Five-Year Review Report

Third Five-Year Review Report
for
The Sylvester Superfund Site
City of Nashua
Hillsborough County, New Hampshire

September 2004

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

Approved by: Date:

Susan Studlien 09/17/04

Susan Studlien, Director
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Appendices

List of Acronyms

ACL	Alternate Cleanup Levels
AGQS	Ambient Ground water Quality Standards (set by New Hampshire)
ARAR	Applicable or Relevant and Appropriate Requirement
AROD	Amended Record of Decision
As	Arsenic
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	The United States Environmental Protection Agency
CD	Consent Decree
CFR	Code of Federal Regulations
ESD	Explanation of Significant Differences
GMZ	Ground water Management Zone (permits by the State of New Hampshire)
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NHDES	New Hampshire Department of Environmental Services
NPL	National Priorities List
O&M	Operations and Maintenance
OSWER	EPA's Office of Solid Waste and Emergency Response
OU	Operable Unit
PCB	Poly-Chlorinated Biphenyls
ppb	Parts per billion or micrograms of contaminant per kilogram of water
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SVOC	Semi-Volatile Organic Compound
SWQC	Surface Water Quality Criteria (set by the State of New Hampshire)
VOC	Volatile Organic Compound

Executive Summary

The remedy for the Sylvester (a.k.a. Gilson Road) Superfund Site in Nashua, New Hampshire included:

- Emergency hydraulic control of the aquifer in 1982 to protect Lyle Reed Brook and the Nashua River by pumping highly contaminated ground water back to the site for re-injection.
- Installing a slurry wall around twenty-acres of the site and capping the area of highest ground water contamination in 1982.
- Providing a municipal drinking water supply to surrounding residences in 1983.
- Pumping and treating ground water at a rate of 300 gallons per minute beginning in 1986.
- Conducting a soil vacuum extraction remedy in an area of high contamination beginning in 1990.
- Ground water pumping and treatment ended on December 31, 1996. The treatment system recovered and destroyed 216 tons of contaminants at the site while treating 1.2 billion gallons of water.
- Since December 31, 1996 monitoring the containment of contaminants that are declining through natural processes.
- Establishing institutional controls in 1999 prohibiting the use of ground water or soil excavation that may interfere with the remedy.

On April 8, 1992, the EPA issued an Interim Close-Out Report that concluded that all long-term response action requirements for this site were met as specified in OSWER Directive 9320.2-3A, as updated by OSWER Directive 9320.2-3B.

This review is a Policy Review of the remedy that was selected prior to the enactment of the Superfund Amendments and Reauthorization Act of 1986 (SARA) which, upon attainment of ROD cleanup levels, will not allow unlimited use and unrestricted exposure.

The assessment of this Five-Year Review found that the State of New Hampshire conducted the ground water remedy in compliance with all applicable decision documents. Within this Five-Year Review, the EPA found that the remedy associated with the water supply line to the nearby residents was protective of human health. The EPA found the capping of the disposal area and slurry wall also to be protective of human health and the environment. The EPA determined that the ground water remedy and the present natural attenuation remedy are protective of human health and the environment in the short-term. The EPA believes that for the ground water remedy to be protective in the

long-term, it will be necessary to maintain institutional controls.

It was also found that arsenic occurs in ground water at the site and within sediments in Lyle Reed Brook that exceed criteria set for drinking water and ecological receptors, respectively. Arsenic was not a contaminant of concern at the site during the operational history of the treatment plant and no cleanup levels were established for it. Based on a review of site data and conditions, the current institutional controls are inadequate to prevent exposure to arsenic.

In response to the arsenic issue, the State of New Hampshire will need to expand the boundaries of existing institutional controls to encompass all areas where ground water contaminated with arsenic exists. Once those institutional controls are in place, which is expected in Spring 2005, and in conjunction with the present water line and access restrictions at the site, the remedy will be protective of human health from arsenic.

