Five-Year Review Report

Fourth Five-Year Review Report
for
The Picillo Farm Superfund Site
Town of Coventry
Kent County, Rhode Island

July 2008

Prepared by:
The United States Environmental Protection Agency
Region 1, New England
Boston, Massachusetts

Approved by:

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Date:

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Executive Summary

EPA Region 1, New England has conducted the fourth five-year review for the Picillo Farm Superfund Site in Coventry, Rhode Island (the Site). The methods, findings, and conclusions of reviews are documented in this five-year review report. The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. This is the fourth five-year review for this site and focuses on remedial action implementation associated with Operable Unit 2 (OU2). Work associated with Operable Unit 1 (OU1) was completed prior to the second five-year review.

OU1 involved the excavation and off-Site disposal of stockpiled soil that was completed in 1989. Residual PCB-impacted surficial soil associated with these stockpiles was removed by EPA as part of OU2 in 1998. Based upon these actions, the remedy for OU1 is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

OU2 protects human health in the short-term through implementation of various response actions, placement of Institutional Controls, and the physical control of Site access. The 1993 ROD determined that the response actions that are in the process of being implemented would be protective in the long term to human health and the environment. The remedy at OU2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Overall, because the remedial actions at all OUs are protective, the site is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Picillo Farm		
EPA ID *(from WasteLAN)*: RID980579056		
Region: *01*	***State:*** *RI*	***City/County:*** *Coventry/Kent*

SITE STATUS

NPL status: x Final ☐ Deleted ☐ Other (specify)	
Remediation status (choose all that apply): ☐ Under Construction x Operating ☐ Complete	
Multiple OUs?* x YES ☐ NO	**Construction completion date:** 09 / 03 / 2003
Has site been put into reuse? ☐ YES x NO	

REVIEW STATUS

Lead agency: x EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____	
Author name: Anna F. Krasko	
Author title: Remedial Project Manager	**Author affiliation:** US EPA Region 1 – NEW England
Review period:** 11 / 06 / 2007 to 07 / 30 / 2008	
Date(s) of site inspection: 04 / 16 / 2008	
Type of review: x Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion	
Review number: ☐ 1 (first) ☐ 2 (second) ☐ 3 (third) x Other (specify) 4 (fourth)	
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion x Previous Five-Year Review Report ☐ Other (specify)	
Triggering action date *(from WasteLAN)*: 07 / 30 / 2003	
Due date *(five years after triggering action date)*: 07/ 30 / 2008	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

Potential for optimization of the system O&M operations

Assess probable groundwater plume longevity

Confirm that the concentrations of contaminants of concern observed in the northwest portion of the Concentrated Plume are stable or declining

Recommendations and Follow-up Actions:

Evaluate additional treatment system O&M optimization, including alternate discharge option, and remedy implementation optimization

Perform groundwater fate and transport modeling to assess plume longevity under varying assumptions

Continue to collect data during semi-annual monitoring events to assess concentrations trends observed in the MW-28 Area; evaluate the data and modify operation of the system if necessary

Protectiveness Statement(s):

OU1 involved the excavation and off-Site disposal of stockpiled soil that was completed in 1989. Residual PCB impacted surficial soil associated with these stockpiles was removed by EPA as part of OU2 in 1998. Based upon these actions, the remedy for OU1 is expected to be protective upon completion or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

OU2 protects human health in the short-term through implementation of various response actions, the placement of Institutional Controls, and the physical control of Site access. The 1993 ROD determined that the response actions that are in the process of being implemented would be protective in the long term to human health and the environment. The remedy at OU2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. However, in order for the remedy to be protective in the long-term, the clean-up levels in the 1993 ROD have to be met to ensure long-term protectiveness.

Overall, because the remedial actions at all OUs are protective, the site is protective of human health and the environment.

Other Comments:

None

Picillo Farm Superfund Site
Coventry, Rhode Island
Fourth Five Year Review Report

1.0 INTRODUCTION

The purpose of the five-year review 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 identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

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

The Agency interpreted this requirement further in the NCP; 40 CFR Section 300.430(f)(4)(ii):

> *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.*

EPA Region 1 has conducted this policy five year review of the remedial actions implemented at the Picillo Farm Superfund Site in Coventry, Rhode Island (the Site) in accordance with OSWER Directives 9355.7-03B-P, "Comprehensive Five-Year Review Guidance" (June 2001). ESS Group, Inc. (ESS), the contractor for the Potentially Responsible Parties provided analysis in support of this five year review.

This is the fourth five-year review conducted for the Site. The triggering action for this review is the completion of the previous five-year review on July 30, 2003 and the fact that the remedial action in OU2 requires five or more years to complete and contaminated water is still present at the Site that prevent unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

Table 1 presents a chronology of significant events for the Picillo Farm Superfund Site.

Table 1
Site Chronology

Date	Event
Prior to late '70s	Pig farm and private residences occupied the Site.
1977	Waste shipped from other disposal facilities or diverted by waste haulers to Picillo Pig Farm over the course of several months was disposed of illegally into open, unlined trenches.
September 1977	Sodium aluminum hydride disposed of at the Site reacted and caused a large explosion and fire, which brought the Site to the attention of the Town of Coventry, RIDEM and EPA.
1980-1982	Early EPA and RIDEM removal actions: over 10,000 drums removed; 6 former disposal trenches excavated; some soil disposed of off-Site; approximately 6,500 cubic yards of soil stockpiled – 2 piles of Phenol-containing soil and 1 pile of PCB-containing soil.
1980-1983	First round of fund-lead investigation of groundwater, surface water and soil – first RI/FS.
October 23, 1981	EPA proposed Site for the NPL.
September 8, 1983	Site was listed on the NPL.
September 30, 1985	EPA issued ROD calling for disposal of approximately 6,500 cubic yards of stockpiled contaminated soil in an on-Site RCRA landfill. (Operable Unit (OU) 1)
March 3, 1987	EPA issued an amended ROD stipulating off-Site disposal of the stockpiled contaminated soil and requiring a second RI/FS to determine the nature and extent of residual contamination and to evaluate groundwater cleanup alternatives. (Operable Unit (OU) 1)
April 14, 1988	EPA and RIDEM entered into a Consent Decree with four PRPs to implement the 1987 amended ROD: removal and off-Site disposal of the stockpiled soil and Site closure tasks.
February 7, 1990	EPA certifies that remedial action work under 1988 Consent Decree completed by PRPs.
1990-1993	EPA performed the second RI/FS.
May 19, 1993	EPA signs first Five Year Review Report.
June 15, 1993	EPA published notice of issuance of FS Report and Proposed Remedial Action Plan for OU 2.
September 27, 1993	EPA issued second ROD requiring SVE of Source Area; groundwater treatment and extraction; and institutional controls.
November 28, 1995	EPA entered into a Consent Decree with a group of PRPs, five of whom agreed to implement the 1993 ROD.
January 1996	PRP Group submits Draft Remedial Design Work Plan and Project Operations Plan along with preliminary remedial design for remedial action.
September 1997	PRP Group submits Draft 30 Percent Design for remedial action. Documents SVE pilot test.
March 1998	PRP Group submits Draft 60 Percent Design for remedial action.
May 22, 1998	EPA signs second Five Year Review Report.
October 1998	PRP Group completes 100 Percent Design for remedial action.
Fall 1998	EPA excavated and removed shallow soils in vicinity of former PCB pile.
January 18, 1999 – January 17, 2000	PRP Group implements 100 Percent Design by constructing the Management of Migration (MOM) Remedy (hydraulic control) and the Source Area Remedy (dewatering and SVE) and the associated groundwater and air treatment systems.
August 1999	PRP Group discovered epoxy waste and grossly contaminated soil during pipe trench excavation in the Northwest trench area.
February 2000 to April	PRP Group completed a series of remediation system performance tests in

2001	preparation for full-scale system operation.
March 2000	PRP Group submitted draft Construction Completion Report.
March 2000	PRP Group submits Institutional Controls Plan and EPA approves. PRP Group continues implementing institutional controls.
March 2001 – August 2001	PRP Group commences with full-scale groundwater extraction and treatment system operation. Source control dewatering and MOM remedy commence. Implemented a series of tests and groundwater treatment system modifications to achieve Al and Zn surface-water-discharge criteria.
November 2001	PRP Group commenced source control SVE operation.
September 25, 2002	EPA issues Action Memorandum for the epoxy waste Removal Action. Starts formal process for CERCLA Response Action for excavation and removal of Picillo Waste from portion of Northwest Trench. PRPs partially reimbursed for the work by the EPA after filing a Claim for CERCLA Response Action in accordance with 40 CFR Part 307.30.
December 5, 2002	EPA issues Administrative Order on Consent for Picillo Waste Removal Action. PRPs start preparing work plans for Picillo Waste removal.
March 12, 2003	PRPs submit Draft Final Work Plan for the Picillo Waste Removal Action.
May -November 2003	PRP Group implements the Removal Action.
July 30, 2003	EPA signs third Five Year Review Report.
August 2003	West Trench Soil Boring Program conducted.
October 6, 2003	Operation of the groundwater treatment system ultraviolet oxidation unit (UV/OX) and peroxide destruction units (PDUs) were suspended. PDU vessels were filled with carbon and put online at the end-of-pipe as polishing units.
August 1, 2003	PRP Group submits Picillo Waste Removal Construction Completion of Work Report
September 3, 2003	EPA issues Preliminary Close Out report
November 6, 2003	EPA, RIDEM and the PRPs conduct Final Site Inspection for the Removal Action
November 17, 2003	PRP Group submits Picillo Waste Removal Completion of Work Report.
September 2004	West Trench Source Remedy Closure Evaluations begin with the suspension of SVE and dewatering efforts over two/thirds of this trench (Areas 2 and 3).
October - November 2004	Eighteen soil borings were advanced within the paved areas associated with the three Source Area trenches. Eight additional SVE wells, five vapor probes, and one piezometer were installed in the Northeast and Northwest trenches. One monitoring well was installed in the West Trench.
November - December, 2004	Groundwater treatment system reconfigured to bypass the air stripper. SVE system reconfigured to focused flow/air injection operation. Vapor treatment reconfigured to replace catalytic oxidation unit (CatOx/acid gas scrubber) with a heat exchanger and vapor phase carbon units.
February 2005	Final ELUR recorded. All institutional controls in place.
April 8, 2005	Remaining portion of the West Trench (Area 1) dewatering system suspended.
August 30, 2005	PRPs submit draft Interim Remedial Action Completion Report.
September 13, 2005	EPA issues approval of Interim Remedial Action Report.
October 31, 2005	Remaining portion of the West Trench (Area 1) SVE system was suspended.
April 12, 2006	PRPs submit the Draft Source Remedy Performance Summary and Preliminary Closure Evaluation (Preliminary Report) which provided a performance summary and preliminary closure evaluation for the Source Remedy in the Northeast and Northwest Trenches.
April - May 2006	Additional MW-28 Area monitoring wells installed by PRPs.
June 30, 2006	PRPs submit Draft System Evaluation Report (SER)-Phase I which presented the technical rationale for shutting down the Source Remedy and the approach for evaluating continued MOM operation performance.
September 11, 2006	Operation of the SVE portion of the Source Remedy was suspended.
September 18, 2006	EPA letter to the PRP Group provided concurrence with the SER Phase I to suspend all remaining Source Area Remedy Operations and implement a MOM

	Evaluation Program.
October 16, 2006	Operation of the dewatering system was suspended in the Northeast and Northwest Trenches.
November 2006	MOM Wells EW-305 and EW-306 were installed.
March 16, 2007	PRPs submit Draft System Evaluation Report (SER) – Phase II which summarized Source Remedy operation and monitoring.
April 2008	Additional Northwest Plume monitoring wells installed.

3.0 BACKGROUND

This section describes the fundamental aspects of the Site to assist in identifying the threat posed to the public and the environment at the time of ROD.

