated at many LEAD sites within the SE Area. However, this pathway poses no new threat to human health and the environment at SE OU 1 based on land use controls, in the form of signage restricting access to the K Areas, implemented in the second ESD (LEAD, 2004) and the implementation of the Cap Maintenance Plan, which was designed to preserve long-term integrity of the synthetic caps.

6.1.2.3 Changes in Toxicity and Other Contaminant Characteristics

There are no significant changes in toxicity and other contaminant characteristics other than for TCE. TCE toxicity is a complicated issue involving many uncertainties and has been the subject of considerable controversy over the past two decades. The current guidelines implemented by the EPA are draft provisional guidance not accepted by EPA as final as of the date of this report. The most recently proposed guidance regarding TCE is under internal review with the EPA. Based on the current and future intended commercial/industrial use the site is protective of human health. Issues regarding toxicity of TCE will be revisited during the next SE 5-Year Review.

6.1.2.4 Changes in Risk Assessment Methods

There are no changes in risk assessment methods that affect the protectiveness of the remedy. There have been some minor changes in risk assessment procedures recommend by EPA since 1991, such as methods for calculation of exposure point concentrations (EPA, 2004); however, these do not affect the overall protectiveness of the remedy (see discussion in Appendix B).

6.1.2.5 Expected Progress Towards Meeting RAO's

The RAO's, specified in the ROD for SE OU 1, have been completed as follows:

- Excavation of approximately 8,000 yd³ of contaminated soil.
- Thermal treatment of the contaminated soils at a temperature not to exceed 450 degrees Fahrenheit.
- Destruction of the volatilized contaminants by a secondary high-temperature combustor or collection on a carbon filter.
- Chemical analysis of representative samples of the treated soils to ensure cleanup criteria are met.
- Proper management of treated soils.

ANSWER B SE OU 1: YES – The exposure assumptions, toxicity data, cleanup levels, and RAO's used at the time of remedy selection are still valid.

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

6.1.3.1 Newly Identified Ecological Risks

There are no newly identified ecological risks.

6.1.3.2 Impacts from Natural Disasters

There have been no impacts from natural disasters.

6.1.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

There has been no other information that could affect the protectiveness of the remedy.

ANSWER C SE OU 1: NO – There has not been any new information that calls into question the protectiveness of the remedy.

6.2 SE OU 2—INDUSTRIAL WASTEWATER SEWER SYSTEM

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

6.2.1.1 Remedial Action Performance

A ROD was signed in September 2006. The selected remedy for SE OU 2 consists of cleaning and abandonment of sewers and drain lines at Buildings 37 and 57 and the implementation of land use controls to prevent future residential use of the existing sewers.

From fall 2004 through spring 2006, the IWWS system was cleaned and tested for leaks, a portion of the IWWS system that serviced Buildings 37 and 57 was rerouted to the sanitary sewer at LEAD to support a new mission, and the remaining unused portion of the IWWS system force main was abandoned. Currently, the wastewater from Building 37 is being containerized and transported for treatment at the IWTP at LEAD because it does not meet the newly established discharge criteria for the sanitary sewer system. Wastewater from Building 57 continues to be discharged to the sanitary sewer system. The Army is currently considering whether to continue transporting the wastewater to the IWTP or to install a new force main (in the vicinity of the abandoned force main) to direct flow from both buildings to the IWTP. This part of the remedy is complete and is performing as expected.

Land use controls will be effective in preventing the use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, as specified in the ROD for SE OU 2 (Shaw, 2006a). The LUCs are to be implemented and maintained as described in the Land Use Control (LUC) Remedial Design. It was determined during the 5-Year review that the Land Use Control Remedial Design document has not yet been prepared and this is a deficiency that needs to be addressed. The document is currently in progress and it is expected to be completed by the end of September 2008; however, the remedy is being implemented and has been functioning properly to date because none of the lands where the sewers are located has been or is being used for residential-type purposes.

Land use controls for property that has been transferred to the public, which are located in the Phase I and Phase II parcels (Figure 6) were implemented via deed restrictions at the time of property conveyance. The remedy is performing as expected for these parcels. The 2002 LUCAP MOA ensures that the land use restrictions for the Phase I and Phase II BRAC property transfer remain in-place. The LUCAP MOA and its land use control provisions last until 2012, when the Army, USEPA and PADEP may consult and, if necessary, make other provisions for ensuring the effectiveness of the institutional controls on the Phase I and II property. In addition, the existing Greene Township zoning ordinances restricts the property to non-residential use. Bryan

Hoke reviewed the deeds in the Chambersburg Court House in August 2007 and verified that the land use restrictions specified in the ROD were recorded with the respective Phase I and II parcels at the time of property transfer.

For parcels related to SE OU 2 currently retained for military use at LEAD, the LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 2 to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. A statement that prohibits residential use at SE OU 2, including residential housing, elementary and secondary schools, child care facilities, and playgrounds will be included in the LEAD Master Plan, along with the figure showing the locations of the sewer lines. Some of the parcels associated with SE OU 2 are to be transferred to LIDA in the future (will be Phase V BRAC, see Figure 17); the land use controls for these parcels will be implemented via deed restrictions, analogous to what was done for the Phase I and II BRAC parcels as was previously described. The details for land use restrictions for the sewers in Phase V BRAC parcels will be specified in the Land Use Control Remedial Design document, which is expected to be completed by the end of September 2008. In the interim, land use in SE OU 2 is restricted to commercial/industrial through the requirement for health and safety and dig permits to perform work at the site. Security patrols are also being utilized to prevent unauthorized activity at the site.

6.2.1.2 System Operations/O&M

The abandonment of sewers and drain lines at Buildings 37 and 57 has been completed and O&M is not necessary.

The land use controls portion of the SE OU 2 remedy requires O&M to prevent future residential use of the property. Portions of the sewers associated with SE OU 2 are located in Army retained land, and portions are located within BRAC parcel, and this BRAC property has been or the land will ultimately be transferred to LIDA.

The O&M requirements for the BRAC property that has been transferred, the Phase I and Phase II parcels, are documented in the LUCAP MOA that was developed and signed by the BRAC Cleanup Team in August 2002 (LEAD, 2002 LKD.RT-257). The LUCAP MOA documents the land use controls and mechanisms, the enforcement and the annual reporting requirements.

Annual requirements for land use controls stated in the MOA include: annual inspection of the CVBP; annual notification of land use controls to LIDA, Greene Township, Letterkenny Township, and CVBP; and annual status report of land use controls to PADEP and EPA. Inspections of the land use controls were conducted for calendar years 1999 thru 2007 for the Phase I and II Parcels. An annual report summarizing the findings was submitted to EPA and PADEP for calendar years 1999 thru 2006. The 2007 inspection report is in progress and will be submitted in the spring of 2008. To date no land use control violations have been discovered. Land use at the Cumberland Valley Business Park has followed the commercial/industrial use restrictions.

For the portions of SE OU 2 located in Army-retained property, the property has not been used for purposes other than commercial/industrial use to date. Restrictions that have been placed in the LEAD Master Plan will ensure this for the future. For sewer parcels that are to be transferred in the future (Phase V BRAC), the land use controls O&M will be maintained as specified in the Land Use Controls Remedial Design document.

6.2.1.3 Opportunities for Optimization

There have been no opportunities for optimization.

6.2.1.4 Early Indicators of Potential Remedy Problems

There have not been any indications of potential remedy problems other than the need to follow through with formalized land use controls for the areas other than those covered under the LUCAP MOA.

6.2.1.5 Implementation of Land Use Controls and Other Measures

Land use controls will be implemented as specified in Section 6.2.1.1 and 6.2.1.2 at SE OU 2 as part of the selected remedy. The land use controls will be effective in preventing the use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, as specified in the ROD for SE OU 2 (Shaw, 2006a), and they will be maintained until the concentrations of hazardous substances in the soil are at levels that allow for unrestricted use and unlimited exposure.

ANSWER A SE OU 2: YES – The remedy of abandonment of specified sewers is functioning as intended. The remedy of land use controls is functioning as intended and is preventing use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds.

6.2.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.2.2.1 Changes in Standards and TBCs

The site was evaluated for industrial/commercial use only (most likely future use), and the post-removal risks were found to be within acceptable levels; therefore, there are no COCs based on likely future use of the site. Screening criteria that were used to support the Decision Document, which could potentially be considered to be ARARs at this point in time, included:

- PADEP Medium-specific concentrations (MSCs), Residential, Soil Direct Contact and Soil to Groundwater Used Aquifer, TDS<2,500 (Title 25 PA code, Chapter 250, Administration of Land Recycling Program).
- PADEP Residential MSCs for Organics and Inorganics in Groundwater, Used Aquifer, TDS<2,500 (Title 25 PA code, Chapter 250, Administration of Land Recycling Program).

The following table provides a list of ARARs and TBCs for the site for the COC (identified prior to the removal action at SE OU 2) along with the original benchmarks and the current applicable standards:

Pre-Removal COCs	Exposure Pathway	Original Benchmarks (PADEP MSCs)	Current Benchmarks PADEP MSCs
TCE	Residential Soil	190,000 µg/kg	190,000 µg/kg
TCE	NonResidential Soil	970,000 µg/kg	970,000 µg/kg
TCE	Soil-to-Groundwater Residential, Generic Value, TDS<2500	170 ug/kg	170 ug/kg

Overall, ARARs or TBCs for the contaminant of concern have not changed in a manner that affects the protectiveness of the remedy.