Ecological risks due to elevated concentrations of arsenic in sediments are still being evaluated. A report regarding ecological risk and impairment is expected in 2005.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Sylvester (a.k.a. Gilson Road)		
EPA ID: NHD099363541		
Region: 1	**State:** New Hampshire	**City/County:** Nashua/Hillsborough
SITE STATUS		
NPL Status: Final		
Remediation status: Complete		
Multiple OUs?* Yes, three		**Construction Completion date:** April 8, 1992
Has the Site been put into reuse? Yes, the State uses the on-site treatment building for storage. The City of Nashua is also examining the potential to use the building for storage of equipment. There will be no reuse in the area of the cap.		
REVIEW STATUS		
Lead Agency: EPA		
Author Name: Darryl Luce		
Author Title: Remedial Project Manager		**Author Affiliation:** U.S. EPA, Region 1
Review Period: 5/21/2004 to 9/30/2004		
Date of Site Inspection: 7/23/2004		
Type of Review: Pre-SARA		
Review Number: Third five-year review		
Triggering Action: Signature of September 30, 1999 Five Year Review		
Triggering Action date: April 8, 1992		
Date due: September 30, 2004		

* ["OU" refers to operable unit]

Issues:
A key component of the remedy is maintaining the Institutional Controls. Monitored Natural Attenuation (MNA) is presently the ground water remedy at the site. The primary issue is a contaminant for which cleanup levels were not established in 1983. More specifically, arsenic exceeds concentrations that are protective of human health in ground water both inside and outside the slurry wall. Monitoring has shown that the present area subject to Institutional Controls is inadequate to protect residents who may use ground water. With respect to ecological risks from arsenic in sediment outside the slurry wall, the State is currently finalizing an Ecological Assessment. Previous assessments had found that the requirement of biological diversity established in the 1983 ROD had been met.

Recommendations and Follow-up Actions:
The State will be expanding the area subject to Institutional Controls to include the area where ground water contains arsenic that exceeds concentrations that are protective of human health.

Protectiveness Statements:
All immediate threats at the Site have been addressed. The EPA found that the remedies performed under the 1982 and 1983 Records of Decision (*i.e.*, installing a slurry wall and capping the disposal area, and installing a pump and treat remedy, respectively) were protective of human health and the environment. The EPA found that the ground water remedy was protective of human health and the environment in the short-term. A preliminary qualitative assessment of site data indicate that Alternative Cleanup Levels (ACLs) established in the 1983 ROD and modified in a 2002 Explanation of Significant Differences, have been attained and will be maintained under the MNA remedy. Further monitoring and investigations are required to determine site cleanup progress in reaching concentrations that are below health-based levels. Further monitoring is also required to determine the mechanism and fate of the arsenic contamination.

Long-Term Protectiveness:
ACLs have been generally attained inside the slurry wall. Concentrations of contaminants are generally below health-based concentrations outside the slurry wall except for arsenic and chlorobenzene. One confounding factor is the effect of the nearby Four Hills Landfill. Contaminated ground water appears to flow from the landfill towards the site and may cause the generation of some inorganic and organic contaminants. Once health-based cleanup levels have been attained at the Site the remedy will be protective of human health and the environment in the long-term.

Sylvester (a.k.a. Gilson Road) Superfund Site
Nashua, New Hampshire
Five-Year Review

September 2004

I. Introduction

The purpose of a five-year review is to determine whether a remedy at a Superfund site is protective of human health and the environment. The methods, findings, and conclusions of a review are documented in a Five-Year Review report. In addition, Five-Year Review reports identify issues found during the review, if any, and recommend actions necessary to address them.