3.1 Physical Characteristics and Land Use

The Site is located at 210 Piggy Lane in Coventry, Rhode Island near the intersection of State Highway 102 and Perry Hill Road (Figure 1). Located on a former pig farm, the Site includes a 10-acre disposal area, which is currently fenced, and approximately 35 acres of surrounding woodland and wetland areas, defined by the extent of the groundwater and surface water impacts. Land surrounding the Site is rural and consists of mixed woods and wetlands. Residential properties are located north, northeast, and east of the Site, along Perry Hill, Colewood Circle and West Log Bridge Roads. All nearby residences are served by private wells and the testing of these drinking water wells found no Site-related contamination to date. To the west, southwest, and south of the Site is a mix of wetlands and wooded areas.

3.2 History of Impacts

During a limited period in 1977, at least 10,000 drums of hazardous substances plus an undetermined volume of liquid chemical waste and solid waste were illegally disposed of into several unlined trenches at the Site. Wastes disposed of at the Site included industrial solvents, oils, pesticides, PCBs, paint sludges, resins, still bottoms, and other hazardous materials.

3.3 Initial Response

Impacts at the Site were discovered after a sodium aluminum hydride explosion and fire at the Site in September 1977 brought the dumping activities to the attention of regulatory agencies. This led to a number of investigations and remedial activities at the Site. The State of Rhode Island and EPA shared responsibilities in joint cleanup activities and supervision. Between 1980 and 1982, the trenches located along the perimeter of a cleared field – the northeast trench, northwest trench, west trench, south trench, and two slit trenches – were excavated, approximately 10,000 drums and a significant amount of contaminated soils were removed and disposed off-Site. Approximately 6,500 cubic yards of PCB- and phenol-contaminated soil were stockpiled on site.

On September 30, 1985, after conducting an RI/FS, EPA issued a Record of Decision (ROD) for Operable Unit 1 (OU 1) which called for disposal of the stockpiled contaminated soil in an on-site RCRA landfill. The State of Rhode Island contested the ROD, and in 1987, following the

enactment of the Superfund Amendments and Reauthorization Act (SARA), EPA issued an amended ROD. The amended March 3, 1987, ROD required that the contaminated soils be disposed offsite in a RCRA/TSCA landfill, and site closure activities be implemented. The stockpiled soils were removed in 1988 by the Potentially Responsible Parties.

The 1987 amended ROD stated that the recommended remedy would not eliminate the residual groundwater contamination at the Site and required the EPA to conduct a remedial investigation/feasibility study (RI/FS) to determine the nature and extent of the contamination and to evaluate cleanup alternatives. The EPA initiated RI/FS activities in 1988. Upon RI/FS completion, the EPA issued a ROD for OU 2 on September 27, 1993.

3.4 Summary of Basis for Taking Action

Investigations by RIDEM and EPA determined that impacted groundwater was discharging to a wetland approximately 1,200 feet northwest of the former Disposal Area, and that the groundwater and surface waters were impacted by various halogenated and aromatic VOCs, SVOCs, and metals. On-site soil was contaminated with SVOCs and VOCs that were found to represent a continuing source for adverse groundwater impacts. Potential threats include use of groundwater and surface water as drinking water supplies. Contaminated surface water and the PCB-contaminated shallow soils also posed ecological risks.

4.0 REMEDIAL ACTIONS

Following initial emergency response actions between 1980 and 1982, remedial actions have been developed and implemented in accordance with the March 3, 1987 amended ROD (OU 1) and September 27, 1993 ROD (OU 2). In addition, a CERCLA Removal Action was implemented under the December 2002 Administrative Order on Consent for the excavation and disposal of epoxy waste in the Northwest Trench. Between May 28 and June 20, 2003, approximately 2,300 tons of waste was excavated and disposed of offsite at two incineration facilities. As of November 6, 2003, the date of the Final inspection conducted by the RIDEM and the EPA, the SVE wells in this area had been put back on-line and the excavation area had been sufficiently restored. See Section 4.5 for more details.

4.1 Operable Unit 1 Remedial Actions

All remedial actions required by the 1987 amended ROD (OU 1) were completed as documented in the EPA's February 7, 1990 certification letter. Remedy selection, implementation, and operation and maintenance (O&M) were documented in the first two Five Year Reports. The following summarizes this information.

The 1987 amended ROD required off-Site disposal of approximately 3,500 cubic yards of PCB impacted soils and 3,000 cubic yards of phenol impacted soils at an appropriate facility. In 1988, under a Consent Decree with EPA and the State, four of the PRPs implemented the remedial action. The PRPs submitted a report certifying project completion in January 1989. EPA approved this report conditioned upon the Site being reseeded during spring 1989 and making improvement to Site drainage structures. These requirements were met by the PRPs as confirmed by a December 19, 1989, EPA and RIDEM Site inspection and documented in an EPA

February 7, 1990, certification letter.

Post remedial action O&M involved periodic Site inspections which were initially performed as part of the EPA RI/FS activities in the early 1990s and then continued as part of the PRP lead remedial action. These O&M requirements have since been incorporated into ongoing O&M performed under the 1993 ROD (OU 2).

4.2 Operable Unit 2 Remedy Selection

In 1988, EPA initiated the groundwater RI/FS. Following its completion, EPA Region 1 signed the ROD for OU 2 on September 27, 1993. The remedy described in the ROD includes treatment of contaminated groundwater and treatment of soil which presents an ongoing source of adverse groundwater impacts. Removal of the drums and impacted soil conducted in the early 1980s reduced the immediate threat to public health from exposure to hazardous waste contained in the drums and disposal trenches. Implementation of the 1987 amended ROD resulted in the removal of the remaining stockpiled soil from these initial activities. These actions reduced the risk to public health from exposure to contaminated soil remaining on-Site.

The 1993 ROD selected a remedy that combines source control and management of migration (MOM) to address remaining in-situ contamination. The ROD also required excavation and off-site disposal of surface soils impacted with PCBs from the soil stockpiles managed under OU 1. The ROD's primary objective was to address the remaining principal threats to human health and the environment posed by residual soil contamination that presents a continuing source for leaching of contaminants to Site groundwater. To meet this objective the selected remedy included construction and operation of an enhanced Soil Vapor Extraction (SVE), dewatering and groundwater pump & treat systems, natural attenuation of fringes of the groundwater plume, institutional controls, long-term environmental monitoring, and removal of PCB impacted surface soil. The specific objectives associated with each of these remedial actions are summarized below.

- Source control - reduce VOC and SVOC levels in the soils so that they no longer represent a significant continuing source for leaching of contaminants to Site groundwater;
- MOM - provide hydraulic containment and treatment of groundwater plumes to limit contaminant migration and discharge into surface waters; fringes of the plume (Dilute Plume) are to be monitored for the natural attenuation process;
- Institutional controls - restrict the use of impacted land, groundwater and surface water for the duration of the remedial action and ensure that off-Site activities do not interfere with the remedial action;
- PCB-impacted surface soil - remove residual surface soil contamination; and
- Long-term environmental monitoring program - evaluate the extent of contamination over time and demonstrate compliance.

The major components of the source control remedy included:

- In-situ enhanced soil vacuum extraction (SVE) to remove volatile organic

compounds and semi-volatile organic compounds;

- Dewatering to lower the water table and treatment of the extracted groundwater.
- Thermally treating vapors extracted from the soil;
- Constructing a temporary cap over source area;
- Performing SVE pilot test and other investigations to optimize SVE system design and evaluate SVE enhancements;
- Developing and implementing a soil monitoring program and performance monitoring *program to evaluate the effectiveness of the soil vapor extraction system; and*
- Maintaining access restriction to the source area via fence construction and maintenance.

The major components of the MOM remedy and long-term monitoring include:

- Extracting and treating contaminated groundwater from the overburden and shallow bedrock aquifers;
- Developing and implementing an environmental monitoring program for ground water, surface water, and sediment to evaluate the extent of contamination over time and to demonstrate compliance; and
- Developing and implementing a monitoring program to evaluate natural attenuation in the fringes of the groundwater plume.

The major institutional control components include:

- Limiting access to areas of active remediation; and
- Placing environmental land use restrictions.

The PCB soil removal component involved delineation and excavation and off-site disposal of surface soil contaminated with PCBs.

4.3 Operable Unit 2 Remedy Implementation

In 1995, EPA entered into a Remedial Design and Remedial Action (RD/RA) Consent Decree (Consent Decree) with its associated Statement of Work (SOW) with a number of Potentially Responsible Parties (PRPs) at the Site. The SOW specifies the remedial design requirements and sets the performance standards for the remedial action. Five of the PRPs, American Cyanamid Company (whose obligations are being performed by Wyeth), Ashland, Inc. (for Ashland Chemical Company), ISP Environmental Services, Inc. (for GAF Corporation), General Electric Company, and Solutia Inc. for Monsanto Company (Monsanto Company is now performing the work), agreed to perform the RD/RA, as set forth in the ROD, the Consent Decree and its associated SOW. The five parties are defined in the Consent Decree as the Performing Settling Defendants and are referred to herein as the PRPs. Rohm and Haas Company became a participating member of the PRP Group in 2006.

With the October 1995 integrity testing of existing monitoring wells the PRPs initiated design investigations. The PRPs submitted the Draft Remedial Design Work Plan and Project Operations Plan (GeoTrans, January 10, 1996) detailing extensive pre-design investigations, an SVE pilot test, and SVE thermal enhancement bench scale study activities. The PRPs initiated field activities with the collection of the first round of quarterly groundwater data in February 1996. Information from these investigations was used during the preparation of the Draft 30 Percent Design Report (HSI GeoTrans, September 16, 1997). Design refinements proposed in the Draft 30 Percent Design Report included discharging treated groundwater to the Unnamed Swamp surface water body and not incorporating thermal enhancement into the SVE system design.

Based on additional engineering evaluations and Agencies' comments, the Draft 60 Percent Design Report (Envirogen, March 2, 1998) included a modification to use 2 ppm (instead of 1 ppm) total VOCs specified in the SOW as a basis for the source control SVE implementation areas and specifying that select SVE and/or dual phase extraction wells be constructed using stainless steel to facilitate future thermally enhanced SVE, if so required.

The Final 100 Percent Design Report (Envirogen, October 5, 1998) presented the final design, drawings, and technical specifications for constructing the Source Control remedy and MOM remedy. This included development of an Investigatory Boring Program and Construction Stage Testing Program to provide additional information to refine source area remedy implementation area and to establish source area target dewatering elevations. The Investigatory Boring Program was completed prior to construction and was used to refine the Final 100 Percent Design. In addition, EPA's Office of Research and Development (NRMP, Ada, Oklahoma), in collaboration with EPA Region 1, installed a number of monitoring wells and collected soil data to facilitate implementation of the remedy.

On January 13, 1999, EPA Region 1 issued an Administrative Order for Property Access to one of the affected property owners; other required access was obtained by the PRPs through the execution of access agreements. Following securing of the access, remedial construction in accordance with the Final 100 Percent Design Report and Revised Draft Remedial Action Work Plan (Envirogen, January 18, 1998) began January 18, 1999, and was completed January 17, 2000. Construction activities are documented in the Construction Completion Report (Envirogen, March 2000). Construction activities included the installation of 95 SVE wells, 37 dual phase extraction wells, and 4 MOM wells to collect soil vapors and groundwater. The bedrock SVE wells proposed in the Final 100 Percent Design Report were not installed based upon the results of the Construction Stage Testing program. A treatment system for soil vapor and groundwater was constructed within an enclosed treatment building.

The groundwater treatment system included:

- Pre-treatment system to remove metals and suspended solids;
- Ultraviolet oxidation (UV/OX) unit to remove VOCs;
- Carbon to remove residual peroxide from the UV/OX unit;
- Air stripping unit; and

- Sludge management system.