6.2.2.2 Changes in Exposure Pathways

Exposure pathways evaluated at SE OU 2 were direct contact with soil, incidental ingestion of dust, soil-to-groundwater, and vapor inhalation. Since the first SE 5-Year Review, it has been determined that the VIP will need to be re-evaluated at many LEAD sites within the SE Area. At the time of the ROD VIP was determined to be an incomplete pathway based on an evaluation using methods that are now considered inaccurate for preferential pathways situations. In addition, new information has been developed regarding the toxicity of TCE. VIP is of potential concern with SE OU 2 because the sewers are located in areas where underlying groundwater is contaminated with VOCs. However, this pathway poses no new threat to human health and the environment at SE OU 2 because the OU covers industrial sewers which are underground, primarily below roadways. It is very unlikely that habitable buildings would be constructed on top of the road/sewers; therefore, the VIP is not considered a pathway of concern for this OU.

6.2.2.3 Changes in Toxicity and Other Contaminant Characteristics

There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy. TCE toxicity is a complicated issue involving many uncertainties and has been the subject of considerable controversy over the past two decades. The current guidelines implemented by the EPA are draft provisional guidance not accepted by EPA as final as of the date of this report. The most recently proposed guidance regarding TCE is under internal review with the EPA. Based on the current and future intended commercial/industrial use the site is protective of human health. Issues regarding toxicity of TCE will be revisited during the next SE 5-Year Review.

6.2.2.4 Changes in Risk Assessment Methods

There have been no changes in risk assessment methods that affect the protectiveness of the remedy.

6.2.2.5 Expected Progress Towards Meeting RAO's

The following RAOs were established in the SE OU 2 ROD (Shaw, 2006a):

- Prevent potential future releases from the sewers
- Prevent residential land use exposure

The possibility of future releases from the sewers has been prevented by abandoning the sewers and drain lines as outlined in the ROD. Land use controls will be implemented at SE OU 2 to prohibit the future use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds. Land use controls will be implemented as specified in Section 6.2.1.1 and 6.2.1.2.

ANSWER B SE OU 2: YES – The exposure assumptions, toxicity data, cleanup levels, and RAO's used at the time of remedy selection are still valid.

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

6.2.3.1 Newly Identified Ecological Risks

There are no newly identified ecological risks.

6.2.3.2 Impacts from Natural Disasters

There have been no impacts from natural disasters.

6.2.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

No new information has come to light that would affect the selected remedy.

ANSWER C SE OU 2: NO – There has not been any new information that calls into question the protectiveness of the remedy.

6.3 SE OU 3A—DISPOSAL AREA VOC-CONTAMINATED GROUNDWATER

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

6.3.1.1 Remedial Action Performance

The remedy for SE OU 3A has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 3A will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the use of the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells (LEAD Master Plan, Chapter 5). The LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 3A to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. Buildings that could potentially be affected by the vapor intrusion pathway are currently being evaluated to determine whether the pathway is complete.

6.3.1.2 System Operations/O&M

Not applicable.

6.3.1.3 Opportunities for Optimization

Not applicable.

6.3.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.3.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 3A: Not applicable since a remedy has not been selected.

6.3.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.3.2.1 Changes in Standards and TBCs

Not applicable since remedy has not yet been selected.

6.3.2.2 Changes in Exposure Pathways

Not applicable since remedy has not yet been selected.

6.3.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable since remedy has not yet been selected.

6.3.2.4 Changes in Risk Assessment Methods

Not applicable since remedy has not yet been selected.

6.3.2.5 Expected Progress Towards Meeting RAO's

Not applicable since remedy has not yet been selected.

ANSWER B SE OU 3A: Not applicable since a remedy has not been selected.

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

6.3.3.1 Newly Identified Ecological Risks

Not applicable since remedy has not yet been selected.

6.3.3.2 Impacts from Natural Disasters

Not applicable.

6.3.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 3A: Not applicable since a remedy has not been selected.

6.4 SE OU 5—AREA A AND B CONTAMINATED SOILS

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

6.4.1.1 Remedial Action Performance

The remedy for SE OU 5 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 5 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 5 to commercial/industrial; however, the document will be amended to address this deficiency. Exposure to contaminated soil will also be addressed by the Land Use Control Remedial Design document, which will be completed by the end of September 2008. Potential risks to ecological receptors are currently in the risk management decision process.

6.4.1.2 System Operations/O&M

Not applicable.

6.4.1.3 Opportunities for Optimization

Not applicable.

6.4.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.4.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 5: Not applicable since a remedy has not been selected.

6.4.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.4.2.1 Changes in Standards and TBCs

Not applicable since remedy has not yet been selected.

6.4.2.2 Changes in Exposure Pathways

Not applicable.

6.4.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.4.2.4 Changes in Risk Assessment Methods

Not applicable.

6.4.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 5: Not applicable since a remedy has not been selected.

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

6.4.3.1 Newly Identified Ecological Risks

Not applicable.

6.4.3.2 Impacts from Natural Disasters

Not applicable.

6.4.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 5: Not applicable since a remedy has not been selected.

6.5 SE OU 6—VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6 AND EAST OF EAST PATROL ROAD (ROWE RUN DRAINAGE SYSTEM)

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

6.5.1.1 Remedial Action Performance

The remedy for SE OU 6 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 6 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. To eliminate the possibility for direct contact with and ingestion of contaminated groundwater, residents affected by groundwater contamination have received bottled water and/or have been connected to the public water supply line and the public has been notified through public

meetings and publicly-available documents about the contaminated groundwater. In addition, the Greene Township code Chapter 101 contains a provision for requiring additional analysis of a water supply if the township has reason to suspect that harmful substances are present in amounts that are significantly adverse to human health and safety. Also, the Greene Township code (*Code of the Township of Greene Pennsylvania, Part II General Legislation, V3 Updated through 12-15-2002, Chapter 85, Subdivision and Land Development, and Chapter 101, Water*) also applies to SE OU 6 which is located entirely within Greene Township. The Greene Township code requires connection to public water supply for specified areas and situations as defined in Chapters 85 and 101 of the 2005 Code of the Township of Greene. Chapter 85 states that if any part of a proposed subdivision, mobile home park, or land development is located within 500 feet of an existing or planned public water system, it shall be connected to said water system and shall serve every lot, dwelling unit or other occupancy within the proposed subdivision. Chapter 101 of Greene Township code requires connection to public water supply for existing structures located within 150 feet of a public water system where the existing individual or semipublic water supply becomes nonfunctional or inadequate, as defined by the code.

The vapor intrusion pathway is currently being evaluated at SE OU 6 to determine whether this pathway is complete and whether this pathway presents any unacceptable risk to human health or the environment in SE OU 6.

6.5.1.2 System Operations/O&M

Not applicable.

6.5.1.3 Opportunities for Optimization

Not applicable.

6.5.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.5.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 6: Not applicable since a remedy has not been selected.

6.5.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.5.2.1 Changes in Standards and TBCs

Not applicable since remedy has not yet been selected.

6.5.2.2 Changes in Exposure Pathways

Not applicable.

6.5.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.5.2.4 Changes in Risk Assessment Methods

Not applicable.

6.5.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 6: Not applicable since a remedy has not been selected.

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

6.5.3.1 Newly Identified Ecological Risks

Not applicable.

6.5.3.2 Impacts from Natural Disasters

Not applicable.

6.5.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 6: Not applicable since a remedy has not been selected.

6.6 SE OU 7—TRUCK OPEN STORAGE AREA**6.6.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?****6.6.1.1 Remedial Action Performance**

The remedy for SE OU 7 has not been selected at this time. The selected remedy for SE OU 7 will be documented in the FS, Proposed Plan, and ROD for the Phase V BRAC property transfer. It is anticipated that all remedial actions selected for SE OU 7 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 7 to commercial/industrial; however, the document will be amended to address this deficiency. Exposure to contaminated soil will also be addressed by the future Phase V Land Use Control Remedial Design document.

6.6.1.2 System Operations/O&M

Not applicable.

6.6.1.3 Opportunities for Optimization

Not applicable.

6.6.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.6.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 7: Not applicable since a remedy has not been selected.

6.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.6.2.1 Changes in Standards and TBCs

Not applicable since remedy has not been selected.

6.6.2.2 Changes in Exposure Pathways

Not applicable.

6.6.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.6.2.4 Changes in Risk Assessment Methods

Not applicable.

6.6.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 7: Not applicable since a remedy has not been selected.

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

6.6.3.1 Newly Identified Ecological Risks

Not applicable.

6.6.3.2 Impacts from Natural Disasters

Not applicable.

6.6.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 7: Not applicable since a remedy has not been selected.

6.7 SE OU 8—BRAC WASTE SITES

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

6.7.1.1 Remedial Action Performance

As of December 2003, remedies have been selected for the Phase I and Phase II BRAC parcels portions of SE OU 8. In addition, a No Further Action decision was documented for the Phase III BRAC parcels portion of SE OU 8. The remedy is performing as expected for these parcels. The 2002 LUCAP MOA ensures that the land use restrictions for the Phase I and Phase II BRAC property transfer remain in-place. The land use controls are effective in meeting the remedial action objectives for the SE OU 8 Phase I and Phase II Transfer Parcels. The land use controls prevent direct contact and ingestion of soil under residential and other nonindustrial exposure scenarios, prevent direct contact and ingestion of groundwater under any scenario, and reduce exposure levels of contaminants that produce unacceptable risk. In addition, the existing Greene Township zoning ordinances restricts the property to non-residential use. Bryan Hoke reviewed the most recent deeds in the Chambersburg Court House in August 2007 and verified that the

land use restrictions specified in the ROD were recorded with the respective Phase I and II parcel deeds at the time of property transfer.