The U.S. Environmental Protection Agency (EPA) - New England implements five-year reviews pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution 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. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with Section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The EPA interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

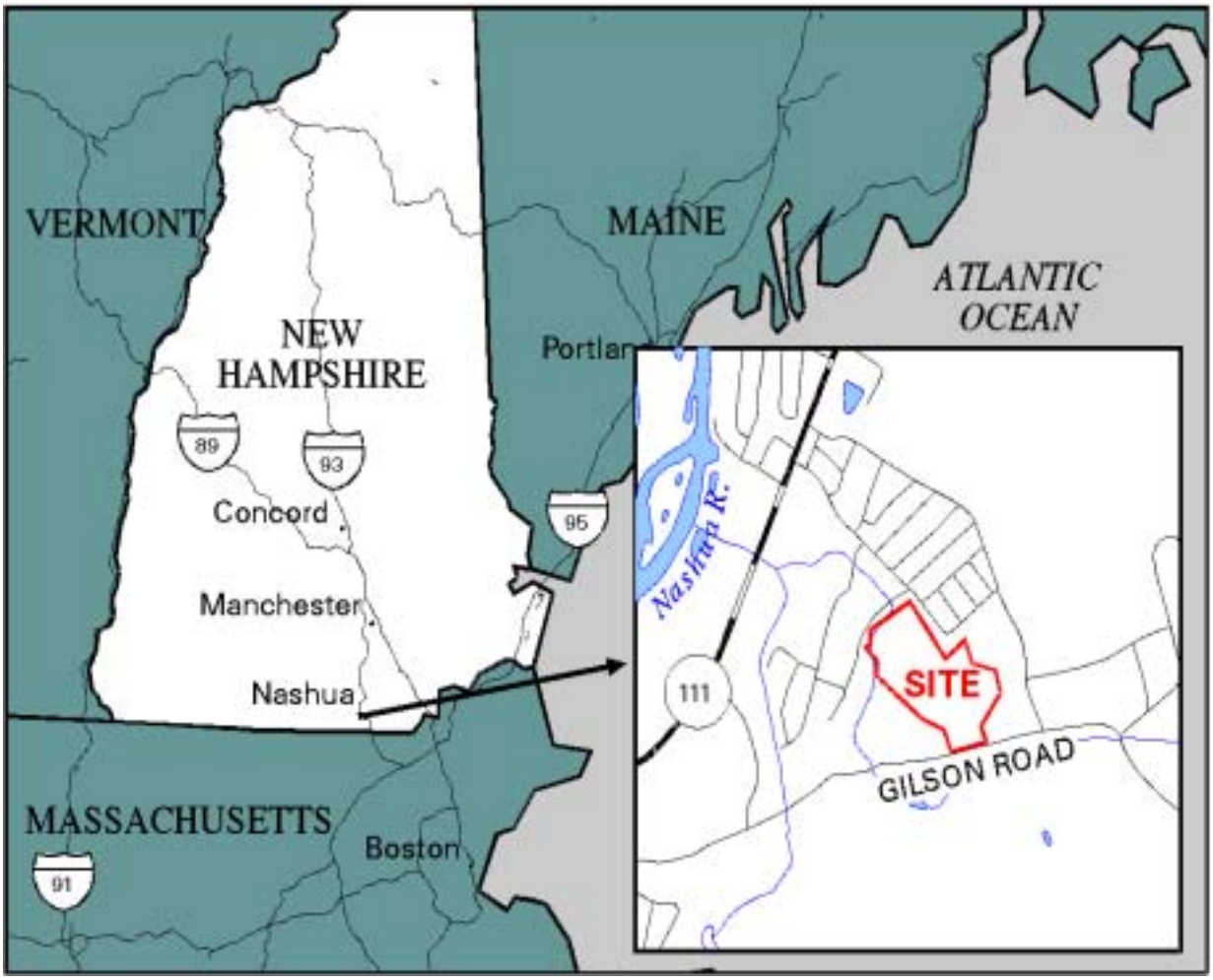
> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected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

The remedial actions at this site commenced and were completed prior to the enactment of the Superfund Amendments and Re-authorization Act of 1986. Therefore, this review is required by policy and is not required by CERCLA Section 121.

The EPA conducted this five-year review of the remedy implemented at the Sylvester (a.k.a. Gilson Road) Superfund site in Nashua, New Hampshire. The Remedial Project Manager (RPM) conducted this review for the entire site from May 2004 through September 2004. This report documents the results of that review.