The SVE vapor treatment system included:

- Liquid/vapor separators;
- Catalytic oxidation (Catox) unit for VOC removal;
- Acid-gas scrubber for HCL removal; and
- Brine management system.

Initial mechanical shakedown of the treatment system was successfully completed in the winter of 1999 and mechanical performance testing was partially completed by April 2000. Complete system testing was delayed as the system was forced to operate in batch mode while the PRPs attempted to demonstrate compliance with Surface Water Discharge Criteria (SWDC) for treated groundwater. Specifically SWDC for aluminum, zinc, and four SVOCs were not met during initial batch scale testing. To address this issue the PRPs, the EPA, and the RIDEM agreed to extend the startup period to facilitate full-scale system testing. The SVE system would not run during this initial startup period.

The MOM remedy component and groundwater portion of the Source Control remedy commenced continuous operation in March 2001. From March 2001 through August 2001, the PRPs implemented a series of tests and plant modifications to achieve aluminum and zinc surface-water-discharge criteria. Continued weekly monitoring of groundwater treatment system process water has shown the system is meeting all required SWDC, including the four SVOCs that initially did not meet SWDC, with occasional inorganic exceedances. The occurrence of these exceedances was remedied with further system optimization and maintenance. Significant modification to the 100 Percent Design groundwater treatment system was not required.

The SVE portion of the Source Control remedy commenced continuous operation on November 13, 2001. Monthly process vapor samples collected from the SVE system demonstrated that applicable maximum allowable stack concentrations (MASCs) were being met by the system.

In the summer of 1998, the Army Corps of Engineers performed PCB soil removal in accordance with the 1993 ROD under an Interagency Agreement with the EPA and under a mixed-work agreement provision of the Consent Decree The objective was to define the extent of the PCB contamination in the surface soil in four known locations of the site, excavate all contaminated soil above the site-specific cleanup level of 1.3 parts per million (ppm) based on protection of environmental receptors, and dispose of the contaminated soil off-site. The excavation and stockpiling of approximately 1,350 cubic yards of soil was completed on September 1, 1998. Following stockpile sampling for characterization, the contaminated soil was transported and disposed of at an off-site facility in November and December 1998.

The PRPs began developing the Institutional Controls Plan (ICP) in 1996, with the final Draft Institutional Controls Plan submitted to the EPA on March 20, 2000, and approved by the EPA March 30, 2000. The ICP established the institutional control limits for controlling contact with soil, groundwater and surface water. The ICP requires that Environmental Land Use Restrictions

(ELURs) be placed on property owned by four private parties. Institutional controls implementation commenced prior to final ICP approval and included expanding the source area fence to include all portions of the source area remedy, installing fences around MOM wells located outside the source area fence, placing warning/informational signs on the source area fence and adjacent to portions of the surface water bodies covered by institutional controls, and initiating negotiations with all four property owners to place ELURs on their properties. As of this five year review, ELURs have been placed on all four properties.

4.4 Operable Unit 2 System Operations and Maintenance

4.4.1 Historic Remedy Operations and Maintenance

The MOM remedy and dewatering portion of the Source Control remedy commenced full-scale operation March 2001. The SVE portion of the Source Control remedy commenced full-scale operation November 2001 and ran in various configurations to optimize TVOC removal until the SVE system was shutdown on September 11, 2006. Progress and changes in the configuration and operation of the primary remedy components since the submittal of the previous 5 Year Report are summarized below.

Source Control Remedy

In general, from start-up of the SVE system in November 2001, the SVE system was configured to maximize mass removal from the subsurface across all trenches by maximizing air flow from the SVE wells that demonstrated the highest VOC concentrations. This successful operating approach was continued until January 22, 2004 when a series of operating modifications, including air injection and reduced extraction air flow configurations, were implemented to evaluate the optimization of system performance in consideration of groundwater mounding and energy usage. On December 14, 2004, the SVE system treatment train and wellfield were reconfigured to a focused extraction flow configuration with ambient air injection in the Northwest Trench. For this focused flow configuration, 38 SVE wells and 11 air injection wells were activated as primary wells while an additional set of 5 to 10 wells were run on an intermittent basis. The reconfigured operation allowed for the same air flow through the soil, but at a lower vacuum while focusing air flow in those areas that demonstrated the highest concentrations of VOCs in soil. This reconfiguration included taking the catalytic oxidation (CatOx)/acid gas scrubber air treatment unit offline and replacing it with a heat exchanger and a vapor phase granular activated carbon based offgas control system.

In August 2003, an exploratory boring program was initiated in the West Trench to allow an evaluation of SVE effectiveness in the West Trench in accordance with the provisions of the Compliance Monitoring Plan (CMP). The evaluation of soil data collected from the boring program allowed the refinement of the SVE Closure program conceptualized in the CMP. Additional evaluations were performed to assess the progress of the SVE remedy in the West, Northwest and Northeast Trenches in 2004, 2005 and 2006. Based on these results, and after approval by EPA and RIDEM, the operation of the SVE system was suspended on a sequential basis. In September 2004, the operation of the SVE wells in Area 2 and Area 3 of the West Trench was suspended and the operation of the remaining SVE wells in the West Trench was

suspended on October 31, 2005. The SVE system continued to run in the Northeast and Northwest trenches in the focused flow configuration, rotating sets of 5-10 intermittent wells into and out of extraction every two weeks, until SVE operation was suspended site-wide on September 11, 2006. Dewatering operations in the Northeast and Northwest Trenches were shutdown on October 16, 2006. Source Remedy evaluations and closure approach are presented in the Draft SER – Phase I (ESS, June 2006) and Draft SER – Phase II (ESS, March 2007). The shutdown of the SVE was approved by the EPA and RIDEM in a correspondence dated September 18, 2006.

Groundwater Treatment System and MOM Remedy

The groundwater treatment system was operated in the 100% Design Configuration until October 6, 2003. On October 6, 2003, as a result of the decrease in influent organic loading, the operation of the UV/OX and the peroxide destruction units (PDUs) were suspended. The PDU vessels were cleaned and re-filled with virgin grade liquid phase granular activated carbon (LGAC) and put online in series at the "end-of-pipe" as a final polish prior to discharge to the Unnamed Swamp.

On December 10, 2004, the groundwater treatment system was reconfigured to bypass the air stripper. On April 11, 2005, the LGAC units were replaced with two new 2,000 pound fiberglass units. On May 5, 2005, a second pair of bag filters was placed in parallel with the two existing units on the inlet of the lead LGAC. These bag filters were run in manual mode until June 22, 2005 when automatic controls were installed.

Select dewatering wells (currently seven wells) in the Northwest Trench remain in operation in accordance with the Draft System Evaluation Report Recommendations Implementation Work Plan (ESS, September 26, 2006; (Draft SER Work Plan)).

To improve the performance of the MOM remedy, two new MOM Wells (EW-305 and EW-306) were installed and developed in the Northwest Plume in November 2006 as proposed in the Draft SER Work Plan.

4.4.2 Current MOM Remedy Operation and Maintenance

Currently, site groundwater is removed from the subsurface through seven source area pumping wells and six MOM wells. Four MOM wells are piped directly to the influent holding tank for flow and chemical equalization. The remaining two MOM wells and the active source area pumping wells discharge to the satellite groundwater transfer stations (GWTS-3 and GWTS-4). These two transfer stations convey the Site groundwater to the influent holding tank and then into the groundwater treatment system. The treated effluent flows down the gravity sewer line to a surface water discharge outfall at the Unnamed Swamp.

Operations and maintenance activities are monitored and reported to the EPA in accordance with the current Operation and Maintenance Plan (ESS, August 7, 2007), the Compliance Monitoring Plan (ESS, June 13, 2003 as revised) and the SER Work Plan. The frequency of monitoring has been reduced since the SVE and dewatering systems have been shut down and is limited to physical (water levels) and chemical (via both field instruments and laboratory) analysis of

groundwater, surface water, process water, sediments, and sludge.

Remedy performance is summarized in Quarterly Performance Monitoring Reports prepared by the PRPs. Interpretation of system monitoring data and important events at the Site are detailed in Semi-Annual Remedy progress monitoring (SAR) Reports. Groundwater monitoring events are performed semi-annually to monitor trends in groundwater contaminants and are detailed in Semi-Annual Monitoring Event Reports. Also included in these reports are the results of the annual residential well monitoring program. Select surface water and sediment samples at the Site are collected as required and the results are also summarized in Semi-Annual Monitoring Event Reports. Status and effectiveness of institutional controls at the Site are reviewed on an annual basis and are summarized in Institutional Control Plan (ICP) status reports.

Treatment system performance is reported in Quarterly and Semi-Annual Reports. Based on review of these reports, the current groundwater treatment system train is sufficient in removing site contaminants as the system continues to meet the applicable Rhode Island SWDC for VOCs, SVOCs, inorganics, pesticides, and PCBs.

System and Site maintenance is continuously performed in accordance with the O&M Plan. System maintenance includes pump and pipe servicing to maintain flows, tank and piping inspections to identify possible leaks, and treatment system maintenance to ensure performance. Site maintenance includes grass cutting, snow plowing, road grading, erosion and sedimentation control device inspections and maintenance, and fence maintenance. In addition the integrity of all system and monitoring well points are inspected on an annual basis.

The following table summarizes the PRPs' actual O&M costs, which exceed ROD estimates. The presented costs do not include any closure related costs. According to the PRPs, the underestimated costs in the ROD can be attributed to increased efforts required to achieve inorganic SWDC, number of components in initial groundwater treatment train prior to treatment system changes, increased monitoring effort (treatment system and groundwater), the number of open work plans not finalized prior to initiating O&M, level of reporting, and inflation (ROD estimated costs are from 1993 and have not been adjusted to represent present value). In particular, the increase in utility costs has had a significant bearing on the system operational costs. Despite a significant reduction in electricity consumption as a result of SVE system shutdown and groundwater treatment system optimization, electricity costs have not significantly decreased and remain greater than those in the original remedy estimates. Similarly, propane costs for heating the building have also risen significantly.

Table 2
PRPs' O&M Costs

Dates		Actual Total Costs	Notes
From	**To**		
March 2001	February 2002	$3,730,000	MOM and dewatering commenced 3/01 SVE operation commenced 11/01
March 2002	February 2003	$3,210,000	
March 2003	February 2004	$2,390,000	
March 2004	February 2005	$2,100,000	
March 2005	February 2006	$1,410,000	
March 2006	February 2007	$1,230,000	Site-wide SVE shutdown 9/06 Dewatering suspended 10/06
March 2007	February 2008	$1,010,000	
March 2008	April 2008	$ 190,000	

4.5 CERCLA Response Actions

In 1999, during the SVE system piping installation, an area of hazardous material consisting of elongated lumps of white to slightly gray, solid, firm textured material (the "epoxy waste" material), and grossly contaminated soil was uncovered in what is now the West Leg of the Northwest Trench. In order to install the piping, approximately 250 cubic yards of this material was excavated and disposed of at a hazardous waste incinerator. The remaining waste material was left in place and temporarily capped with asphalt.

On September 25, 2002, EPA Region 1 signed an Action Memorandum for removal of the epoxy waste. The Action Memorandum required the delineation, excavation, sampling, and off-site disposal of the epoxy material and grossly contaminated soil. Following the Respondents' submittal of a formal application for preauthorization for mixed funding, EPA Region 1 signed an Administrative Order on Consent between EPA and the Respondents on December 5, 2002. An Interim Work Plan (ESS) was submitted to the EPA on December 24, 2002. Following initial field testing, the Finalized Work Plan (ESS) was submitted to the EPA March 12, 2003.