In the Phase III ROD (WESTON, 2003e and 2006) it was determined that the soil and groundwater associated with the SE OU 8 sites and SE 13 groundwater are not contaminated (i.e., risk calculated based on unrestricted use of and exposure to groundwater and soil are within acceptable levels), and no further action is warranted for parcels located within these regions. As a result of No Further Action for Phase III, groundwater use restrictions previously placed on some of the Phase I and Phase II parcels were lifted, since they are located within the SMSR. Based on the Phase III ROD, the following are the parcels that require No Further Action:

- Parcels 3-89, 3-90, and 3-91 located in both SE and PDO Areas.
- Parcels 24, 27, and 28 (groundwater of the Phase I parcels located within the SMSR).
- Parcels 2-53L, 2-54L, 2-70L, 2R-80L-3, 2R-84L-3, and 2R-86L-3 (subsurface property deeper than 8 ft of the Phase II parcels located within the SMSR).

6.7.1.2 System Operations/O&M

The O&M requirements for the Phase I and Phase II parcels of this OU are documented in the LUCAP MOA that was developed and signed by the BRAC Cleanup Team in August 2002 (LEAD, 2002 LKD.RT-257). The LUCAP MOA documents the land use controls and mechanisms, the enforcement and the annual reporting requirements.

Annual requirements for land use controls stated in the MOA include: annual inspection of the CVBP; annual notification of land use controls to LIDA, Greene Township, Letterkenny Township, and CVBP; and annual status report of land use controls to PADEP and EPA. Inspections of the land use controls were conducted for calendar years 1999 thru 2007 for the Phase I and II Parcels. An annual report summarizing the findings was submitted to EPA and PADEP for calendar years 1999 thru 2006. To date no land use control violations have been discovered. Land use at the Cumberland Valley Business Park has followed the commercial/industrial use restrictions. To date no new tenants or lessees have excavated into any contaminated soil or underlying groundwater.

6.7.1.3 Opportunities for Optimization

There are currently no opportunities for optimization for the SE OU 8 Phase I and Phase II Transfer Parcels.

6.7.1.4 Early Indicators of Potential Remedy Problems

There are no early indicators of potential remedy problems.

6.7.1.5 Implementation of Land Use Controls and Other Measures

Land use controls have been implemented successfully at the Phase I and II BRAC parcels to prevent contact with contaminated groundwater and to ensure land use remains commercial/industrial.

ANSWER A SE OU 8: YES – The remedy of land use controls is functioning as intended and is preventing human exposure to the underlying groundwater and preventing use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds.

6.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.7.2.1 Changes in Standards and TBCs

The ARARs and TBCs for soil as identified for SE OU 8 sites associated with the Phase I and II Parcels ROD are the following:

- PADEP Medium-specific concentrations (MSCs), Non-Residential, Soil Direct Contact and Soil to Groundwater Used Aquifer, TDS<2,500 (Title 25 PA code, Chapter 250, Administration of Land Recycling Program).
- EPA, Title 40 Code of Federal Regulations (CFR), Part 761, Disposal of Polychlorinated Biphenyls (PCB), Final Rule under the Toxic Substances Control Act (TSCA), Section 761.61(a)(4)(i)(A), Cleanup Levels for Bulk PCB Remediation Waste, High Occupancy Areas: action is required for concentrations greater than 1 part per million (equivalent to milligrams per kilogram for soil or solid materials). Source: Federal Register, Volume 63, Number 124, 29 June 1998, pp 35383-35474).

The EPA ARAR for PCBs as described above has not changed.

The COCs for Phase I parcels identified in the respective Area of Concern Decision Documents (WESTON, 1998c-1998f) are shown in the following tables. There were no COCs identified for Parcels 8 – 13 (Open Shed Storage Area) and Buildings 6 and 9 (former storage),

Parcels 1 and 2 (Industrial area) – arsenic and beryllium

Parcel 24 (former vehicle storage) – arsenic

Parcel 29 (former vehicle storage) – arsenic and beryllium

Railroad parcels – arsenic and beryllium

The only constituents which were detected above any of the screening criteria were arsenic and beryllium, which were consistently detected at concentrations above the Region III RBCs. These results were discussed by the Army, EPA and PADEP, and the concentrations were deemed as not requiring additional remedial action (based on continued industrial/commercial use of the parcel) for the following reasons:

- Arsenic and beryllium are naturally occurring compounds, and are not known to be related to any past or current operations at LEAD; and/or
- The results are within published regional (PA) values for these two metals.

The changes in standards for the 2 metals of concern are as follows; these standards for the respective COCs have not changed in a manner that would affect the protectiveness of the remedy. The standards for beryllium have remained the same or increased (are less restrictive). Although some standards for arsenic have decreased, levels of arsenic are still considered within naturally occurring levels.

Metals	Region III EPA RBC (original/current value)	PA Act 2 (original/current value)	
	Soil Ingestion - Industrial (mg/kg)	Nonresidential Ingestion (mg/kg)	Soil to Groundwater Pathway (mg/kg)
Arsenic	3.8/1.9	53/12	150/150
Beryllium	1.3/2,000	18/440	320/320

The Gate 1 Guardhouse was the only Phase II site with COCs; however, the COCs were determined using a future resident scenario. Under the future intended commercial/industrial use scenario there were no compounds determined to be COCs. The following table provides a list of COCs under the future resident scenario and the respective MSCs:

COCs	Original Criteria PADEP MSCs Residential Soil (mg/kg)	Current PADEP MSCs Residential Soil (mg/kg)	Original Criteria EPA RBCs Residential Soil (mg/kg)	Current EPA RBCs Residential Soil (mg/kg)
aluminum	190,000	190,000	7,821	7,821
arsenic	12	12	0.43	0.43
barium	15,000	15,000	548	1,564
chromium	1,100 (IV)	94 (IV)	23	23.5
cobalt	13,000	4,400	469	469
iron	66,000	66,000	2,346	5,475
lead	500	500	400*	400*

manganese	10,000	31,000	156	156
nickel	4,400	4,400	156	156
selenium	1,100	1,100	39	39.1
thallium	18	15	0.55	0.55
vanadium	13	1,500	55	7.82
zinc	66,000	66,000	2,346	2,346
acetone	10,000	10,000	782	7,039
benzene	38	41	12	11.6
naphthalene	8,800	4,400	156	156
acenaphthene	13,000	13,000	469	469
benz[a]anthracene	25	25	0.87	0.22
benzo[a]pyrene	2.5	2.5	0.087	0.022
benzo[b]fluoranthene	25	25	0.87	0.22
dibenz[a,h]anthracene	2.5	2.5	0.087	0.022
indeno[1,2,3-cd]pyrene	25	25	0.87	0.22
fluorene	8,800	8,800	313	313

*There is no RBC for lead; the value listed is the CERCLA guideline number.

The land use controls and deed provisions for the Phase I and Phase II Parcels portions of SE OU 8 are protective of human health and the environment. A No Further Action ROD was signed for the Phase III and Phase IV BRAC parcels portions of SE OU 8. Any action planned for the remaining areas of this OU in the future will meet ARARs and be protective of human health and the environment.

A No Action ROD was signed for Phases III and IV. These portions of SE OU 8 were evaluated for unrestricted use (i.e., residential or daycare) and the risks were found to be within acceptable levels. Therefore the CERCLA 5-year review and associated review of standard and TBCs is not required.

6.7.2.2 Changes in Exposure Pathways

Exposure pathways evaluated for SE OU 8 were direct contact (skin adsorption and ingestion), vapor/dust inhalation, and vapor intrusion. Since the first SE 5-Year Review, it has been determined that the VIP will need to be re-evaluated at many LEAD sites within the SE Area due to changes in methods and new information has been developed regarding the toxicity of TCE. At the time of the ROD VIP was determined to be an incomplete pathway based on an evaluation using methods that are now considered inaccurate for preferential pathways situations. Based on current evaluation methods, the VIP is incomplete for the majority of the Phase I and II parcels, and all of the Phase III and IV parcels due to levels of VOCs being below practical quantitation limits. Phase I BRAC Parcels 10 and 12 and Phase II BRAC Parcels 2-65, 2-66, and 2R-82 within SE OU 8 overlap the SE OU 10 VOC-contaminated groundwater plume and are potentially affected by this exposure pathway. VIP is not considered to be of concern for roadways parcels since there are no buildings on these parcels and it is unlikely that habitable

buildings will be constructed. The other parcels are being further evaluated. However, the current remedy for SE OU 10 potentially could reduce the contamination to levels that are acceptable based on risk calculations for commercial/industrial use. The EPA continues to evaluate this potential pathway and the current remedy at SE OU 10 until a determination can be made regarding its effectiveness in reducing the mass of the VOCs in the site groundwater.

6.7.2.3 Changes in Toxicity and Other Contaminant Characteristics

There have been no changes in toxicity and other contaminants at the SE OU 8 Phase I and Phase II Transfer Parcels that would affect the protectiveness of the remedy.

6.7.2.4 Changes in Risk Assessment Methods

There have been no changes in risk assessment methodology that would affect the protectiveness of the remedy other than a change in the approach for evaluating VIP (see Section 6.9.2.2).

6.7.2.5 Expected Progress Towards Meeting RAO's

The remedy for the SE OU 8 Phase I and Phase II Transfer Parcels continues to achieve the remedial action objectives.

ANSWER B SE OU 8: The exposure assumptions, toxicity data, cleanup levels, and RAO's used in preparing the Phase I and Phase II RODs are still valid, with the exception of Vapor Intrusion Pathway which continues to be evaluated.

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

6.7.3.1 Newly Identified Ecological Risks

There have been no newly identified ecological risks.

6.7.3.2 Impacts from Natural Disasters

There have been no impacts from natural disasters.