This is the third Five-Year Review Report for the Sylvester site. The triggering action for this policy review is the signature of the Division Director of the Office of Site Remediation and Restoration, EPA Region I, approving the September 30, 1999 Five-Year Review. A five-year review is required because hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. Specifically, following implementation and construction of the protective cap, slurry wall, and performing ten-years of ground water pump-and-treat, wastes remain on-site and ground water remains contaminated. The remaining contamination is being addressed by Monitored Natural Attenuation (MNA).

Figure 1: Locus map and Site features. North is at the top on all maps. The top map shows the location of the site in New Hampshire. The inset map shows the road network surrounding the site, the streams, and the capped, contaminated area.



II Site Chronology

TABLE 1: SYLVESTER SUPERFUND SITE, NASHUA, NEW HAMPSHIRE CHRONOLOGY OF SITE EVENTS	
DATE	**EVENT**
November 1978	New Hampshire State personnel observe drums being stored on site.
June 1980	EPA and State remove 1,314 drums primarily containing toluene, xylene and benzene.
December 1981 to September 1982	After investigations show that high concentrations of contaminants will discharge to the Nashua River, EPA and State pump water from aquifer and re-inject up-gradient, creating hydraulic control of contaminants.
July 29, 1982	First Record of Decision calling for a containment wall and cap over worst-contaminated area.
December 1982	A three-foot thick, up to 90-foot deep slurry wall and cap are installed over a twenty-acre area on the site.
1983	City of Nashua supplies municipal drinking water to homes that may be affected by contaminated ground water from the site.
September 22, 1983	EPA issues a Supplemental Record of Decision that describes how contaminated ground water will be restored.
1985	Ground water treatment plant constructed and begins operation, pumping-and-treating 300 gallons per minute.
July 10, 1990	EPA issues an Explanation of Significant Differences for the installation of six additional pumping wells and a vacuum extraction remedy in the southern half of the site.
October 1996	State documents the attainment of cleanup levels inside the slurry wall.
December 31, 1996	Ground Water extraction and treatment ends.
May 19, 1997	EPA issues a memorandum detailing how conditions will be assessed at the site to verify attainment of cleanup levels.
August 25, 2001	De-commissioning activities at the ground water treatment plant are completed.
September, 2002	Explanation of Significant Differences changes cleanup levels for two compounds.

III Background

Physical Characteristics

The Sylvester Superfund Site (the "site") is located in Hillsborough County, Nashua, New Hampshire. The site consists of twenty-eight acres and lies approximately ½ mile east of the Nashua River, a tributary of the Merrimack River. Four Hills Landfill, a large, regional solid waste landfill, lies 1,000 feet to the northeast of the site. A trailer park and a high density residential area directly abut the site on the east and north sides. The western side of the site consists of lower density residential use.

The area of the site and surrounding the site is low-lying and drains gently westward. Lyle Reed Brook flows past the site to the northwest. Lyle Reed Brook drains the area adjacent to the site and a second stream, Trout Brook, joins with Lyle Reed Brook before discharging to the Nashua River approximately 1 mile to the northwest of the site. The Nashua River is a tributary of the Merrimack River. The Nashua River joins the Merrimack River approximately seven miles from the site.

The site geology consists of a 30 to 90-foot thick layer of stratified sands and gravels overlying a thin layer of glacial till which rests on bedrock. The water table lies approximately 10 to 15 feet below the ground surface. Ground water flows northwest to the Nashua River. Ground water at the site is found in two aquifers. The upper, surficial aquifer consists of stratified glacial drift ("overburden") that is very permeable. The lower, bedrock aquifer is separated from the overburden aquifer by a discontinuous, basal, glacial till.

The site is presently fenced and institutional controls, in the form of restrictions on ground water use through the State's Ground Water Management Zone, including recorded use restrictions, are in place. The majority of the ground water contamination is surrounded by a slurry wall and covered with a surface cap, both of which are maintained by the State of New Hampshire (the "State"). The former ground water treatment building at the site is now used by the Town and State for storage.