The first fieldwork completed was the temporary disconnection of the SVE system in the work area. Excavation work was performed from May through June, 2003. Approximately 2,300 tons of waste was excavated and loaded into 116 lined intermodal shipping containers for off-site disposal. After the epoxy waste material was removed, the excavation was backfilled and the SVE system restored. A Construction Completion Report (ESS) was submitted to the EPA on August 1, 2003 summarizing the Picillo Waste Removal Actions. As of November 6, 2003, the date of the Final Inspection conducted by the RIDEM and the EPA, the SVE system and appurtenances had been put back on-line and the excavation area had been sufficiently restored as described in the Picillo Waste Removal Completion of Work Report submitted to the EPA on November 17, 2003.

5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

Previous five-year reviews for the Site, completed in May 1993, May 1998, and July 2003, recommended a number of actions that were followed-up during the current review period. These recommendations along with

the follow up activities and status are summarized below.

- *Implementation of the remedy selected in 1993 ROD under the Consent Decree with the PRPs and an IAG with the COE should be continued: additional extensive delays in the design and implementation of the remedy should be avoided;*

All components of the remedy have been designed and implemented as stated in Section 4.2. As stated in Section 4.3, remediation system construction was completed on January 17, 2000. Implementation of the institutional controls portion of the remedy has been completed and ELURs have been placed on all four properties. The surficial PCB impacted soils were excavated and removed from the Site in 1998 and the epoxy waste was removed and disposed of offsite in 2003. The SVE component of the remedy was suspended on September 11, 2006. Currently, site groundwater is removed from the subsurface through seven source area pumping wells and six MOM wells and pumped to the groundwater treatment system prior to discharge to the Unnamed Swamp.

- *Collaboration with EPA's Office of Research and Development (NRMRL, Ada, OK) has been crucial in negotiating the Consent Decree and design documents at this site. Continued technical assistance will be extremely helpful in assuring that the PRP's construction and implementation of the remedy is technically sound.*

NRMRL technical assistance was provided throughout the design process, through Source Control and MOM construction, and during CMP and other plans and submittals prepared by the PRP Group. NRMRL also conducted extensive field studies and data analysis at the Site to aid in design of the remedy. In addition NRMRL provided extensive review of SVE remedy operating data and assisted with the development and implementation of the SVE remedy closure program. NRMRL provided technical support during Source Remedy review and shutdown activities performed during this Five Year review period.

- *Monitoring specified in the Consent Decree should continue.*

The required monitoring of all media has been performed in accordance with the Operation and Maintenance Plan (Envirogen/ESS) and the revised O&M Plan (ESS August 7, 2007), Compliance Monitoring Plan (ESS, June 13, 2003 as revised), and other workplans prepared and submitted in accordance with the Consent Decree and its associated Statement of Work.

- *Institutional Control Plan should be finalized and access restrictions and institutional controls should be implemented as currently planned.*

The Institutional Control Plan (Environmental Project Control, March 2000) was approved by the EPA in March 2000. Institutional controls including access restrictions have been placed on all the affected properties which are owned by four parties. An inspection of properties on which Institutional Controls apply is performed on an annual basis and the status of Institutional Controls is documented in the annual Institutional Controls status report.

- *Periodic site inspections should continue*

The EPA and the RIDEM continued to make regular Site inspections during system start-up and the initial

phases of system operation. Current site inspections are less frequent since the level of activity at the Site is reduced. The 5-Year Review Site visit was performed on April 16, 2008.

- *Evaluate ability to consistently meet dewatering levels, including installation of additional well(s).*

Extensive evaluations of the dewatering effectiveness were performed over the operating duration of the SVE and dewatering system. The dewatering design criteria (target dewatering elevation (TDE)) were consistently achieved in the West Trench and across most of the Northeast Trench. The TDEs were also consistently achieved in the portion of the Northwest Trench where it was technically feasible to do so. New dewatering wells were installed in both the Northeast and Northwest Trenches to improve dewatering effectiveness. As of October 2006, following the shutdown of the SVE dewatering system, TDE evaluations have been discontinued.

- *Review air emissions data to confirm requirements are being met, if not met then implement corrective action.*

Air emission data were reviewed over the duration of the SVE remedy operation. The review indicated that air emission standards were consistently met from start-up through shutdown of the SVE system. Air emissions testing has not been conducted since January 19, 2006, since the operation of the SVE was suspended on September 11, 2006.

- *Continue to implement passive and active air injection in most problematic area, evaluate SVE performance.*

SVE system performance was routinely evaluated over the operating duration of the SVE system. As detailed in Section 4.4, air injection was evaluated and implemented starting in January 2004. Beginning in December 2004, the SVE system was operated in a focused extraction and injection air flow configuration, rotating sets of 5 to10 intermittent wells into and out of extraction every two weeks, until SVE operation was suspended site-wide on September 11, 2006. The performance of the SVE system was evaluated comprehensively as documented in the September 2006 Draft System Evaluation Report and Semi-Annual Remedy Progress Monitoring reports.

In both the West and Northeast Trenches, the SVE system achieved its remedial objective of removing VOCs from soils such that the remaining VOCs within the unsaturated and dewatered zones do not have the potential to degrade groundwater quality beyond a marginal degree. Dramatic decreases in groundwater VOC concentrations have been observed over most of the Site since active remediation commenced. The operation of the SVE system was suspended as proposed in the Draft System Evaluation Report- Phase I, as its continued operation is unlikely to achieve the CMP closure criteria in the Northwest Trench.

- *Evaluate flow conditions using flow nets, modify operations if necessary.*

Extensive evaluations of flow conditions were performed for both the combined SVE and MOM operation and MOM only operation. These evaluations were documented in the Semi-Annual Remedy Progress Reports. In order to further evaluate the lateral and vertical components of hydraulic containment within the concentrated plumes, flow nets were developed using cross sections both parallel and perpendicular to groundwater flow within the Northwest and Southwest plumes to assess the vertical component of flow and the extent of the

vertical hydraulic containment by the groundwater extraction system. The flow nets, along with other hydraulic containment evaluation techniques, were used as a basis for the modification of system operating configurations and to identify locations where additional pumping wells may be beneficial. Two new MOM wells (EW-305 and EW-306) were installed to improve flow characteristics downgradient of the Northeast Trench following shut down of the SVE dewatering system. The converging lines of evidence evaluation of hydraulic data, including flow nets, subsequent to the installation and operation of these new MOM wells, indicates that the operation of the groundwater extraction system (MOM wells and Northwest Trench pumping wells only) is having a significant hydraulic effect and that this effect extends into the intermediate bedrock zone, at a minimum, and that the groundwater extraction system is generally containing the Concentrated Plume areas, both laterally and vertically.

- *Collect additional data to assess the increasing concentration trends observed at a portion of the Northwest Plume. Evaluate impact of the operation of nearby pumping wells on the hydraulics in the vicinity of these wells and effect on the concentration trends in this area, modify operations if necessary.*

An investigation and monitoring program was implemented to assess the increasing concentration trends observed at a portion of the Northwest Plume, particularly in the vicinity of monitoring well MW-28. This program included borehole geophysics, the installation and sampling of additional groundwater monitoring wells, hydraulic conductivity testing, MOM pumping well shutdown tests and follow-on groundwater monitoring. The preliminary results of this program were reported in the Draft MW-28 Area Investigation Report (ESS, October 2006) and subsequent monitoring results were provided in draft SARs #11 (ESS, March 2007) and #12 (ESS September 2007) and the draft 2006 and 2007 Monitoring Event reports. The data evaluations included in these reports resulted in the following conclusions: the Concentrated Plume is being contained in this area, the existing monitoring well network is sufficient to define and monitor the Concentrated Plume (total VOCs greater than 1 mg/L) in this area; and, groundwater concentration trends appear to be declining as evidenced by the results of the quarterly groundwater monitoring performed in 2006 and 2007 and summarized in the Draft Fall 2007 Monitoring Event Report (ESS, February 2008).

6.0 FIVE-YEAR REVIEW PROCESS

This section describes activities performed during the five-year review process and provides a summary of findings when appropriate.

6.1 Administrative Components

The Picillo Farm Superfund Site Five Year Review was conducted by EPA Region 1 with analysis provided by ESS Group, Inc, the contractor for the PRPs. On November 6, 2007 EPA held a conference call with ESS to discuss the Picillo Farm Superfund Site Five Year Review. Notification of the initiation of drafting the Fourth Five-Year Review Report is documented in the ESS e-mail to EPA dated November 12, 2007.

6.2 Community Involvement

Recently the community interest in the Site has been low. No inquiries were received by EPA in response

to the Five Year Review public notice placed in the Kent County Daily Times on March 6, 2008.

A public meeting to update the public on the progress at the Site was held on October 26, 2006 at the Greene Public Library in Greene, Rhode Island. The meeting was coordinated through the Roaring Brook Watershed Association which received EPA's Technical Assistance Grant (TAG) in the past. The objective of the meeting was to provide the public with an update on Site activities. Most of the public interest at the meeting was related to the town's plans for their parcel of land, a portion of which is occupied by the Site. A Site walk and tour was also held with the public on November 17, 2006.

The Town of Coventry recently entered into a letter of intent with a private company to develop a solar power farm on the town's parcel. This development is contingent on the passage of pending state legislation. Representatives of the PRP Group have recently reviewed the town's obligations under the ELUR related to any redevelopment activities with representatives of the Town of Coventry. The town representatives understand their obligations and that this development, if it occurs, can not impact the ability to implement the remedy at the Site.

Approximately 40 residences in the vicinity of the Site participate in the annual residential well testing program. EPA distributes results of these tests to individual home owners on a yearly basis. The results of the residential sampling are also presented in the most recent Spring 2007 Groundwater Monitoring Report (ESS, August 27, 2007). EPA and the State provide information letters to prospective home buyers in the vicinity of the Site and to residents seeking refinancing upon request.

Copies of the Five Year Review are being placed in the information repositories, including the Coventry Public Library. Copies of established and recorded land usage restrictions are available at the Coventry Land Records.

6.3 Site Inspection and Interviews

The Site inspection was led by Anna Krasko, the EPA Remedial Project Manager (RPM) for the Site on April 16, 2008. Shelley Ducharme, RIDEM Project Manager for the Site assisted in the review as the representative for the support agency. Several other EPA and RIDEM personnel participated in the inspection. A representative of the Town of Coventry also participated. The inspection included observations and review of the treatment systems, observation of the integrity and wear of the protective caps over the source area Northeast, Northwest, and West trenches, monitoring well labels and locks, groundwater treatment system outfall, daily operations of the remedial systems, and security and condition of the source area fence line. No problems were observed.

Operation and maintenance of the Site is being reviewed in regular conference calls between EPA, RIDEM and the PRPs' consultants. In addition, the PRP Group's Project Coordinator and Project Engineer were interviewed during the April 16, 2008 Five Year Review inspection to provide an understanding of the system's performance and operational issues that might require documentation in this five year review report.

6.4 Document Review

Major reports consulted as part of this review are listed in the Reference Section. Quarterly and semi-

annual reports to assist in evaluating system performance and a review of the institutional controls are performed by the PRPs on an annual basis. Report formats are optimized when necessary to ensure appropriate and relevant information is both documented and reported. No significant issues relating to document and data reporting were discovered during this five-year review.

6.5 Data Review

Data is regularly collected in accordance with the Compliance Monitoring Plan, O&M Plan, and other work plans generated in accordance with the Statement of Work. Data is reported in Quarterly and Semi-Annual reports. As of January 2004, monthly reporting was terminated and information previously submitted in Monthly Status Reports is now included in the Quarterly Performance Monitoring reports. System performance and compliance is summarized in Semi-Annual Remedy Progress Monitoring reports. The results of Site-wide monitoring activities are presented in Semi-Annual Monitoring Event reports.

Hydraulic Containment Assessment

The system performance was evaluated to determine whether the groundwater extraction program achieves hydraulic control of the 1 ppm TVOC plume, thereby isolating the source area and concentrated groundwater plume from the dilute groundwater plume. Results of this evaluation are summarized below.