6.7.3.3 Any other new information that could affect the protectiveness of the remedy.

There has been no new information that could affect the protectiveness of the remedy.

ANSWER C SE OU 8: NO – There has not been any new information that calls into question the protectiveness of the Phase I and II remedies consisting of land use controls.

6.8 SE OU 9—LANDFILL J**6.8.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?****6.8.1.1 Remedial Action Performance**

The remedy for SE OU 9 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 9 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 9 to commercial/industrial; however, the document will be amended to address this deficiency. In addition, a layer of soil and crushed shale covers nearly all of the landfill, preventing direct contact with landfill contents.

6.8.1.2 System Operations/O&M

Not applicable.

6.8.1.3 Opportunities for Optimization

Not applicable.

6.8.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.8.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 9: Not applicable since a remedy has not been selected yet.

6.8.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.8.2.1 Changes in Standards and TBCs

Not applicable; the remedy for SE OU 9 has not been selected at this time.

6.8.2.2 Changes in Exposure Pathways

Not applicable.

6.8.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.8.2.4 Changes in Risk Assessment Methods

Not applicable.

6.8.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 9: Not applicable since a remedy has not been selected.

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

6.8.3.1 Newly Identified Ecological Risks

Not applicable.

6.8.3.2 Impacts from Natural Disasters

Not applicable.

6.8.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 9: Not applicable since a remedy has not been selected.

6.9 SE OU 10—SOUTHERN SOUTHEAST INDUSTRIAL AREA VOC-CONTAMINATED GROUNDWATER SOUTH OF GATE 6 (CONOCOCHIEGUE DRAINAGE SYSTEM)

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

6.9.1.1 Remedial Action Performance

A final Proposed Plan was completed in February 2005 (WESTON, 2005c), and a ROD was completed in March 2006 (WESTON, 2006d). The selected remedy for SE OU 10 was Enhanced Biodegradation with Monitored Natural Attenuation and Land Use Controls.

In late 2000, the USACE retained WESTON to continue the enhanced bioremediation pilot study (EBPS) in SE OU 10 as a full-scale treatment operation (WESTON, 2001h, LKD-RT-185). The EBPS, which was initiated by Geophex, Ltd. (Geophex) in 1999 as part of the SE OU 10 FFS, was successful in accelerating the biodegradation of chlorinated volatile organic compounds (CVOCs) in the on-post groundwater and off-post groundwater and springs. Due to the effectiveness of the EBPS, the FFS concluded that enhanced biodegradation with institutional

controls was the preferred remedial alternative for the CVOC groundwater contamination within SE OU 10. The findings and scope of the initial EBPS served as the basis for the design of the continued field pilot EBPS at a level equal to that designed for a full-scale operation, as detailed in the *Final Technical Plan for the EBPS* (WESTON, 2001h) and the Remedial Action Work Plan for SE OU 10 (WESTON, 2007c).

A pair of nutrient delivery systems were set up in October 2000 as gravity feed systems (as per the pilot study). Introduction of sodium lactate nutrient solution began on November 2, 2000 following completion of monitor well and epikarst dye injection point (EDIP) installations and baseline sampling of the groundwater in October 2000. To track and document the distribution of the nutrient solution throughout the groundwater regime from each EDIP, fluorescein dye and rhodamine WT dye were mixed with the water/sodium lactate solution introduced into the EDIPs. Nine four-week long nutrient introductions (at rates and concentrations designed for full-scale implementation) were performed between November 2000 and May 2007 according to the following schedule:

- 2 November to 1 December 2000
- 17 May to 15 June, 2001
- 13 November to 24 December 2001
- 21 May to 18 June 2002
- 23 October to 21 November 2002
- 9 July to 6 August 2003
- 27 August to 24 September 2004
- 27 May to 22 July 2005 (Injection suspended briefly in June due to failure/replacement of pump)
- 9 April to 7 May 2007

The FFS Addendum concluded that bi-annual applications of the nutrient solution has enhanced the microbial activity and stimulated the reductive dechlorination processes in SE OU 10 groundwater. Decreased concentrations of the primary parent compounds (TCE and 1,1,1-TCA) to below MCLs, decreased concentrations of degradation compounds, and increased production of dissolved gases (i.e., methane, ethane and ethene) in the treatment area indicate that complete dechlorination through vinyl chloride is occurring at most locations.

Consistent detections of tracer dyes (fluorescein and rhodamine WT) in treatment area monitoring wells and off-post locations following nutrient introductions indicates that nutrients were effectively distributed and maintained throughout the target treatment area. While lactate concentrations in treatment area wells were intermittent and oscillated in concentrations, this was attributed to the increased microbial populations consuming the nutrients during the dechlorination process.

The declining concentrations of primary CVOC and lighter molecular weight daughter products in off-post wells and Hawbaker Spring indicates that the mass of contaminants on-post, that were

trapped in the epikarst and bedrock matrix, has been significantly reduced since the start of the continued EBPS program was implemented at a full-scale magnitude. Since 2003 and 2004, there have been no exceedances of either Federal MCLs or State SWQS in off-post sampling locations for site related VOCs.

The SE OU 10 remedial action objectives are:

- Protect human health and the environment.
- Restore the aquifer to federal and state drinking water standards within a reasonable timeframe.
- Comply with all federal and state environmental laws and ARARs.
- Reduce or eliminate further contamination of groundwater.
- Reduce or eliminate the migration of VOC-contaminated groundwater off-post and the discharge of VOC-contaminated groundwater to surface waters at off-post springs.
- Provide a suitable remedial alternative so that land can be transferred for beneficial use with minimal limitations.
- Prevent human exposure to contaminants associated with VOC-contaminated groundwater and springs at concentration in excess of the remediation goals.

In accordance with the Remedial Action Work Plan, the final chemical injection for the selected remedy was completed at SE OU 10 in June 2007. A long-term groundwater monitoring program has been implemented for SE OU 10 and the most recent sampling event was conducted in August 2007. Information to date has indicated that the remedial action objectives are being met during remedial actions; post-treatment monitoring data is needed to determine final compliance with ARARs and risk-based levels in groundwater.

The SE OU 10 land use controls objectives are as follows:

- Reduce risks to human health by: preventing bathing with, showering with and drinking VOC-contaminated groundwater throughout SE OU 10; prohibiting people from digging into or drilling into or otherwise disturbing soil below the water table in on-post areas (Army-retained and BRAC property); and prohibiting people from building subsurface structures designed for human occupation in on-post areas (Army-retained and BRAC property).
- Maintain the integrity of any current or future remedial or monitoring system associated with SE OU 10 remedial actions, such as monitoring wells.

In the future, it is anticipated that the Army will transfer portions of the SE OU 10 site to LIDA. In addition, the SE OU 10 site includes off-post groundwater. As a result of the anticipated property transfer and off-post groundwater contamination, the SE OU 10 remedy includes pre-

transfer land use controls, post-transfer land use controls, and off-post land use controls, as described in the SE OU 10 ROD (WESTON, 2006d) and Remedial Action Work Plan (WESTON, 2007c).

6.9.1.2 System Operations/O&M

Land use controls have been implemented at SE OU 10 as part of the selected remedy. The land use controls have been effective in preventing exposure to groundwater with concentrations greater than MCLs, PADEP medium specific concentrations (MSCs), and carcinogen and systemic toxicant remediation levels, as specified in the ROD for SE OU 10 (WESTON, 2006d) and the Remedial Action Work Plan for SE OU 10 (WESTON, 2007c). Regular inspections have been conducted to ensure their ongoing effectiveness. Land use controls for onpost property already transferred to the public are discussed in Section 6.9 for SE OU 8 and are maintained via the LUCAP MOA and the CVBP codes, which are still in force. The LEAD Master Plan was amended as follows to include groundwater use restrictions for Army property, to be implemented until risks to exposure to groundwater are within acceptable levels:

“Groundwater Land Use Controls

The groundwater underlying the Industrial Area, the Administrative Area, and the BRAC Excess Area is contaminated with solvents. Source areas include the (IWTP) lagoons, the K Areas west of the ore piles, the Building 37 leaking industrial gravity sewer lines, the DRMO revetments, and the Oil Burn Pit. As stated on Page 10 Letterkenny receives its drinking water from the Letterkenny Reservoir, therefore the Letterkenny employees are not drinking the underlying contaminated groundwater.

All depot personnel are prohibited from coming in contact with the groundwater. Installation of drinking water wells is absolutely forbidden. Installation of monitoring wells is prohibited without prior approval from BRAC Environmental Coordinator or the Letterkenny Remedial Project Manager. All excavations must follow the Letterkenny Army Depot National Environmental Policy Act Handbook as documented in Section VI, p 16, *NEPA Procedure at LEAD*, dated June 30, 1995.

The land use controls pertaining to the BRAC Excess Area will only remain in effect as long as the Army owns the property. Once the property is transferred to the Letterkenny Industrial Development Authority the environmental land use controls will be incorporated into the property transfer deed.”

Land use controls for onpost property associated with SE OU 10 that will be transferred to the public will be maintained as specified in the Remedial Action Work Plan for SE OU 10 (WESTON, 2007c).

Groundwater use in offpost property is managed via local ordinances of Greene Township. The Greene Township code (*Code of the Township of Greene Pennsylvania, Part II General Legislation, V4 Updated through 07-15-2005, Chapter 85, Subdivision and Land Development, and Chapter 101, Water*) applies to SE OU 10 which is located entirely within Greene

Township. It was verified that, as of September 2007, these ordinances are still in place (Greene Township, 2007).

6.9.1.3 Opportunities for Optimization

There have not been any opportunities for optimization for the SE OU 10 selected remedy.