Land and Resource Use

Although the area surrounding the site may have been used for agricultural purposes in the past 100 years, the site and surrounding area has been residential since before waste disposal began in the 1960s. The site is enclosed by a six-foot chain-linked fence topped with three strands of barbed wire preventing entry onto the site.

The ground water beneath the site and surrounding area is not used as a drinking water source. The State maintains institutional controls preventing the use of the ground water. Ground water flows northward discharging to Lyle Reed Brook, northwest of the site, and the Nashua River.

The site consists of a large metal building, approximately 100 feet long by 75 feet deep and thirty feet in height with an open meadow behind it. The meadow is naturally vegetated and covers more than 20 acres. The site is surrounded on three sides by residences, mostly by a large trailer park, and to the south by undeveloped swamp and woodlands. There are 200 to 300 residences within a three-quarter mile radius of the site.

Photo 1: Photo of capped area and treatment building. Photo is taken from the middle of the capped area, looking south-southeast, at the treatment building in the background. A trailer park lies to the east and north approximately 800 and 1000 feet, respectively, from where the photo was taken.

History of Contamination

The Sylvester site began as the C&S Disposal Company which was based in a garage adjacent to the home of the owner, William Sylvester. The original property consisted of six to seven acres on which Mr. Sylvester created an illegal solid waste disposal facility in a sand and gravel pit sometime in the late 1960s. In the 1970's Mr. Sylvester transported and disposed of liquid hazardous wastes on the site. These liquid wastes consisted of organic chemicals, flammable solvents, and other hazardous wastes that were either stored in drums or disposed of onto the ground and into ground water beneath the site.

Enforcement History/Initial Response Actions

Illegal solid waste activity was first discovered at the site in 1970. A court issued an injunction in 1976 ordering the removal of all solid waste. Mr. Sylvester ignored that order. Liquid wastes were poured on the ground beginning in the mid-1970s and in the late 1970's wastes were disposed clandestinely through a pipe into the ground.

In November 1978, State personnel observed drums stored at the site. A court order issued in October 1979 prohibited all further disposal of hazardous wastes at the site. However, through the 1970s solid and liquid hazardous wastes had been disposed of in a sand and gravel pit located behind the residence at 57 Gilson Road. These wastes consisted of organic solvents and other organic fluids taken from the Cannons Engineering incinerator in Bridgewater, Massachusetts. The liquid hazardous wastes migrated through unsaturated soils and entered the ground water at the site until EPA and the State of New Hampshire began cleanup operations. It is estimated that hazardous wastes were disposed at the site for five years. As an indication of the quantity of

material disposed at this site, during the period from January to October 1979 over 800,000 gallons of hazardous wastes are documented as having been disposed onto the ground.

Initial clean up activities began after a Court Order allowed EPA and the State to enter and work on the property. In May 1980, the City of Nashua enclosed the site with a security fence. From May to June 1980, 1,314 drums were removed from the site for disposal.

Basis for Taking Action

Ground water monitoring found contaminants moving towards Lyle Reed Brook at the rate of 20 to 45 centimeters per day. Ground water contamination consisted of high concentrations of heavy metals and volatile and extractable organic compounds. The contaminant plume began discharging into Lyle Reed Brook in December 1980. In 1981 EPA and the State installed temporary ground water extraction wells to hydraulically control the contaminant plume by pumping ground water from the area near Lyle Reed Brook and re-injecting it into ground water at the site to arrest the discharge of contaminated ground water into surface waters. The temporary hydraulic control continued until a Record of Decision was signed in 1982 (1982 ROD) to construct a slurry wall around twenty acres of the most-contaminated ground water and place an impermeable cap on that area.[1]

IV Remedial Actions

Remedy Selection

There have been two Records of Decision and two Explanation of Significant Differences written for the site. Ground water containment at the site began in 1982 to prevent migration and concluded when the slurry wall was constructed later that year. Ground water remedial actions began in 1986 and concluded in December 1997.