1. Observations from the groundwater contour maps, flownets and groundwater modeling of conditions during the SVE dewatering and MOM operation between 2003 and October 2006 indicated that the extraction system generally maintained hydraulic containment of the 1 ppm TVOC plume laterally in the Northwest Plume. TVOC concentrations within all the downgradient monitoring wells continued to decline over the operating period of the SVE system.
2. Converging lines of evidence indicate that under the current MOM-only operating conditions the groundwater extraction system has maintained hydraulic containment of the current and historic 1 mg/L TVOC plume laterally and vertically in the Northwest and Southwest plumes. This conclusion is supported by the general decline in TVOC concentrations within all of the monitoring wells at the downgradient well groups (MW-92, MW-93 and MW-102) based on recent monitoring data and maintenance of these concentrations following the suspension of the SVE.
3. Hydraulic and groundwater quality data collected since the implementation of the MW-28 Area investigation continues to support the conclusion that hydraulic containment of the MW-28 Area is being maintained. The MW-28 Area is located in the northeastern portion of the Northwest Plume.
4. Recent data from the Southwest Plume continue to suggest that ongoing natural attenuation processes and operation of MOM well EW-304 are effectively reducing groundwater concentration in this area of the Site. This is a continuation of the groundwater and surface water quality improvements observed before the active remedy was implemented.
5. Based on the results of the evaluations completed during this review period, it is concluded that the current MOM and Northwest Trench pumping well system is providing hydraulic containment in accordance with the requirements of the CMP. As a result, no further enhancements to the MOM extraction system are warranted.

VOC Reduction in the Dilute Plume Area

In general, the monitored natural attenuation rates within Dilute Plume monitoring wells have remained relatively consistent since 2002. Data from the most recent sampling event, the Fall 2007 event, identified limited exceedances of the Interim Groundwater Cleanup Levels (IGCL) at the Dilute Plume monitoring locations. Annual monitoring of Dilute Plume monitoring wells in accordance with the CMP continues.

Groundwater Treatment System Discharges

The standards for determining groundwater treatment compliance are the Surface Water Discharge Criteria (SWDC) established in accordance with applicable RIDEM regulations. The groundwater treatment system has been effective at meeting the applicable SWDC for all organic constituents, including VOCs, SVOCs, pesticides and PCBs. The groundwater treatment system has been effective at meeting the applicable SWDC for all inorganic constituents as well. Groundwater treatment discharge compliance samples will continue to be collected on a quarterly basis and will be validated once per calendar year. The results will continue to be reported in Quarterly reports. Until December 10, 2004, the groundwater treatment system included an air stripper with vapors managed with the SVE vapor treatment system discussed below.

SVE Vapor Treatment System Performance

Combined treatment system vapor emission (SVE system and groundwater system off gas controls) compliance limits are established by the State of Rhode Island Department of Environmental Management (RIDEM) Air Pollution Regulation (APCR) 22. The 1993 Record of Decision for the Site identified APCR 22 as an Action Specific ARAR. Stack sampling was conducted annually to assess compliance with the ARARs. The results of the stack testing were reported in the appropriate SARs or ARAR Compliance Monitoring report and indicated that the vapor emissions met ARARs during each event.

Air emissions of all target compounds were below their respective MASCs and the RIDEM allowable ambient levels (AALs) during each sampling event performed between February 2003 and January 2006. Vapor emissions testing is no longer performed since the SVE system was suspended on September 11, 2006.

Surface Water and Sediment Monitoring

Surface water monitoring is performed on an annual basis. More extensive sampling is performed every five years and includes sediment sampling and testing. Results from the latest sampling events for surface water (2007) and sediment (2003) are described below:

1. During recent monitoring events (2003-2007), all detected VOC and SVOC concentrations were below the applicable surface water cleanup levels, including samples collected from two upland seep locations.
2. The most recent sediment sampling within the Unnamed Swamp detected VOCs and SVOCs similar to the compounds detected in nearby groundwater monitoring wells. The detected concentrations were either less than or within the range of historic results for these locations.

7.0 TECHNICAL ASSESMENT OF REMEDY

7.1 Question A

Is the remedy functioning as intended by the decision documents?

OU1 - Yes

OU2 – Yes. Remedy performance evaluations indicate that the remedy has functioned and continues to function as designed. The system was confirmed to be operational and functional as documented in the EPA-approved Interim Remedial Action Completion Report (ESS, August 30, 2005).

- **Source Control**: The SVE performed well in its nearly five years of operation and is estimated to have removed over 40,000 pounds of volatile organic compounds (VOCs) and semi-volatile organic compounds. Dramatic decreases in groundwater VOC concentrations have been observed over most of the Site as a result of the SVE operations. In both the West and Northeast Trenches, the SVE has generally achieved its remedial objective of removing VOCs from soils to prevent further degradation of groundwater quality.

  The SER Phase I concluded that despite enhancements to both the dewatering and soil vapor extraction portions of the system, it is technically impracticable to achieve the CMP closure criteria in the Northwest Trench. This is due primarily to the presence of VOCs in saturated zone overburden heterogeneous soils in the Northwest Trench in an area that is technically infeasible to dewater. It was therefore recommended that operation of the SVE be suspended. The Source Control SVE operation was suspended in September 2006. It is premature at this time to determine whether additional Source Remedy needs to be implemented at the Site.

The remedy includes multiple components in addition to the SVE. The status of the other components of the remedy is summarized below.

- **Management of Migration**: The objective of the MOM remedy is to provide hydraulic containment of the area of groundwater defined as the Concentrated Plume (total volatile organic compounds (TVOC) >/= 1 milligram per liter [mg/L]). Operation of the MOM remedy, which consists of a groundwater pump and treat system, was commenced in March 2001 and is ongoing. Based on recent technical evaluation of remedy performance under MOM-only operating conditions, it has been concluded that the groundwater extraction system has maintained hydraulic containment of the current and historic 1 mg/L TVOC plume laterally and vertically in the Northwest and Southwest plumes. These activities are ongoing in accordance with the CMP.

- **Natural Attenuation**: The Dilute Plume remedy consists of natural attenuation of the impacted groundwater beyond the Concentrated Plume areas. Monitoring wells in the Dilute Plume region are monitored on an annual basis as part of the ongoing Semi-Annual monitoring program and the resultant data is used to assess VOC trends. Based on monitoring data, natural attenuation is occurring in the Dilute Plume region. These evaluations are being performed in accordance with the CMP and are ongoing.

- **Institutional Controls**: Institutional controls were identified as being required for soil, groundwater and surface water. As of February 2005, all required institutional controls (environmental land usage

restrictions in Rhode Island) are in place. An annual institutional controls status report is prepared to ensure the ongoing effectiveness of the Institutional Controls and to research land use changes within the restricted areas in accordance with the requirements of the USEPA-approved Institutional Controls Plan (ICP; Environmental Project Control [EPC], 2000). These activities are ongoing.

- **Long-term Monitoring**: Long-term monitoring of groundwater and surface water is required to document the performance of the multi-component remedy in accordance with the CMP. The Semi-Annual Monitoring Program also includes the periodic sampling of residential wells and sediment.

Figures 2 and 3 – Present a general Site plan and delineations over time of the Concentrated Plume Areas (> 1 mg/L TVOC) in 1996, 2002 and 2007 for the overburden and shallow bedrock. Current conditions are similar to those depicted for 2005. Previous delineations of the Southwest Concentrated Plume are not included as there is no Concentrated Plume currently in this portion of the Site.

Figure 4 - Presents the SVE system influent TVOCs and SVE system cumulative mass removed via volatilization versus time during the operation of the SVE system through September 2006. As shown, the vast majority of VOC mass removal via volatilization occurred within the first two months of project operation. VOC mass removal rates decreased significantly, first in mid-February 2002 and then further after mid-December 2002.

Figure 5 – Presents Total VOC and SVOC Groundwater Influent Concentrations and shows how influent concentration levels have decreased over time through January 2008.

System O&M and Costs

Preventative maintenance procedures are routinely performed to maintain the effectiveness of response actions and to reduce the amount of unexpected system downtime, which has been minimal.

System monitoring is continuously performed and the data used to adjust system-operating parameters. Environmental data are collected in accordance with the Compliance Monitoring Plan and the O&M Plan to evaluate remedy effectiveness. Both are adequate.

O&M costs have been and continue to be higher than those originally estimated in the ROD. Despite the shutdown of the SVE system and the optimization of system treatment equipment, O&M costs continue to be higher than originally estimated due to increased efforts required to achieve inorganic SWDC, initial high number of components in groundwater treatment train, level of reporting, and inflation (ROD estimated costs are from 1993 and have not been adjusted to represent present value). In particular, the increase in utility costs has had a significant bearing on cost. For example, despite a significant reduction in electricity consumption as a result of SVE system shutdown and groundwater treatment system optimization, electricity costs remain high relative to original remedy estimates and the system operating costs over the first 5 years of operation. Propane costs for heating the building have also risen significantly relative to original remedy estimates and the system operating costs over the first 5 years of operation.

Opportunities for treatment system optimization identified in the 2003 five-year review, such as reducing monitoring frequency and the number of parameters to be monitored for the groundwater treatment effluent, discontinuing groundwater UV/OX and air stripper operation, and replacing CAT/OX system with

vapor phase carbon units, have already been implemented as described in section 4.4.

Opportunities for Optimization

The following additional opportunities for remedy optimization have been identified:

- Determine whether the groundwater metals pre-treatment system can be eliminated or simplified to reduce operating costs.
- Reduce the amount of energy consumption/evaluate new sources of energy required to operate inter-process pumps and equipment as feasible.
- Rearrange process equipment to reduce the amount of building space needed to reduce heating and electrical costs.
- Change the groundwater treatment system's effluent discharge location from a surface water location to a ground surface location via a rapid infiltration basin.

7.2 Question B

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

OU1 - Yes.

OU2 – Yes. There have been no significant changes in the Site setting and surrounding land use which would affect exposure assumptions and Remedial Action Objectives (RAOs) developed in the 1993 ROD.

The overall remedy is performing as expected in the 1993 ROD in terms of controlling the principal threats to human health and the environment. The aquifer under the Site is a potential source of drinking water, therefore, MCLs and non-zero MCLGs are ARARs in the 1993 ROD. Soil cleanup levels were established to protect the aquifer from the potential leaching of contaminants to groundwater. Ambient Water Quality Criteria (AWQCs) are also ARARs for surface water bodies near the Site. The ROD anticipated three years of source control (dewatering and SVE) operation, and 20 years to meet the groundwater cleanup levels. The ROD acknowledged that the ability to meet this timeframe would be dependent on a number of factors associated with subsurface conditions and the remedy performance.

The SVE system and source dewatering operated for almost 5 years, while hydraulic containment and monitored natural attenuation is ongoing. Groundwater modeling performed during the evaluation of the Source Remedy performance indicates that even if all accessible VOCs in exceedance of Site cleanup levels are removed from the soils in the source areas, exceedances of the groundwater cleanup levels would remain. This information suggests that the ability to meet all required cleanup goals in 20 years, as identified in the ROD, should be evaluated.

Surface Water Discharge Criteria

Surface water discharge criteria (SWDC) for the treatment system are generally based on ambient water quality criteria established in the RIDEM Water Quality Regulations (August 26, 1997). However, Site specific SWDC were established for the six compounds listed in the following table. These Site specific

SWDC were established to reflect laboratory Method Detection Limits (MDLs) and were approved in a June 18, 1999, RIDEM letter. The RIDEM agreed that the MDLs were sufficiently close to the established SWDC for each of the compounds listed below. The Table shows the SWDC for Class A water bodies presented in the Water Quality Regulations, the current site-specific SWDC and the associated ROD surface water cleanup levels.