6.9.1.4 Early Indicators of Potential Remedy Problems

There have been no early indicators of potential remedy problems.

6.9.1.5 Implementation of Land Use Controls and Other Measures

See Subsection 6.11.1.2.

ANSWER A SE OU 10: YES – The remedy of Enhanced Biodegradation and Land Use Controls is functioning as intended by lowering VOC concentrations and preventing human exposure in the underlying groundwater.

6.9.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.9.2.1 Changes in Standards and TBCs

COCs, original target cleanup goals, and current applicable standards are provided in the following table:

Chemical	EPA MCL micrograms per liter (µg/L) (original/current)	PADEP MSC µg/L Residential (original/current)	WQC µg/L (lower of fish and aquatic life or human health criteria) (original/current)
benzene	5/5	5/5	1.2 (human health, cancer risk level at 1×10^{-6})/1.2
chloroethane	NA	230/230	NA
1,1-dichloroethane (1,1-DCA)*	NA	27 /27	NA
1,1-dichloroethene (1,1-DCE)*	7/7	7/7	0.057 (human health, cancer risk level at 1×10^{-6} , regulation allows for achievable detection limit of 0.13)/0.057 (0.13)
cis-1,2-dichloroethene (cis-1,2-DCE)*	70/70	70/70	NA
trans-1,2-dichloroethene (trans-1,2-DCE)*	100/100	100/100	700 (threshold effect human health criterion)/700
trichloroethene (TCE)	5/5	5/5	2.7 (human health, cancer risk level at 1×10^{-6})/2.7
vinyl chloride	2/2	2/2	2 (human health, cancer risk level at 1×10^{-6})/2

*Breakdown products of TCE.

As shown in the table above, the applicable standards for the contaminants of concern have not changed since the original cleanup goals were determined for SE OU 10 groundwater.

6.9.2.2 Changes in Exposure Pathways

The exposure pathway evaluated for SE OU 10 was groundwater consumption and contact, and vapor intrusion. Since the first SE 5-Year Review, it has been determined that the VIP will need to be re-evaluated at many LEAD sites within the SE Area due to changes in methods and new information has been developed regarding the toxicity of TCE. At the time of the ROD VIP was determined to be an incomplete pathway based on an evaluation using methods that are now considered inaccurate for preferential pathways situations. Based on current evaluation methods, the VIP is incomplete for the majority of SE OU 10 due to levels of CVOCs being below practical quantitation limits. The SE OU 10 plume is being further evaluated. However, the current remedy for SE OU 10 potentially could reduce the contamination to levels that are acceptable based on risk calculations for commercial/industrial use. The EPA continues to

evaluate this potential pathway and the current remedy at SE OU 10 until a determination can be made regarding its effectiveness in reducing the mass of the VOCs in the site groundwater.

6.9.2.3 Changes in Toxicity and Other Contaminant Characteristics

There have been no changes in toxicity or other contaminant characteristics that would affect the protectiveness of the selected remedy. TCE toxicity is a complicated issue involving many uncertainties and has been the subject of considerable controversy over the past two decades. The current guidelines implemented by the EPA are draft provisional guidance not accepted by EPA as final as of the date of this report. The most recently proposed guidance regarding TCE is under internal review with the EPA. Based on the current and future intended commercial/industrial use the site is protective of human health. Issues regarding toxicity of TCE will be revisited during the next SE 5-Year Review.

6.9.2.4 Changes in Risk Assessment Methods

There have been no changes in risk assessment methods with the exception of the method to evaluate VIP (see Section 6.11.2.2).

6.9.2.5 Expected Progress Towards Meeting RAO's

ANSWER B SE OU 10: YES – The exposure assumptions, toxicity data, cleanup levels, and RAOs used in preparing the SE OU 10 ROD are still valid, with the exception of Vapor Intrusion Pathway which continues to be evaluated.

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

6.9.3.1 Newly Identified Ecological Risks

There have been no newly identified ecological risks.

6.9.3.2 Impacts from Natural Disasters

There have been no impacts from natural disasters. Land use controls will prevent exposure to contaminated groundwater in the event of any natural disaster.

6.9.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

There has been no new information that has come to light that affects the protectiveness of the selected remedy.

ANSWER C SE OU 10: NO – There has not been any new information that calls into question the protectiveness of the SE OU 10 remedy.

6.10 SE OU 11—NSIA VOC-CONTAMINATED GROUNDWATER NORTH OF GATE 6**6.10.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?****6.10.1.1 Remedial Action Performance**

The remedy for SE OU 11 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 11 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The Army has an existing water supply and the LEAD Master Plan both prohibits all depot personnel from coming in contact with groundwater use at this site and prohibits the installation of drinking water wells.

6.10.1.2 System Operations/O&M

Not applicable.

6.10.1.3 Opportunities for Optimization

Not applicable.

6.10.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.10.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 11: Not applicable since a remedy has not been selected.

6.10.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.10.2.1 Changes in Standards and TBCs

Not applicable; the remedy has not been selected.

6.10.2.2 Changes in Exposure Pathways

Not applicable.

6.10.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.10.2.4 Changes in Risk Assessment Methods

Not applicable.

6.10.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 11: Not applicable since a remedy has not been selected.

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

6.10.3.1 Newly Identified Ecological Risks

Not applicable.

6.10.3.2 Impacts from Natural Disasters

Not applicable.

6.10.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 11: Not applicable since a remedy has not been selected.

6.11 SE OU 12—LANDFILL G**6.11.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?****6.11.1.1 Remedial Action Performance**

The remedy for SE OU 12 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 12 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 12 to commercial/industrial; however, the document will be amended to address this deficiency. Exposure to contaminated soil will also be addressed by the future SE OU 12 Land Use Control Remedial Design document.

6.11.1.2 System Operations/O&M

Not applicable.

6.11.1.3 Opportunities for Optimization

Not applicable.

6.11.1.4 Early Indicators of Potential Remedy Problems

Not applicable.

6.11.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 12: Not applicable since a remedy has not been selected.

6.11.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.11.2.1 Changes in Standards and TBCs

Not applicable; the remedy has not been selected.

6.11.2.2 Changes in Exposure Pathways

Not applicable.

6.11.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.11.2.4 Changes in Risk Assessment Methods

Not applicable.

6.11.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 12: Not applicable since a remedy has not been selected.

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

6.11.3.1 Newly Identified Ecological Risks

Not applicable.

6.11.3.2 Impacts from Natural Disasters

Not applicable.

6.11.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 12: Not applicable since a remedy has not been selected.

6.12 SE OU 14—FORMER TEST TRACK AREA

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

6.12.1.1 Remedial Action Performance

The remedy for SE OU 14 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 14 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 14 to commercial/industrial; however, the document will be amended to address this deficiency. Exposure to contaminated soil will also be addressed by the future SE OU 14 Land Use Control Remedial Design document.

6.12.1.2 System Operations/O&M

Not applicable.

6.12.1.3 Opportunities for Optimization

Not applicable.

6.12.1.4 Early Indicators of Potential Issues

Not applicable.

6.12.1.5 Implementation of Land Use Controls and Other Measures

Not applicable.

ANSWER A SE OU 14: Not applicable since a remedy has not been selected.

6.12.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAO's) used at the time of remedy selection still valid?

6.12.2.1 Changes in Standards and TBCs

Not applicable.

6.12.2.2 Changes in Exposure Pathways

Not applicable.

6.12.2.3 Changes in Toxicity and Other Contaminant Characteristics

Not applicable.

6.12.2.4 Changes in Risk Assessment Methods

Not applicable.

6.12.2.5 Expected Progress Towards Meeting RAO's

Not Applicable.

ANSWER B SE OU 14: Not applicable since a remedy has not been selected.

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

6.12.3.1 Newly Identified Ecological Risks

Not applicable.

6.12.3.2 Impacts from Natural Disasters

Not applicable.

6.12.3.3 Any other New Information that could affect the Protectiveness of the Remedy.

Not applicable.

ANSWER C SE OU 14: Not applicable since a remedy has not been selected.

7. DEFICIENCIES

The deficiencies identified during the five-year review are noted in the table below. These deficiencies are not considered by the Army to be sufficient to warrant a finding that the remedy is not protective as long as corrective actions are implemented in a timely manner with respect to each deficiency. The deficiencies include some that were identified during the first five-year review to indicate progress.