Monitoring of ground water, surface water and air, initiated in 1980 showed that significant risks were posed by the hazardous wastes in ground water at the site. Based on monitoring it was determined that if no action were taken at the site, contaminated ground water discharging to surface water would exceed water quality criteria for arsenic, trichloroethylene, chloroform, 1,2 dichloroethylene, methylene chloride and benzene at the drinking water intakes for Lowell, Lawrence and Methuen, Massachusetts. The study concluded that if no abatement action were taken, Lyle Reed Brook would not be able to support aquatic life and that there would be periodic fish kills in the Nashua River.

Based on that study the first Record of Decision (1982 ROD) for the site was signed on July 29,

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[1] United States Environmental Protection Agency, Office of Emergency and Remedial Response, Superfund Record of Decision: Sylvester Site, NH, EPA/ROD/R01-82/005, July 29, 1982.

1982 and called for construction of the slurry wall and cap. The 1982 ROD also called for the treatment of ground water but did not specify how this would be accomplished. In November of 1982 EPA and State contractors constructed a slurry wall that spanned the aquifer from the ground surface to the bedrock and enclosed the twenty-acre area of highest contamination. The area enclosed by the slurry wall was covered by a cap.

Following the installation of the temporary hydraulic re-circulation system, slurry wall, and cap, pre-design investigations and pilot tests were performed to determine how to recover and treat the contaminated ground water. Following the pilot tests, a 1983 Supplemental Record of Decision, signed on September 22, 1983 (the "1983 ROD"), chose a 300 gallon per minute treatment plant that removed metals and organic compounds, incinerating the organic compounds.[2]

Within the 1983 ROD was a provision for Alternative Cleanup Limits (ACLs). ACLs were established because in 1983 no ground water restoration had yet been attempted in the nation and it was unknown how successful pump-and-treat would be; also the site was so grossly contaminated that it was determined that success may be limited. The ACLs were set at levels deemed necessary to adequately protect human health and the environment. The ACLs were designed with the idea that an attainable goal for ground water cleanup was to lower the maximum concentrations found in 1983, by 90%.[3] Therefore, the concentrations in the table that follows represent 10% of the highest concentration found at the site. These alternative cleanup levels are listed, Table 2, along with the New Hampshire drinking water standards, Ambient Groundwater Quality Standards (AGQS), which are provided for purposes of comparison only.[4]

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[2] U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Superfund Record of Decision: Sylvester Site, NH (Supplemental to 07/29/82 ROD), EPA/ROD/R01-83/007, September 22, 1983.

[3] In the 1983 Supplemental ROD, the Regional Administrator set Alternate Concentration Levels (ACLs) for this site which are listed in an attached memorandum, dated September 21, 1983, to the Supplemental ROD. The ACLs that are the cleanup levels of this site as provided in the 1983 Supplemental ROD should not be confused with the "alternate concentration levels" established in Section 121(d)(2)(B)(ii) of CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA, Pub. L. No. 99-499, 100 Stat. 1613, October 17, 1986).

[4] Where federal maximum contaminant levels have been promulgated under the Safe Drinking Water Act, NH AGQS are set equivalent to such standards. Ten of the sixteen COC for the Site have NH AGQS values which are lower (more stringent) than their representative ACLs (vinyl chloride, benzene, chloroform, tetrachloroethylene, trichloroethylene, methyl ethyl ketone, chlorobenzene, methylene chloride, toluene and *trans*-1,2-dichloroethane). For one COC, 1,1-trichloroethane, the ACL and the AGQS are the same. Of the remaining five COCs, one constituent (methyl methacrylate) does not have an AGQS value, two constituents (selenium and phenol) have lower, more stringent, ACL values than the respective AGQS values, and two constituents (1,1,2-trichloroethane and 1,1-dichloroethane) had ACL values that were lower, more stringent, than AGQS values, but were revised upward, to equal the AGQS values, in a September 2002 Explanation of Significant Differences. The two compounds that were the subject of the 2002 ESD, 1,1,2-trichloroethane and 1,1-dichloroethane, were revised upward from the ACLs of 1.7 and 1.5 ppb, respectively to the AGQS values of 3 and 81 ppb respectively, because the ACL values were below normal detection limits.