Table 3
Site Specific Surface Water Discharge Criteria

Compound	RIDEM Water Quality Regulations SWDC (ug/L)	Site Specific SWDC (ug/l)	ROD Surface Water Cleanup Level (ug/l)
1,1,2,2-Tetrachloroethane	1.7	2.0	None
Bis(2-Chloroethyl)ether	0.31	1.0	None
Pentachlorophenol*	0.13	2.0	None
Methoxychlor	None	0.12	0.1
Thallium	1.7	1.2	None
Vanadium	None	2	None

* Using default hardness of 25 mg/l as $CaCO_3$ and values from Table 2 Appendix B, RIDEM Ambient Water Quality Criteria and Guidelines for Toxic Pollutants (August 6, 1997)

The basis for the manganese SWDC has changed since its 1995 revision as documented in the 2003 five-year review. The 1993 ROD set the human health risk based cleanup level for manganese at 180 ug/l. The manganese reference dose (RfD) in the IRIS database was revised in November 1995. This revision resulted in a lower risk (and thus, higher allowable levels) compared to the previous RfD. Based on the 1995 revision a hazard index (HI) of 1 under drinking water exposures corresponded to a concentration of 840 ug/l and was used to establish the allowable SWDC for the treatment system discharge. However, the EPA issued a Drinking Water Health Advisory for Manganese in 2004. This advisory recommended a lifetime health advisory value for manganese of 300 ug/L. The EPA has yet to set a Maximum Contaminant Level (MCL) for manganese. The January 2004 health advisory recommends reducing manganese concentrations to less than 50 ug/L to enhance consumer acceptance of water resources and avoid staining of clothing and fixtures.

The 2003 five-year review also documented the post-ROD revised national AWQC for aluminum to be 750/87 ug/l (acute/chronic) which was adopted by Rhode Island (August 6, 1997, RIDEM Water Quality Regulations (Appendix B, Table 1)).

It is premature at this time to decide whether these levels need to be adopted as cleanup levels for surface water and groundwater. It is recommended that adoption of appropriate protectiveness levels be evaluated in decision documents to be developed when effectiveness of the remedy to achieve the overall remedial objectives is evaluated.

7.3 Question C

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

OU1 and OU2 - No other information has been discovered that would adversely affect the protectiveness

of the remedy.

7.4 Technical Assessment Summary

According to the data reviewed, the Site inspection, and the interviews, the SVE system functioned essentially as designed during its operation and the MOM is currently meeting its design performance objective of containing the concentrated portion of the plumes. There have been no changes in the physical conditions of the Site except for the removal of the epoxy waste which is expected to improve the protectiveness of the remedy.

8.0 ISSUES

OU1 - None

OU2 - Based upon the above the following issues were identified that might impact the ability of the remedy to be protective in the long-term or serve as early indicators of potential remedy problems.

Table 4
Issues Identified

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Potential for optimization of the system O&M operations	No	No
Assess probable groundwater plume longevity	No	No*
Confirm that concentrations of contaminants of concern observed in the northwest portion of the Concentrated Plume are stable or declining.	No	No*

* It is premature to determine if these issues will affect future protectiveness of the remedy.

9.0 RECOMENDATIONS FOR FOLLOW-UP ACTIONS

For each issue identified, the following table documents recommend follow-up actions.

Table 5
Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-Up Actions: Affects Protectiveness (Y/N) Current	Future
Potential for optimization of the system O&M operations	Evaluate additional treatment system O&M optimization, including alternate discharge option, and remedy implementation optimization	PRP Group	EPA/RIDEM	3/15/09	No	No
Assess probable groundwater plume longevity	Perform groundwater fate and transport modeling to assess plume longevity under varying assumptions	PRP Group	EPA/RIDEM	11/15/11	No	No*
Confirm that concentrations of contaminants of concern observed in the northwest portion of the Concentrated Plume are stable or declining	Continue to collect data during semi-annual monitoring events to assess the concentration trends observed in the MW-28 Area; evaluate the data and modify operation of the system if necessary.	PRP Group	EPA/RIDEM	11/15/11	No	No*

* It is premature to determine if these issues will affect future protectiveness of the remedy.

10.0 PROTECTIVENESS STATEMENT

OU1 involved the excavation and off-Site disposal of stockpiled soil that was completed in 1989. Residual PCB impacted surficial soil associated with these stockpiles was removed by EPA as part of OU2 in 1998. Based upon these actions, the remedy for OU1 is expected to be protective upon completion or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

OU2 protects human health in the short-term through implementation of various response actions, the placement of Institutional Controls, and the physical control of Site access. The 1993 ROD determined that the response actions that are in the process of being implemented would be protective in the long term to human health and the environment. The remedy at OU2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. However, in order for the remedy to be protective in the long-term, the clean-up levels in the 1993 ROD have to be met to ensure long-term protectiveness.

Overall, because the remedial actions at all OUs are protective, the site is protective of human health and the environment.

11.0 NEXT REVIEW

The next five-year review for the Picillo Farm Superfund Site is required by July 2013, five years from the date of this review.

12.0 REFERENCES

Comprehensive Five-year Review Guidance, U.S. EPA, OERR, June 2001.

Construction Completion Report, Envirogen, March 29, 2000.

Construction Completion Report for the Removal Action, ESS Group, Inc., August 1, 2003.

Draft 30 Percent Design Report, HSI GeoTrans, September 16, 1997.

Draft 60% Design Report, Envirogen/Woodward-Clyde, March 2, 1998.

Draft Compliance Monitoring Plan, Environmental Science Services, Inc, June 13, 2003 as revised through December 2004.

Draft Operation and Maintenance Plan, ESS Group, August 7, 2007.

Draft Institutional Controls Plan, Environmental Project Control, March 20, 2001.

Draft Final Work Plan, Picillo Waste Removal Action, Environmental Science Services, March 12, 2003.

Draft Spring 2003 Monitoring Event Report, ESS, September 19, 2003.

Draft Fall 2003 Monitoring Event Report, ESS, April 6, 2004.

Draft Spring 2004 Monitoring Event Report, ESS, September 2, 2004.

Draft Fall 2004 Monitoring Event Report, ESS, February 10, 2005.

Draft Spring 2005 Monitoring Event Report, ESS, October 20, 2005.

Draft Fall 2005 Monitoring Event Report, ESS, April 6, 2006.

Draft Spring 2006 Monitoring Event Report, ESS, September 29, 2006.

Draft Fall 2006 Monitoring Event Report, ESS, February 16, 2007.

Draft Spring 2007 Monitoring Event Report, ESS, August 27, 2007.

Draft Fall 2007 Monitoring Event Report, ESS, February 19, 2007.

Draft Eighth Semi-Annual Remedy Progress Monitoring Report, ESS Group, January 11, 2006.

Draft Ninth Semi-Annual Remedy Progress Monitoring Report, ESS Group, May 12, 2006.

Draft Tenth Semi-Annual Remedy Progress Monitoring Report, ESS Group, October 18, 2006.

Draft Eleventh Semi-Annual Remedy Progress Monitoring Report, ESS Group, May 28, 2007.

Draft Twelfth Semi-Annual Remedy Progress Monitoring Report, ESS Group, September 21, 2007.

Draft Thirteenth Semi-Annual Remedy Progress Monitoring Report, ESS Group, April 28, 2008.

Draft System Evaluation Report - Phase I, ESS Group, June 30, 2006.

Draft System Evaluation Report - Phase II, ESS Group, March 16, 2007.

Draft System Evaluation Report Recommendations Implementation Work Plan, ESS Group, September 26, 2006.

Drinking Water Health Advisory for Manganese, U.S. EPA, January 2004.

Five Year Review, Source Control Remedy, U.S. EPA, May 1993.

Five Year Review, Picillo Farm Superfund Site, U.S. EPA, May 1998.

Five Year Review, Picillo Farm Superfund Site, U.S. EPA, July 2003.

Final 100% Design Report, Envirogen/Woodward-Clyde, October 5, 1998.

Institutional Controls Seventh Semi-Annual Report, ESS Group, September 30, 2003.

Institutional Controls Eighth Semi-Annual Report, ESS Group. March 30, 2004.

Institutional Controls Ninth Semi-Annual Report, ESS Group, September 30, 2004.

Institutional Controls Tenth Semi-Annual Report, ESS Group, March 28, 2005.

Institutional Controls Eleventh Report, ESS Group, March 31, 2006.

Institutional Controls Twelfth Report, ESS Group, March 30, 2007.

Institutional Controls Thirteenth Report, ESS Group, March 26, 2008.

Interim Remedial Action Completion Report, ESS, August 30, 2005.

Operation and Maintenance Plan, Envirogen, May 12, 2000 as revised by Environmental Science Services, Inc. through December 2004.

Picillo Waste Removal Completion of Work Report, ESS Group., Inc. November 17, 2003.

United States Environmental Protection Agency Administrative Order on Consent. US EPA Region 1 CERCLA Docket No. 01-2003-0007.

United States Environmental Protection Agency Decision Document, Preauthorization of a CERCLA Section 111(a) Claim. Signed by Region 1, Regional Administrator, November 13, 2002.

United States Environmental Protection Agency Preliminary Close Out Report. Signed by Region 1, Regional Administrator, September 3, 2003.

United States Environmental Protection Agency RD/RA Consent Decree. Signed by Region 1, Regional Administrator October 25, 1995 and entered by the Court on October 9, 1997.

ATTACHMENT A
Site Inspection Checklist

I. SITE INFORMATION	
Site name: Picillo Farm Superfund Site	**Date of inspection:** April 16, 2008
Location and Region: Coventry, RI – Region I	**EPA ID:** RID980579056
Agency, office, or company leading the five-year review: EPA Region I	**Weather/temperature:** Clear, mid 70's

Remedy Includes: (Check all that apply) ***BOLD = CHECK THROUGHOUT THIS CHECKLIST***

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ **Institutional controls**
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ **Monitored natural attenuation**
- ☐ **Groundwater containment**
- ☐ Vertical barrier walls
- ☐ **Other** Soil vapor extraction – operation suspended

Attachments: ☐ **Inspection team roster attached** ☐ **Site map attached**

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jeff Hershberger (Name) Project Manager (Title) 4/16/08 (Date)
   Interviewed ☐ **at site** ☐ at office ☐ by phone Phone no. 781-489-1102
   Problems, suggestions; ☐ Report attached Looking for ways to reduce long-term costs.

2. **O&M staff** John Contrino (Name) Operator (Title) 4/16/08 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. 401-392-3666
   Problems, suggestions; ☐ Report attached

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

Agency Town of Coventry
Contact Jacob Peabody | Zoning Board of Review | 4/16/08 | 401-822-1360
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached _____

Agency Rhode Island Department of Environmental Protection
Contact Shelley Ducharme | Site Manager | 4/16/08 | 401-222-2797 ext 7158
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached _____

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

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

4. **Other interviews** (optional) ☐ Report attached.

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

1. **O&M Documents**
   - ☐ **O&M manual** ☐ **Readily available** ☐ **Up to date** ☐ N/A
   - ☐ **As-built drawings** ☐ **Readily available** ☐ **Up to date** ☐ N/A
   - ☐ **Maintenance logs** ☐ **Readily available** ☐ **Up to date** ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ **Readily available** ☐ **Up to date** ☐ N/A
   ☐ **Contingency plan/emergency response plan** ☐ **Readily available** ☐ **Up to date** ☐ N/A

   Remarks_____

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

   Remarks_____

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

   Remarks_____

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

   Remarks_____

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

   Remarks_____

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

   Remarks_____

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

   Remarks_____

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

   Remarks Operation of component of system with air discharge terminated 9/06

10. **Daily Access/Security Logs** ☐ **Readily available** ☐ **Up to date** ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ **Contractor for PRP**
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other

2. **O&M Cost Records**

☐ Readily available ☐ **Up to date**
☐ Funding mechanism/agreement in place
Original O&M cost estimate $10,000,000 over 20 years from ROD ☐ Breakdown attached

Total annual cost by year for review period if available

From 3/04	To 2/05	$2,100,000	☐ Breakdown attached
Date	Date	Total cost	
From 3/05	To 2/06	$1,410,000	☐ Breakdown attached
Date	Date	Total cost	
From 3/06	To 2/07	$1,230,000	☐ Breakdown attached
Date	Date	Total cost	
From 3/07	To 2/08	$1,010,000	☐ Breakdown attached
Date	Date	Total cost	
From 3/08	To 4/08	$190,000	☐ Breakdown attached
Date	Date	Total cost	

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

Describe costs and reasons: Utility and system monitoring costs.