Past Deficiencies	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
SE OU 1: Land use controls (LUCs) and Cap Maintenance Plan – From First 5-Year Review – Now resolved		
<p>Land Use Controls to restrict the use of the K Areas OU were not a component of the remedy, as identified in the first five-year review. The land is owned by the Army and the land use has been limited to industrial and groundwater use is restricted; however, maintaining the LUCs needed to be formalized in the form of a change to the LEAD Master Plan.</p> <p>In addition a Cap Maintenance Plan had not been formally implemented at the time of the first five-year review to maintain the long-term integrity of the capped areas. As a result of the first 5-Year Review the Army prepared an explanation of significant difference (ESD) to document LUCs and cap maintenance plan; the ESD was finalized in 2004 (LEAD, 2004). The Cap Maintenance Plan was prepared in 2004 (USACE, 2004). The LEAD Installation Master Plan now includes Environmental Constraints, shown after this table.¹</p>	N	N

Current Deficiencies	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. SE OU 1: Cap Integrity		
<p>SE OU 1: In 2003 the cap integrity was satisfactory. In the past (2001) there was evidence of small animal burrows at a few locations on the surface of the cap but in 2003 and 2007 the high groundwater table has kept the groundhogs away from the area. (Note: Based on the findings of the 28 September 2001 video inspection, the burrows did not breach through the cap). There was some accidental vehicle traffic noted in August 2007 across K-3 which has not damaged the cover. The Army has posted new “Please Keep Off” signs in early September 2007 as part of cap maintenance. The capped areas (K-1, K-2, and K-3) are included in the Depot’s mowing and landscape plan. The last few years this work has been performed by contractors at a reduced level of effort. K-3 has not been mowed for several years. The Army will mow the area this fall. Mowing at a minimum frequency of once per year is needed to prevent the growth of woody plants that could possibly compromise the integrity of the cover.</p>	N	Y

Current Deficiencies	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
2. SE OU 2: LUCs Design and Implementation		
<p>The LUC Remedial Design to be prepared for SE OU 2 as specified in the ROD has not been prepared. The last signature on the ROD was 24 September 2006. Within 90 days of this date the Army was to prepare and submit to EPA for review and approval a LUC Remedial Design containing LUC implementation and maintenance actions, including periodic inspections. The parcels where sewers are located that have been transferred to the public (Phase I and II BRAC) are maintained via the LUCAP MOA, Greene Township codes and the CVBP codes. For parcels related to SE OU 2 currently retained for military use at LEAD, the LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 2 to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. A statement that prohibits residential use at SE OU 2, including residential housing, elementary and secondary schools, child care facilities, and playgrounds will be included in the LEAD Master Plan, along with the figure showing the locations of the sewer lines. Land use controls for parcels that are to be transferred to the public in future (Phase V BRAC) will be specified in a LUC Remedial Design document, which will be completed in September 2008. The Army will prepare a LUC Remedial design to document methods for maintaining and checking land use controls, and the LEAD Master Plan will be amended.</p>	N	Y
3A. SE OU 8: Institutional Controls		
<p>Deeds for Road Parcels 2R-80, 2R-81, 2R-84, 2R-85, 2R-86, and 2R-87 do not include or reference the Land Use Restrictions required by the Phase II ROD. Because the Land Use Restrictions recorded in the May 3, 2002 Phase II deed "run with the land," they are enforceable. However, because the restrictions are not explicitly stated in the deeds, more research would be required for potential future owners to know about them. This deficiency was noted during the PDO Area five-review review and discussions have been initiated with LIDA and Greene Township. Preparation of a deed of correction was implemented during the Five Year Review to provide additional legal certainty that the Land Use Restrictions are being fully implemented. The deed of correction was completed and recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008.</p>	N	N
3B. SE OU 8: Institutional Controls		
<p>The LUCAP MOA requires the LEAD Commander to sign the annual Land Use Control inspection reports. However, it has been the practice at LEAD for the BRAC Environmental Coordinator (BEC) to sign the inspection reports. The Army, PADEP, and EPA agree that requiring the LEAD Commander to sign the inspection reports is overly burdensome, and that it would be more appropriate for the BEC to sign the reports. Therefore, the LUCAP MOA should be revised to allow the BEC to sign the annual reports. The Army and EPA are still in the process of amending the LUCAP MOA to replace the commander with BEC. Discussions were being held in March 2007 with EPA at the BCT meeting. For the interim, there is an e-mail from EPA dated 10/19/06 stating that it was</p>	N	N

Current Deficiencies	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
acceptable for the BEC to sign the annual letter instead of the Commander.		
3C. SE OU 8: Institutional Controls		
<p>Two deficiencies were found as a result of the inspection of Phase I/II deeds and leases done to verify that the land use restrictions specified in the ROD were recorded as necessary:</p> <p>1. Copies of deeds/leases are not being sent to the required parties as stated in the deed/lease as follows: CERCLA Remediation Section, Paragraph C.2. Deed/Lease: Within 14 days after the effective date of the transaction, GRANTEE, its successors and assigns, will provide to the GRANTOR, EPA, and PADEP, copies of the deed, lease, or other conveying instrument evidencing such transaction.</p> <p>2. A lease from a Cumberland Valley Business Park (CVBP) tenant was reviewed and discovered not to reference the corresponding Phase I Deed, thus confirming that not all leases reference the corresponding Phase I or II deed.</p> <p>The Army is working with LIDA and CVBP tenants to determine an effective method to make sure that the deeds/leases are sent to the specified parties. In addition, the Army needs to complete the review of leases and revise leases that do not reference the appropriate land use controls in the deed.</p>	N	N
4. Interim Commercial/Industrial Land Use		
<p>The remedies for SE OU 3A, SE OU 5, SE OU 6, SE OU 7, SE OU 9, SE OU 11, SE OU 12, SE OU 14, and for the remaining portions (BRAC Phase V Parcels) of SE OU 8 have not yet been selected. To be protective of human health and the environment, the interim land use of these areas must be restricted to commercial/industrial use. The LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, however, the LEAD Master Plan does not explicitly restrict land use at SE OUs 3A, 5, 7, remaining portions of 8, 9, 11, 12 or 14 to commercial/industrial. The LEAD Master Plan will be amended to address this deficiency.</p>	N	Y

¹The following paragraphs were added to the *Environmental Constraints* section of the Letterkenny 2010 Installation Master Plan:

“Two areas of the installation contain remediated soils covered with synthetic caps. They include the industrial waste treatment plant lagoons (IWTP) and the K areas west of the ore piles. Intrusive activities are prohibited in these areas.”

“Groundwater Land Use Controls

The groundwater underlying the Industrial Area, the Administrative Area, and the BRAC Excess Area is contaminated with solvents. Source areas include the (IWTP) lagoons, the K Areas west of the ore piles, the Building 37 leaking industrial gravity sewer lines, the DRMO revetments, and the Oil Burn Pit. As stated on Page

10 Letterkenny receives its drinking water from the Letterkenny Reservoir, therefore the Letterkenny employees are not drinking the underlying contaminated groundwater.

All depot personnel are prohibited from coming in contact with the groundwater. Installation of drinking water wells is absolutely forbidden. Installation of monitoring wells is prohibited without prior approval from BRAC Environmental Coordinator or the Letterkenny Remedial Project Manager. All excavations must follow the Letterkenny Army Depot National Environmental Policy Act Handbook as documented in Section VI, p 16, NEPA Procedure at LEAD, dated June 30, 1995.”

8. RECOMMENDATIONS AND REQUIRED FOLLOW-UP ACTIONS

Issue/OU (see Section 7)	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1. SE OU 1	Inspection of sign integrity and mowing cap once per year.	Army, Restoration Program Manager	EPA	Completed – will be done Yearly	N	Y
2. SE OU 2	Land Use Controls Remedial Design to be prepared.	Army, Restoration Program Manager	EPA	Draft September 2008	N	Y
3A. SE OU 8	Preparation of a deed of correction for Phase II Road parcels to provide additional legal certainty that the Land Use Restrictions are being fully implemented.	Army, BRAC Environmental Coordinator	EPA	Completed and recorded in Court House April 15, 2008	N	N
3B. SE OU 8	LUCAP MOA needs to be revised to replace the commander with BEC (in progress). Interim: Email from EPA has stated it is acceptable for the BEC to sign the annual Land Use Control inspection reports instead of the LEAD Commander.	Army, BRAC Environmental Coordinator	EPA	October 15, 2008	N	N

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Issue/OU (see Section 7)	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
3C. SE OU 8	The Army is working with LIDA and CVBP tenants to determine an effective method to make sure that the deeds/leases are sent to the specified parties. In addition, the Army needs to complete the review of leases and revise leases that do not reference the appropriate land use controls in the deed.	Army, BRAC Environmental Coordinator, and LIDA	EPA and PADEP	October 15, 2008	N	N
4. Multiple OUs	The LEAD Master Plan will be amended to specifically restrict land use to commercial/industrial for all applicable sites.	Army, Restoration Program Manager	EPA	October 15, 2008	N	Y

SE OU 1—K-Areas: The original ROD called for excavation, treatment, and management of treated soils. The remedy provided cleanup to industrial-based cleanup levels, but did not include land use controls. Current EPA policy requires that land use controls need to be implemented for those areas where the remedy does not clean up to the most conservative (i.e., residential) standards for human health risk. In addition, the original ROD and original ESD reference capping the area in accordance with Pennsylvania Residual Waste Regulations; however, this does not include cap maintenance as part of the site Operation and Maintenance Plan. The first five-year review resulted in identifying these issues. An ESD (LEAD, 2004) and Cap Maintenance Plan (USACE, 2004) were prepared as a result of the first five-year review to address land use controls and cap maintenance. Land use controls needed to be implemented by changing the LEAD Master Plan to make sure that in the long-term the land use remains commercial/industrial. The LEAD Master Plan now includes Environmental Constraints to address these issues. There was some accidental vehicle traffic noted in August 2007 across K-3 which has not damaged the cover. It was recommended that signs be posted in the areas. The Army has posted new “Please Keep Off” signs in early September 2007 as part of cap maintenance. The capped areas (K-1, K-2, and K-3) are included in the Depot's mowing and landscape plan. The last few years this work has been performed by contractors at a reduced level of effort. K-3 has not been mowed for several years. *It is recommend that the Army mow*

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the K-3 area this fall and follow-up to make sure the mowing is occurring as per the maintenance plan.