Table 2: Alternate Concentration Limits[A] Sylvester Site, Nashua, New Hampshire		
Contaminant	**ACL (ppb)**	**AGQS (ppb)**
Vinyl chloride	95	2
Benzene	340	5
Chloroform	1505	6
1,1,2 trichloroethane	3[B]	5
Tetrachloroethylene	57	5
Trichloroethylene	1500	5
Methyl ethyl ketone	8000	170
Chlorobenzene	110	100
Methylene chloride	12250	5
Toluene	2900	1000
1,1 dichloroethane	81[B]	81
Trans-1,2 dichloroethane	1800	15
1,1,1 trichloroethane	200	200
Methyl methacrylate	350	No standard
Selenium	2.6	50
Phenols	400	4000

Table notes:
[A] ACLs established in 1983 ROD by Michael Deland to Lee M. Thomas, September 21, 1983.
[B] The cleanup level for 1,1,2 trichloroethane and 1,1 dichloroethane were changed from 1.7 and 1.5 ppb, respectively, to 3 and 81 ppb, respectively, in a September 23, 2002 Explanation of Significant Differences.

Remedy Implementation

The Sylvester Superfund Site was the first-in-the-nation pump-and-treat facility. Therefore, extensive bench and pilot tests were performed before the treatment plant was designed. Construction of the 300-gallon-per-minute treatment plant began in 1985 and concluded in 1986. Ground water pumping and treating inside the slurry wall occurred from 1986 until 1996. The

treatment system was modified in 1990 to enhance recovery by additional extraction wells and re-injection wells to the existing treatment system as well as constructing and implementing vacuum extraction in the source area nearest the site.[5] The treatment plant pumped and treated over 1.2 billion gallons of water and removed and destroyed over 216 tons of contaminants during its operational life span from 1986 until December 1996.[6]

In 1995 the State of New Hampshire Department of Environmental Services believed that the ACLs established in the 1983 ROD had been attained. The State submitted a report (the "H&A Report") that documented the conditions that existed at the site and how those conditions met the requirements of the 1983 ROD.[7] Although highly contaminated ground water existed at the site, the H&A Report demonstrated that the most highly contaminated ground water was contained within the slurry wall and that flow from the site either through or around the slurry wall did not pose a threat to contaminate ground water outside of the slurry wall. The H&A Report used a non-parametric statistical test to evaluate the attainment of ACLs consistent with EPA guidance.[8] The H&A Report used 1994 data in its evaluation.

In November 1995, based on the H&A Report, the EPA project manager determined that the concentration of contaminants in the aquifer were such that the treatment plant should cease operating to assess conditions inside the slurry wall in a static state.[9] The treatment plant ceased operations on December 31, 1996. In May 1997 EPA issued a memorandom that documented the attainment of the ACLs and described the methods to be taken to assure protectiveness in the future.[10] At that time, all ACLs had been attained with the exception of 1,1 dichloroethane and 1,1,2 trichloroethane which were below NH AGQS and therefore at levels protective of human health and the environment. The ACLs of 1,1 dichloroethane and 1,1,2 trichloroethane were changed from 1.5 and 1.7 ppb, respectively, to 81 and 3 ppb, respectively, in a 2002 Explanation of Significant Differences. These concentrations are the NH AGQS values typically established as

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[5] U.S. Environmental Protection Agency, Region 1, Explanation of Significant Differences, Sylvester/Gilson Road Hazardous Waste Site, Nashua, New Hampshire, July 10, 1990.

[6] U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Technology Innovation Office, Cost and Performance Report, Pump and Treat of Contaminated Groundwater at the Sylvester/Gilson Road Superfund Site, Nashua, New Hampshire, June 1998.

[7] Haley & Aldrich, Inc., Remedial Action Evaluation Study, Gilson Road Superfund Site, Nashua, New Hampshire (Five volumes), Bedford, New Hampshire, October 1996.