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

A. Fencing

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

Remarks Fencing in good condition.

B. Other Access Restrictions

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

Remarks Required signs posted. Checked annually.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

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

Type of monitoring (*e.g.*, self-reporting, drive by) PRP lead, field visits, public record review.
Frequency Annually
Responsible party/agency PRP Group
Contact Jeff Hershberger (Name) Project Manager (Title) 4/16/08 (Date) 781-489-1102 (Phone no.)

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

Specific requirements in deed or decision documents have been met ☐ **Yes** ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ **No** ☐ N/A
Other problems or suggestions: ☐ Report attached

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

D. General

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

2. **Land use changes on site** ☐ **N/A**
Remarks

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

VI. GENERAL SITE CONDITIONS

A. Roads ☐ **Applicable** ☐ N/A

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

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☐ **N/A**
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

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

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

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

C. Letdown Channels ☐ Applicable ☐ **N/A**
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

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

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

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

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

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

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

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

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

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☐ **N/A – Used for management of migration and natural attenuation remedy components**

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring: groundwater elevation, pump flow rates, groundwater quality
   ☐ Performance not monitored
   Frequency quarterly ☐ Evidence of breaching
   Head differential_____
   Remarks pumping rates monitored at least weekly, groundwater elevation at least quarterly groundwater quality at least semi-annually, surface water quality at least annually

C. Treatment System ☐ **Applicable** ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ **Metals removal** ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ **Carbon adsorbers**
   ☐
   Filters particulate
   ☐ Additive (*e.g.*, chelation agent, flocculent) flocculent
   ☐ Others
   ☐ **Good condition** ☐ Needs Maintenance
   ☐ **Sampling ports properly marked and functional**
   ☐ **Sampling/maintenance log displayed and up to date**
   ☐ **Equipment properly identified**
   ☐ ***Quantity of groundwater treated annually*** approximately 12,500,000
   ☐ Quantity of surface water treated annually
   Remarks

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

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

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

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

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

D. Monitoring Data

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

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

D. Monitored Natural Attenuation

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

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. **Management of migration and natural attenuation. Used Section VIII above in lieu of attachment.**

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

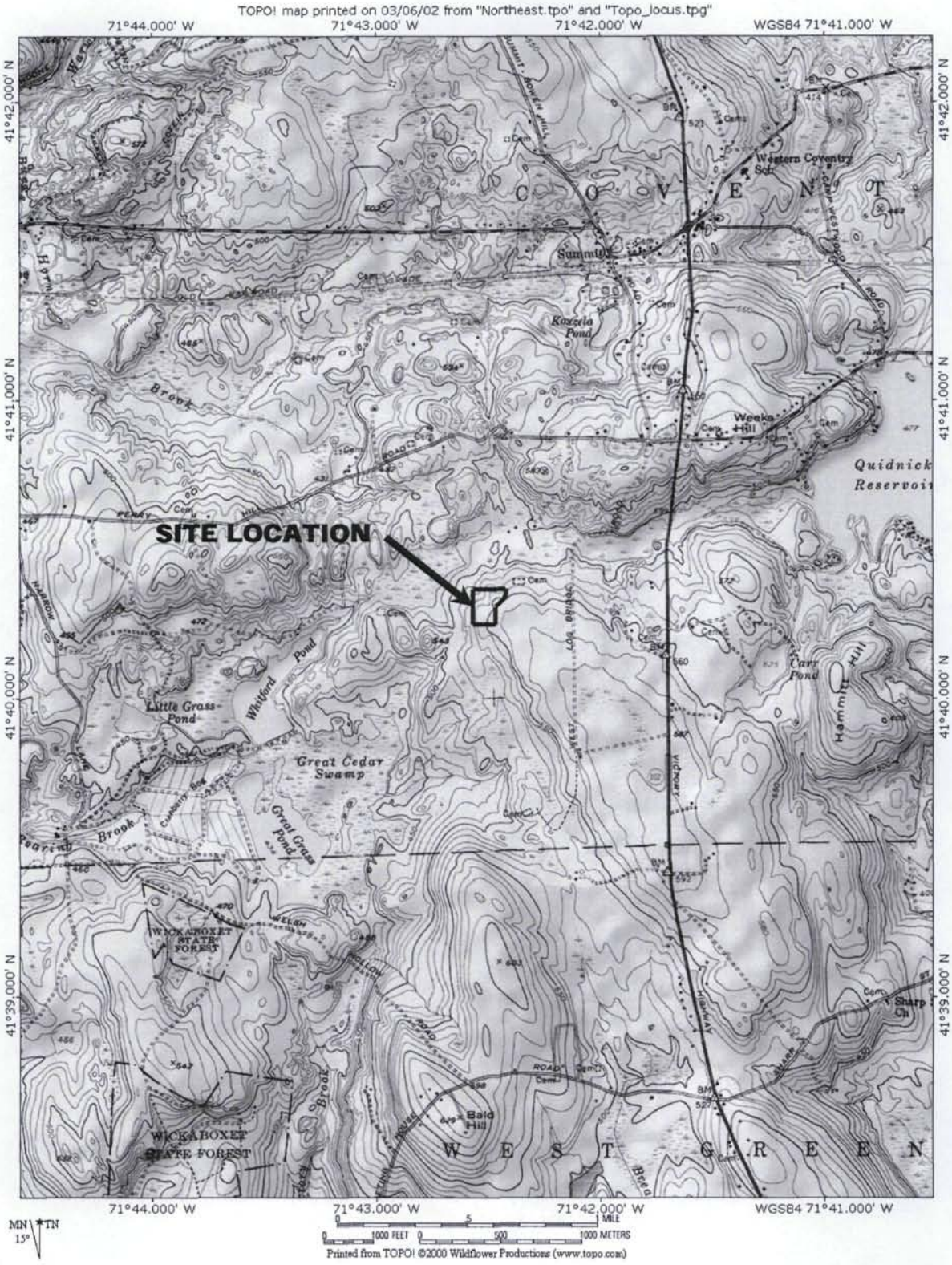
The remedy's goal is to protect human health and the environment through a combination of the source control and management of migration remedies. In the short-term the remedy is effective through source control (SVE suspended), management of migration (groundwater pump and treat) and natural attenuation along with placement of Institutional Controls and physical control of Site access until long term clean-up levels are met. No issues observed relative to remedy function or effectiveness.

B. Adequacy of O&M

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

An operator is on Site during regular business hours to perform remedy O&M. The remediation system has experienced limited unplanned shutdowns and none of these shutdowns have significantly impacted remedy performance. O&M procedures were observed to be adequate for current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. According to the PRPs, utility and treatment system supply costs have significantly increased over the past years, even with implementation of a variety of system optimization efforts. Efforts required to achieve inorganic surface water discharge criteria continue to cost more than originally estimated due to multiple system components and monitoring requirements.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. - evaluate if groundwater metals pretreatment system can be eliminated or simplified - reduce the amount of energy consumption/evaluate new sources of energy required to operate inter-process pumps and equipment - Reduce groundwater treatment system foot print and associated building size - evaluate alternate groundwater treatment system effluent discharge location from a surface water location to a ground surface location via a rapid infiltration basin

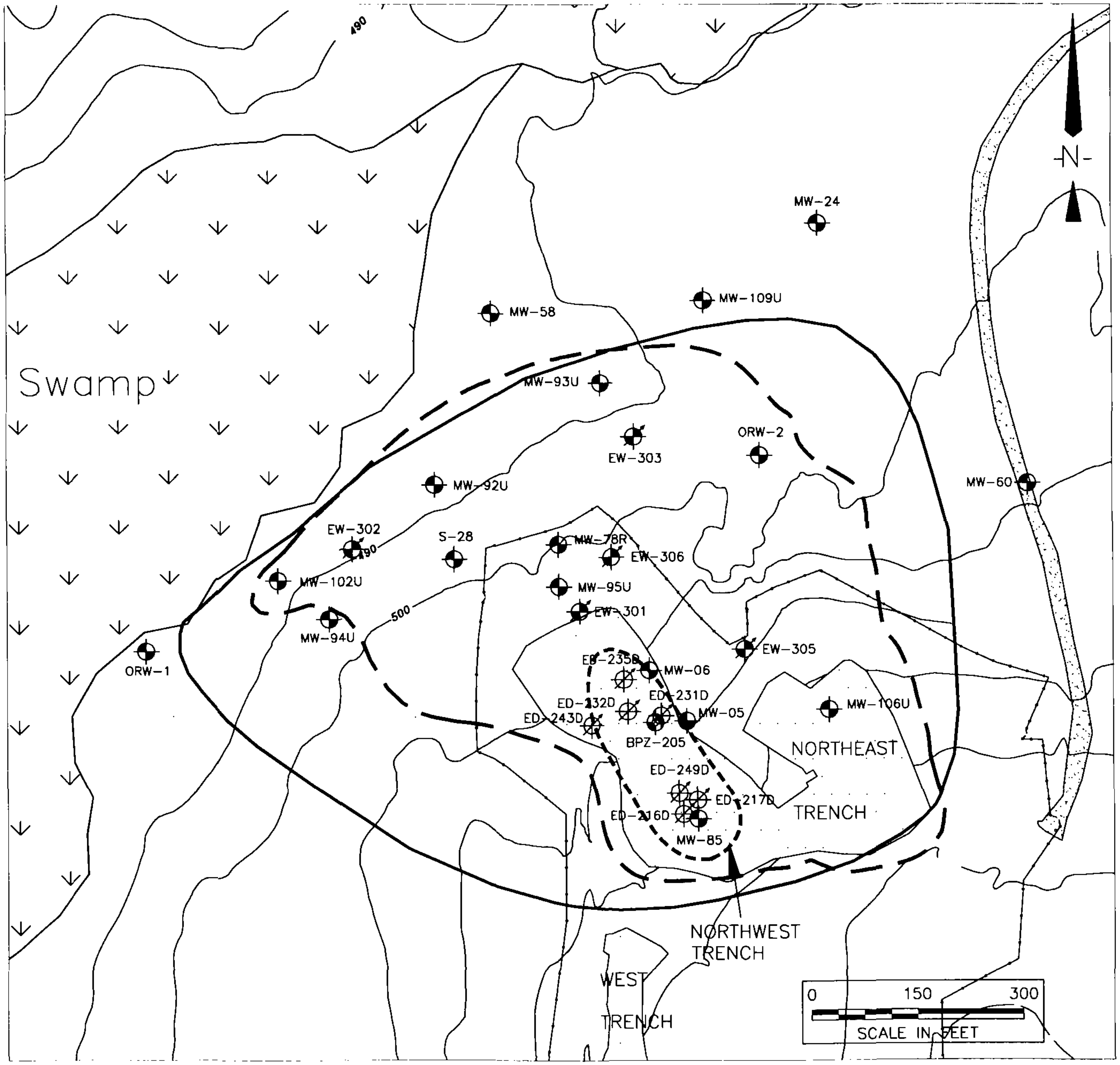


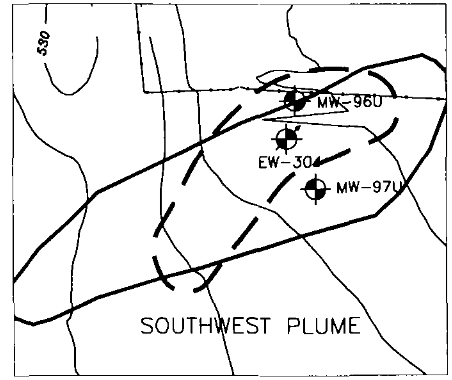
ESS Group Inc.
Engineers
Scientists
Consultants

PICILLO FARM SUPERFUND SITE
Coventry, Rhode Island

Site Location (Approximate) and Area Topography

Figure 1





LEGEND:

1996 ESTIMATED 1 PPM TVOC LINE

2002 ESTIMATED 1 PPM TVOC LINE

2007 ESTIMATED 1 PPM TVOC LINE

MW-85 MONITORING WELL

ED-216D SOURCE AREA PUMPING WELLS

EW-301 MANAGEMENT OF MIGRATION PUMPING WELL

APPROXIMATE EXTENT OF REMEDIATION AREA

FENCELINE

NOTES:

1. THE BASEPLAN HAS BEEN PREPARED FROM INFORMATION OBTAINED FROM ARTHUR D. LITTLE (1992) AND FROM INFORMATION OBTAINED FROM A FIELD INSPECTION BY GEOTRANS, INC. (1995).