SE OU 2—Industrial Wastewater Sewer System: A ROD was completed in August 2006 and signed for SE OU 2 in September 2006 (Shaw, 2006a). The selected remedy for SE OU 2 was cleaning followed by abandonment of the sewers and drain lines at Building 37 and 57 to prevent future use of the existing sewers and implementation of land use controls to prevent the use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds. This portion of the remedial action was completed in spring 2006. The LUC Remedial Design to be prepared for SE OU 2 as specified in the ROD has not been prepared as per the schedule in the ROD; therefore *the Army must prepare and submit to EPA for review and approval a LUC Remedial Design containing LUC implementation and maintenance actions, including periodic inspections.* The parcels where sewers are located that have been transferred to the public (Phase I and II BRAC) are maintained via the LUCAP MOA, Greene Township codes and the CVBP codes. For parcels currently retained for military use at LEAD, the LEAD Master Plan describes land use as non-residential; however it does not explicitly prohibit residential housing, elementary and secondary schools, child care facilities, or playgrounds. The LEAD Master Plan will be amended to include a statement prohibiting such residential-type use. Land use controls for parcels that are to be transferred to the public in the future (Phase V BRAC) will be specified in the LUC Remedial Design; a draft will be completed in September 2008.

SE OU 3A—Disposal Area VOC-Contaminated Groundwater: A remedy has not yet been selected for SE OU 3A. Once the remedy for SE OU 3A has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 5—Area A and B Contaminated Soils: A remedy has not yet been selected for SE OU 5. The selected remedy will be documented in an FS, Proposed Plan, and a ROD for SE OU 5. These documents are expected to be completed in late 2007 or early 2008. Once the remedy for SE OU 5 has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 6— VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road (Rowe Run Drainage System): A remedy has not yet been selected for SE OU 6. The vapor intrusion pathway will be evaluated at this site in winter of 2007 and spring/early summer of 2008. The selected remedy will be documented in an FS, Proposed Plan, and a ROD for SE OU 6. These documents are expected to be completed in 2008. Once the remedy for SE OU 6 has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 7—Truck Open Storage Area: A remedy has not yet been selected for SE OU 7. SE OU 7 will be included in the Phase V BRAC Property transfer. Documents for the Phase V BRAC Property transfer are currently in progress. The selected remedy will be presented in an FS, Proposed Plan, and a ROD for the Phase V BRAC Property transfer. These documents are expected to be completed in fall 2007. There are no recommendations or required actions at this time.

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SE OU 8—BRAC Waste Sites: Based upon a comprehensive review of available site data, the implemented remedies for Phase I and Phase II parcels portions of SE OU 8 appear to be protective of human health and the environment, and no additional action, other than maintaining land use controls, is recommended at this time. The annual notification letter that identifies the land use controls was finalized and distributed to the LIDA on June 16, 2006. This annual notification letter was most recently mailed out on January 30, 2007. Deeds for the Phase II Road Parcels do not include or reference the Land Use Restrictions required by the Phase II ROD. Because the Land Use Restrictions recorded in the May 3, 2002 Phase II deed “run with the land,” they are enforceable. However, because the restrictions are not explicitly stated in the deeds, more research would be required for potential future owners to know about them. This deficiency was noted during the PDO Area five-review review and discussions have been initiated with LIDA and Greene Township. *Preparation of a deed of correction was implemented to provide additional legal certainty that the Land Use Restrictions are being fully implemented; this deed of correction was completed and recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008. In addition, the LUCAP MOA needs to be revised to allow the BRAC Environmental Coordinator to sign the annual reports instead of the Commander.*

Subsequent Phase I and II deeds reviewed in early January 2008 discovered the following requirement in the CERCLA Remediation Section, Paragraph C.2. Deed/Lease: Within 14 days after the effective date of the transaction, GRANTEE, its successors and assigns, will provide to the GRANTOR, EPA, and PADEP, copies of the deed, lease, or other conveying instrument evidencing such transaction. It was found during this review that the copies referenced above were not being sent to the three parties as stated in the deed/lease.

Select leases from the Letterkenny Industrial Development Authority (LIDA) were reviewed on January 28, 2008 and confirmed that the leases reference the corresponding Phase I or Phase II Deed. It was verified with LIDA representative Kip Feldman that all LIDA leases follow the same format and therefore reference the corresponding Phase I and II deeds. In late January 2008, a lease from the Letterkenny Business Park was reviewed and discovered not to reference the corresponding Phase I Deed, thus confirming that not all leases reference the corresponding Phase I or II deed.

The Army is working with LIDA and CVBP tenants to determine an effective method to make sure that the deeds/leases are sent to the specified parties. In addition, the Army needs to complete the review of leases and revise leases that do not reference the appropriate land use controls in the deed.

The Phase III ROD (WESTON, 2003e) concluded that no further action was necessary for Phase III parcels including groundwater associated with some Phase I and the lower portion of some Phase II parcels. Consequently, no recommendations or required actions are applicable to these parcels. After the remedy for the remaining portions of SE OU 8 have been determined, long-term monitoring and O&M will need to be evaluated. The Army and EPA, in consultation with the PADEP, determined that no further CERCLA remedial action is necessary to protect public health or welfare or the environment from the soil at the BRAC Phase IV parcels or groundwater associated with these parcels (SE OU 3B). A FOST (WESTON, 2006c) was approved and these parcels will be transferred without any restrictions. As of the date of this report, the parcels have

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not yet been transferred. The No Action remedy is considered protective of human health and the environment. There are no recommendations or required actions for Phase IV.

Remedies have not yet been selected for the SE OU 8 sites associated with the Phase V BRAC Property transfer. Documents for the Phase V BRAC Property transfer are currently in progress. The selected remedy will be presented in an FS, Proposed Plan, and a ROD for the Phase V BRAC Property transfer. These documents are expected to be completed in fall 2007. There are no recommendations or required actions at this time for Phase V.

SE OU 9—Landfill J: A remedy has not yet been selected for SE OU 9. Once the remedy for SE OU 9 has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 10— Southern Southeast Industrial Area VOC-Contaminated Groundwater South of Gate 6 (Conococheague Drainage System): A ROD for SE OU 10 was completed in March 2006 (WESTON, 2006d). The selected remedy was Enhanced Biodegradation with Monitored Natural Attenuation and Land Use Controls. The Enhanced Biodegradation was completed in May 2007 but the long-term groundwater monitoring and land use controls at SE OU 10 are still in effect. The protectiveness of this remedy cannot be determined at this time based on new exposure pathways (VIP) and continued evaluation. Once sufficient data has been collected and validated from SE OU 10, allowing for a final determination regarding the overall effectiveness of the groundwater remediation as it relates to vapor intrusion, a protectiveness statement will be made. There are no recommendations or required actions at this time.

SE OU 11—NSIA VOC-Contaminated Groundwater North of Gate 6: A remedy has not yet been selected for SE OU 11. The vapor intrusion pathway will be evaluated at this site in winter of 2007 and spring/early summer 2008. The selected remedy will be documented in an FS, Proposed Plan, and a ROD for SE OU 11. These documents are expected to be completed in 2008. Once the remedy for SE OU 11 has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 12—Landfill G: A remedy has not yet been selected for SE OU 12. Once the remedy for SE OU 12 has been determined, long-term monitoring and O&M will need to be evaluated. There are no recommendations or required actions at this time.

SE OU 14—Former Test Track Area: Future plans are to resubmit the RI/RA, with the risk assessment based on likely future use of commercial/industrial, along with completion of the CERCLA process (FS, Proposed Plan, ROD).

9. PROTECTIVENESS STATEMENT

Remedies have been selected for SE OU 1, SE OU 2, SE OU 3B, SE OU 4, portions of SE OU 8, and SE OU 13 and are protective of human health and the environment. The remedy for SE OU 10 has been selected; however, as described below, the protectiveness statement is being deferred. The remedies for SE OU 3A, SE OU 5, SE OU 6, SE OU 7, SE OU 9, SE OU 11, SE OU 12, SE OU 14, and for the remaining portions (BRAC Phase V Parcels) of SE OU 8 have not yet been selected.

SE OU 1—K-Areas: The 1991 ROD for SE OU 1 specified that the soil contaminant concentration at the K-Areas be reduced to levels below the cleanup criteria of 225 micrograms per kilogram ($\mu\text{g}/\text{kg}$). This cleanup criterion has been met through thermal treatment of soil. The remedy at SE OU 1 is protective of human health and the environment under current industrial land use. Long-term protectiveness of the remedial action is expected now that land use controls are specified in the LEAD Master Plan and a Cap Maintenance Plan is in place.

SE OU 2—Industrial Wastewater Sewer System: A ROD was completed (August 2006) and signed for SE OU 2 in September 2006 (Shaw, 2006a). The selected remedy for SE OU 2 was cleaning followed by abandonment of the sewers and drain lines at Building 37 and 57 to prevent future use of the existing sewers. The remedial action for sewer abandonment was completed in spring 2006.

The remedy at OU 2 currently protects human health and the environment. Figure F-1 in Appendix F of this 5-Year report (source SE OU 2 ROD) depicts the parcels and land use controls associated with SE OU 2. For parcels related to SE OU 2 currently retained for military use at LEAD, the LEAD Master Plan describes land use on-post as commercial/industrial by specifying various military uses (LEAD Master Plan, Chapter 5); however, it does not explicitly restrict land use for SE OU 2 to commercial/industrial. Therefore, the LEAD Master Plan will be amended to address this deficiency. A statement that prohibits residential use at SE OU 2, including residential housing, elementary and secondary schools, child care facilities, and playgrounds will be included in the LEAD Master Plan, along with the figure showing the locations of the sewer lines. Some of the parcels shown on Figure F-1 are to be transferred to LIDA in the future (will be Phase V BRAC, see Figure 17); the land use controls for these parcels will be implemented via deed restrictions, analogous to what was done for the Phase I and II BRAC parcels as was previously described. The details for land use restrictions for the sewers in Phase V BRAC parcels will be specified in the Land Use Control Remedial Design document, for which a draft is expected to be completed by the end of September 2008. In the interim, land use in SE OU 2 is restricted to commercial/industrial through the requirement for health and safety and dig permits to perform work at the site. Security patrols are also being utilized to prevent unauthorized activity at the site.

SE OU 3A—Disposal Area VOC-Contaminated Groundwater: The remedy for SE OU 3A has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 3A will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of

drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 3A to commercial/industrial; however, the document will be amended to address this deficiency.

SE OU 3B— Area Upgradient of VOC-Contamination Source in SE OU 3A: A ROD and a FOST were completed and signed in June 2006 (WESTON, 2006b). The ROD specifies No Action for SE OU 3B groundwater and for soil associated with four parcels that consist of a portion of SE OU 8; two of these parcels are to be transferred as part of the Phase IV BRAC property transfer. The no action decision is protective of human health and the environment.

SE OU 4—Stormwater Sewer Lines and Associated Drainageways: A No Further Action ROD was completed in July 2005 and signed for SE OU 4 in August 2005 (Shaw, 2005b). The No Further Action decision is protective of human health and the environment.

SE OU 5—Area A and B Contaminated Soils: The remedy for SE OU 5 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 5 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 5 to commercial/industrial; however, the document will be amended to address this deficiency. Potential risks to ecological receptors are currently in the risk management decision process

SE OU 6— VOC-Contaminated Groundwater North of Gate 6 and East of East Patrol Road (Rowe Run Drainage System): The remedy for SE OU 6 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 6 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. To eliminate the possibility for direct contact with and ingestion of contaminated groundwater, residents affected by groundwater contamination have received bottled water and/or have been connected to the public water supply line and the public has been notified through public meetings and publicly-available documents about the contaminated groundwater. In addition, the Greene Township code Chapter 101 contains a provision for requiring additional analysis of a water supply if the township has reason to suspect that harmful substances are present in amounts that are significantly adverse to human health and safety. Also, the Greene Township code (*Code of the Township of Greene Pennsylvania, Part II General Legislation, V3 Updated through 12-15-2002, Chapter 85, Subdivision and Land Development, and Chapter 101, Water*) also applies to SE OU 6 which is located entirely within Greene Township. The Greene Township code requires connection to public water supply for specified areas and situations as defined in Chapters 85 and 101 of the 2005 Code of the Township of Greene. Chapter 85 states that if any part of a proposed subdivision, mobile home park, or land development is located within 500 feet of an existing or planned public water system, it shall be connected to said water system and shall serve every lot, dwelling unit or other occupancy within the proposed subdivision. Chapter 101 of Greene Township code requires connection to public water supply for existing structures located within 150 feet of a public water system where the existing individual or semipublic water supply becomes nonfunctional or inadequate, as defined by the code.

The vapor intrusion pathway is currently being evaluated at SE OU 6 to determine whether this pathway is complete and whether this pathway presents any unacceptable risk to human health or the environment in SE OU 6.

SE OU 7—Truck Open Storage Area: The remedy for SE OU 7 has not been selected at this time. The selected remedy for SE OU 7 will be documented in the FS, Proposed Plan, and ROD for the Phase V BRAC property transfer. It is anticipated that all remedial actions selected for SE OU 7 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the LEAD Master Plan, which prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 7 to commercial/industrial; however, the LEAD Master Plan will be amended to address this deficiency.

SE OU 8—BRAC Waste Sites: The RODs for Phase I (WESTON, 1998b) and II (WESTON, 2001b) documented selection of land use controls to prevent contact with contaminated groundwater and to ensure that the land use remains commercial/industrial. The remedy for the Phase I and Phase II Parcels portions of SE OU 8 is considered protective of human health and the environment.

During the Five Year Review, the following minor deficiencies were discovered that do not affect the protectiveness of the remedy.

- The deeds transferring the road parcels (2R-80, 2R-81, 2R-84, 2R-85, 2R-86, and 2R-87) to Greene and Letterkenny Townships do not include or reference the Land Use Controls required by the Phase II ROD. Because the Land Use Restrictions recorded in the May 3, 2002 Phase II deed “are binding on the GRANTEE, its successors and assigns; shall run with the land; and are forever enforceable,” they are enforceable and the remedy is protective. However, because the restrictions are not explicitly stated in the deeds, the deeds should be modified to incorporate the Land Use Restrictions, providing additional legal certainty that the remedy is protective. Note: The deed of correction was completed during the Five Year Review process and was recorded in the Franklin County Courthouse in Chambersburg on April 15, 2008.
- The LUCAP MOA requires the LEAD Commander to sign the annual Land Use Control inspection reports. However, it has been the practice at LEAD for the BRAC Environmental Coordinator to sign the inspection reports. This breach of protocol does not affect the protectiveness of the remedy. The Army has submitted the inspection reports to EPA and PADEP annually, as required by the LUCAP MOA. Furthermore, the LEAD Commander signs the Five Year Review reports that incorporate the findings of the annual inspections. In addition, the Army, PADEP, and EPA agree that requiring the LEAD Commander to sign the inspection reports is overly burdensome, and that it would be more appropriate for the BRAC Environmental Coordinator to sign the annual reports. Therefore, the LUCAP MOA should be revised to allow the BRAC Environmental Coordinator to sign the annual reports.

A No Further Action decision was implemented in the ROD for the Phase III BRAC parcels (WESTON, 2003e), which included another portion of SE OU 8 and all of SE OU 13. The No Further Action decision is protective of human health and the environment.

The Army and EPA, in consultation with the PADEP, determined that no CERCLA remedial action is necessary to protect public health or welfare or the environment from the soil at the BRAC Phase IV parcels or groundwater associated with these parcels (SE OU 3B). A FOST (WESTON, 2006c) was approved and these parcels will be transferred without any restrictions. As of the date of this report, the parcels have not yet been transferred. The No Action remedy is considered protective of human health and the environment.

The remedies for the remaining SE OU 8 sites (BRAC Phases V) have not yet been selected. It is anticipated that all remedial actions selected for the remaining portions of SE OU 8 will be protective of human health and the environment. It is anticipated that land use controls will prevent direct contact and ingestion of soil under residential and other non-industrial exposure scenarios, prevent direct contact and ingestion of groundwater under any scenario, and reduce exposure levels of contaminants that produce unacceptable risk. The Army, with USEPA and PADEP approval, may arrange with other entities such as LIDA to maintain the land use controls as long as the Army will remain ultimately responsible for the effectiveness of the land use controls.

SE OU 9—Landfill J: The remedy for SE OU 9 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 9 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 9 to commercial/industrial; however, the document will be amended to address this deficiency. In addition, a layer of soil and crushed shale covers nearly all of the landfill, preventing direct contact with landfill contents.

SE OU 10— Southern Southeast Industrial Area VOC-Contaminated Groundwater South of Gate 6 (Conococheague Drainage System): A final Proposed Plan was completed in February 2005, and a ROD was completed in March 2006 (WESTON, 2006d). The selected remedy for SE OU 10 was Enhanced Biodegradation and Land Use Controls. The Enhanced Biodegradation program has been completed (the last nutrient injection occurred from April to May 2007) and onpost as well as offpost land use controls have been effective in preventing exposure to groundwater with concentrations greater than MCLs, MSCs, and carcinogen and systemic toxicant remediation levels, as specified in the ROD. Regular inspections have been conducted to ensure their ongoing effectiveness. The protectiveness of this remedy for a portion of the SE OU 10 groundwater contamination plume cannot be determined at this time based on the need to re-evaluate the VIP exposure pathway, as discussed in Subsection 6.9.2.2. Once sufficient data has been collected and validated from SE OU 10, allowing for a final determination regarding the overall effectiveness of the groundwater remediation as it relates to vapor intrusion, a protectiveness statement will be made.

SE OU 11—NSIA VOC-Contaminated Groundwater North of Gate 6: The remedy for SE OU 11 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 11 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The Army has an existing water supply and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 11 to commercial/industrial; however, the document will be amended to address this deficiency

SE OU 12—Landfill G: The remedy for SE OU 12 has not been selected at this time. It is anticipated that all remedial actions selected for SE OU 12 will be protective of human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 12 to commercial/industrial; however, the document will be amended to address this deficiency.

SE OU 13—Southern Martinsburg Shale Region Groundwater: A No Further Action decision was implemented in the ROD for the Phase III BRAC parcels, which included all of SE OU 13 (WESTON, 2003e). The Army and EPA, in consultation with the PADEP, determined that no further CERCLA remedial action is necessary to protect public health or welfare or the environment from the soil or groundwater at the Southern Martinsburg Shale Region (SMSR) (SE OU 13), which was included in the Phase III BRAC Property Transfer. These parcels were transferred without any restrictions in January 2004. The No Further Action remedy is considered protective of human health and the environment.

SE OU 14—Former Test Track Area: This OU was created in 2007. Future plans are to resubmit the RI/RA, with the risk assessment based on likely future use of commercial/industrial, along with completion of the CERCLA process (FS, Proposed Plan, ROD). This land is owned by the Army and the LEAD Master Plan prohibits depot personnel from coming in contact with groundwater and forbids installation of drinking water wells. Currently, the LEAD Master Plan does not explicitly restrict land use at SE OU 14 to commercial/industrial; however, the document will be amended to address this deficiency.

10. NEXT FIVE-YEAR REVIEW

This is a statutory site that requires ongoing five-year reviews. The initial trigger date for the first year review was 11 August 1993. The first 5-year review was signed by the Army on 25 October 2001 (LEAD, 2001) and EPA concurred on 06 November 2001 (EPA Region III, 2001). Subsequent 5-year reviews are to be completed five years from the date of EPA concurrence of the previous 5-year review. Therefore, the trigger date for this second five-year review was 06 November 2001. The third five-year review for SE Area will be completed no later than five years after EPA concurs with this five-year review, which will be in 24 June 2013.