2. EXISTING CONDITIONS SHOWN ARE BASED ON A GROUND SURVEY BY ATLANTIC DESIGN ENGINEERS, INC. ON MARCH 3, 2000 AND REVISED ON JUNE 20, 2001 AND NOVEMBER 5, 2002.

DELINEATIONS OF CONCENTRATED PLUME AREA UNCONSOLIDATED DEPOSITS

Figure 2

PICILLO FARM SUPERFUND SITE
Coventry, Rhode Island

ESS Group Inc.
Engineers Scientists Consultants

DATE: Jul 14, 2008 - 10:38AM
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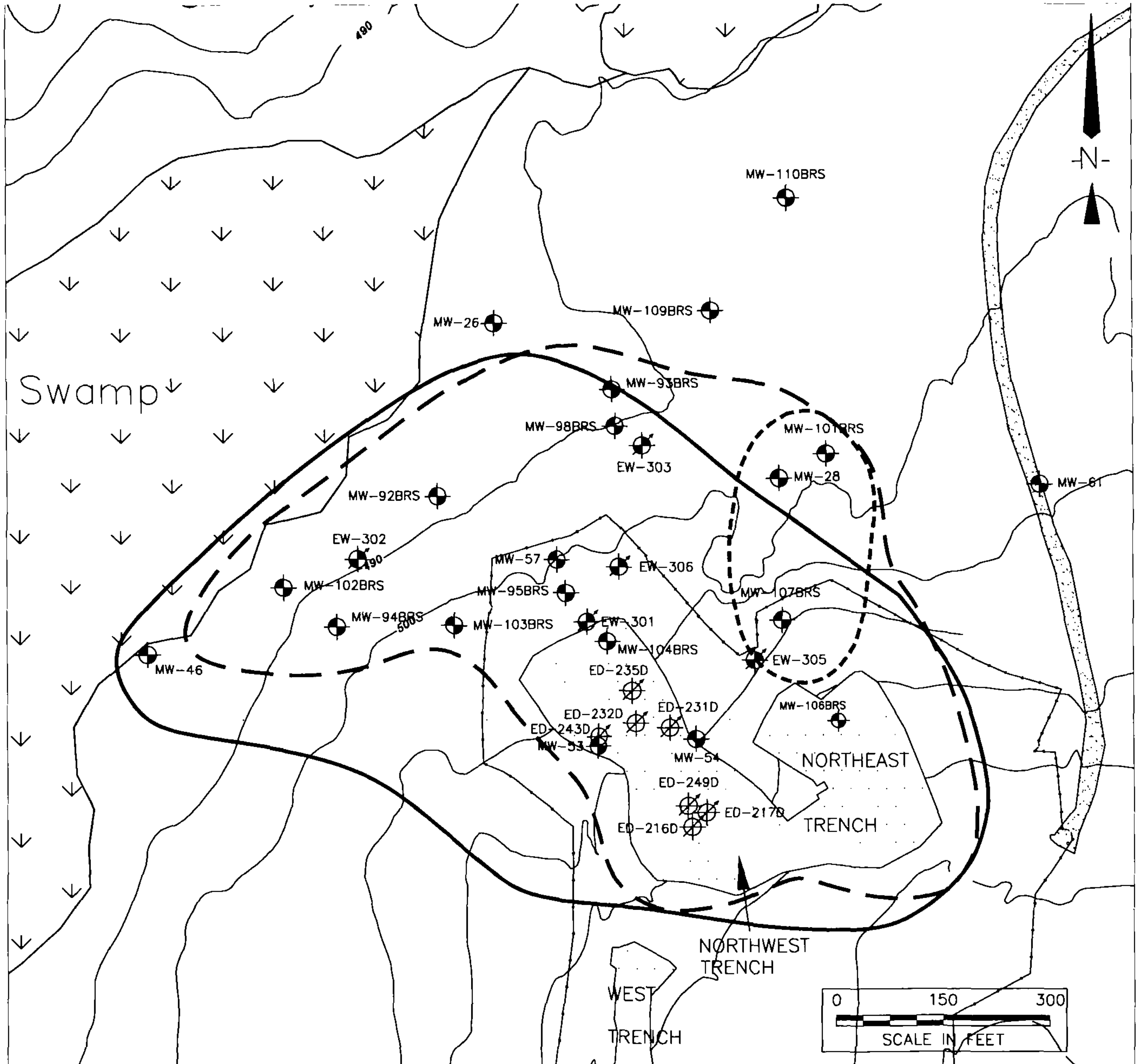

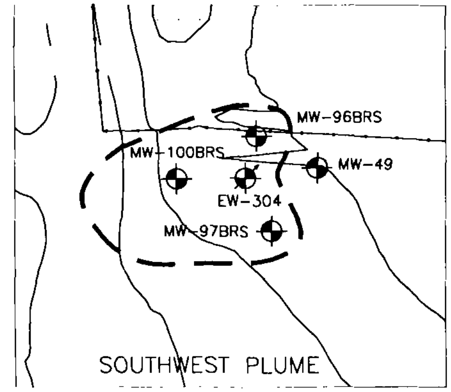

LEGEND:

1996 ESTIMATED 1 PPM TVOC LINE

2002 ESTIMATED 1 PPM TVOC LINE

2007 ESTIMATED 1 PPM TVOC LINE

MW-28 MONITORING WELL

ED-216D SOURCE AREA PUMPING WELLS

EW-301 MANAGEMENT OF MIGRATION PUMPING WELL

APPROXIMATE EXTENT OF REMEDIATION AREA

FENCELINE

NOTES:

1. BASEPLAN HAS BEEN PREPARED FROM INFORMATION OBTAINED FROM ARTHUR D. LITTLE (1992) AND FROM INFORMATION OBTAINED FROM A FIELD INSPECTION BY GEOTRANS, INC. (1995).

2. EXISTING CONDITIONS SHOWN ARE BASED ON A GROUND SURVEY BY ATLANTIC DESIGN ENGINEERS, INC. ON MARCH 3, 2000 AND REVISED ON JUNE 20, 2001 AND NOVEMBER 5, 2002.

DATE: Jul 14, 2008 - 3:34PM
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DELINEATIONS OF CONCENTRATED PLUME AREA SHALLOW BEDROCK

Figure 3

PICILLO FARM SUPERFUND SITE
Coventry, Rhode Island

ESS Group Inc.
Engineers Scientists Consultants

Figure 4
SVE System Mass Removal Via Volatilization and Influent TVOCs
Picillo Farm Superfund Site
Coventry, Rhode Island
November 15, 2001 - September 11, 2006

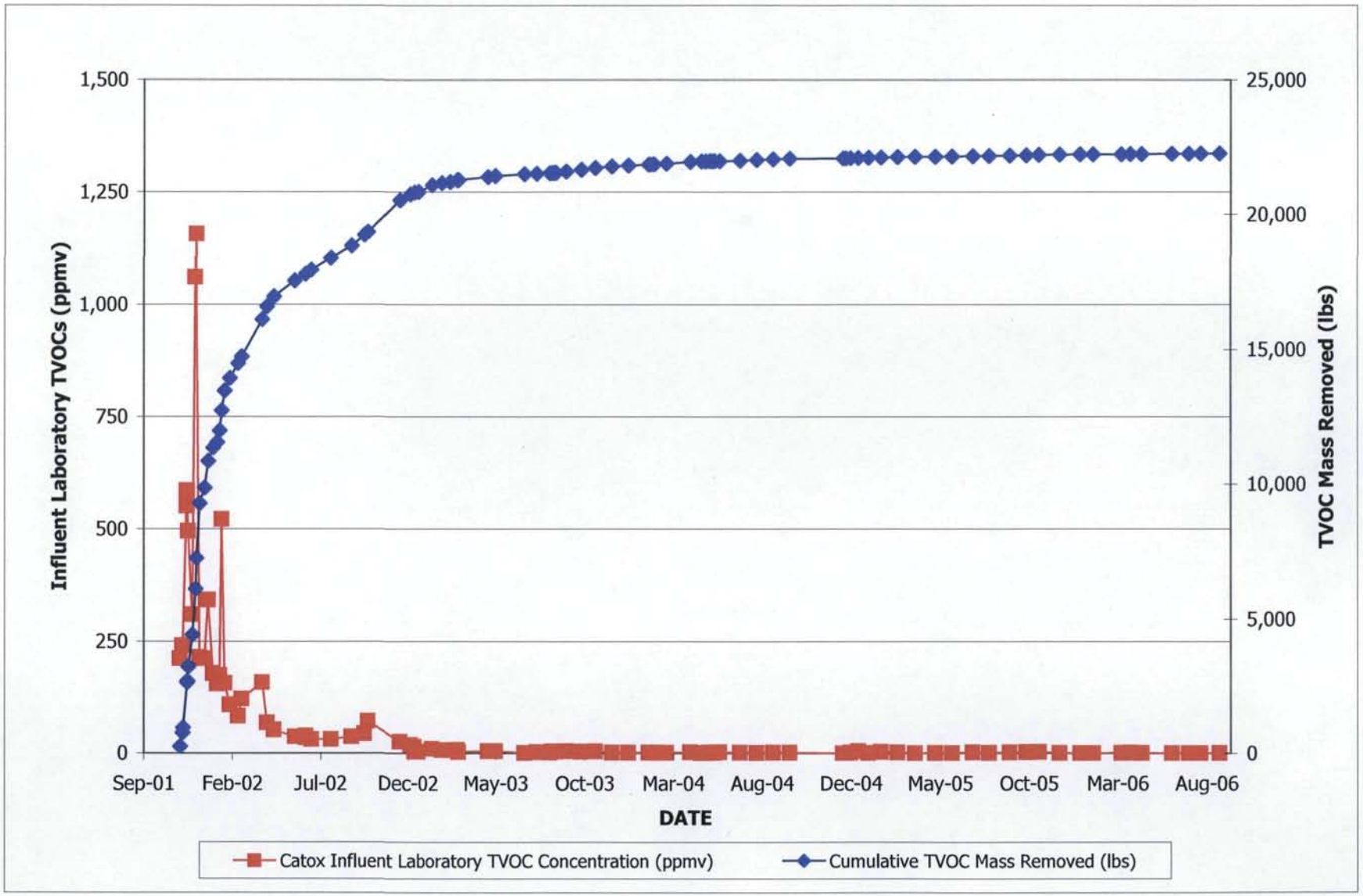

FIGURE 5
Groundwater Treatment System
Total VOC and SVOC Influent Concentrations
Picillo Farm Superfund Site
Coventry, Rhode Island
March 19, 2001 - January 10, 2008