[8] Office of Policy, Planning, and Evaluation, U.S. EPA, Method for Evaluating the Attainment of Cleanup Standards, Volume 2: Ground Water, EPA 230-R-92-014, July 1992.

[9] U.S. Environmental Protection Agency, Memorandum: Operation of the Sylvester Ground Water Treatment Plant, from Darryl Luce to Audrey Zucker, November 21, 1995.

[10] U.S. Environmental Protection Agency, Darryl Luce and Audrey Zucker, Memorandum to the Site File, Sylvester / Gilson Road Superfund Site Verification of Attainment Phase, May 19, 1997.

cleanup levels at other sites. The previous concentrations were below detection limits and therefore unrealistic.[11]

In addition to the ACLs, the 1983 ROD included certain conditions that were expected to result from the containment of contaminants and the achievement of ACLs. These conditions were specifically stated as follows:

1. Volitilization from Lyle Reed Brook will be reduced to acceptable exposure levels.
2. Arsenic and organic concentrations will be reduced to below water quality criteria in the Merrimack River at Lowell, Massachusetts.
3. The likelihood of fish kills in the Nashua River will diminish.
4. Lyle Reed Brook will not meet water quality criteria levels but an expanded aquatic population is expected.
5. All residences using ground water will be provided water service from the City of Nashua.

These conditions, which concern the threat of migration of contaminants to Lyle Reed Brook and the Nashua and Merrimack Rivers, were documented to have been attained within the H&A Report and have been maintained since that time. Risk assessments have found no significant risks posed to human health from contaminants present in the air and surface water in Lyle Reed Brook. With respect to organic contaminants, sampling revealed that ambient water quality criteria have been attained at Lyle Reed Brook for the contaminants that had established ACLs. However, high concentrations of arsenic, which does not have an established ACL, have been found in ground water and in the surface water in Lyle Reed Brook. Lyle Reed Brook has been found to meet the criteria of an "expanded aquatic population.[12]" Arsenic is discussed further in this Five-Year Review in Section IX, Recommendations and Follow-up Actions.

Post-Active Remediation

Since the treatment plant ceased operations in December of 1996 the ground water remedy has consisted of monitored natural attenuation. Monitoring occurs on a semi-annual basis with ground water samples taken in spring and fall. Surface water sampling is done on an annual basis and sediment sampling is done when field observations warrant. The concentrations of volatile organic compounds in surface water are not sufficient to warrant air sampling.

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[11] U.S. Environmental Protection Agency, Region 1, Explanation of Significant Differences, September 23, 2002.

[12] Tetra Tech, Inc., Community Level Bioassessment of Lyle Reed Brook at Sylvester Site, Nashua, New Hampshire. November 30, 1994.

V Progress Since the Last Review

The last Five-Year Review occurred in September 1999. The findings of the 1999 Review were that the Site remained protective of human health and the environment. The recommendations of the 1999 Review were:

- Install an additional bedrock and overburden well down-gradient of the plume near Troutbrook Drive.
- All wells in the monitoring program and surface water in Lyle Reed Brook will be sampled and analyzed for the 8 RCRA metals twice a year.
- Continue the current monitoring program, sampling twice a year and producing a report every-other-year.
- Finalize and enforce institutional controls.

Essentially, the site appears the same as it did in 1999 and monitoring continues to assess the potential for threats to human health and the environment. Monitoring has proceeded as recommended and the institutional controls were established in the Spring of 2000 through a restrictive covenant on the State-owned land and through a deed restriction on private property down-gradient of the site.

In April 2003 NHDES issued a report summarizing the results of sampling and contaminant trends. The NHDES Report found that generally, organic contaminants were declining in concentration and that only arsenic exceeded AGQS at the GMZ boundary. Further, this report found that of the eight RCRA metals, only arsenic and lead had concentrations that warranted further examination. Arsenic had concentrations that are very high, with some wells having concentrations of 500 ppb; however, the overall lead concentrations were just over AGQS of 15 ppb in only one well.[13] Arsenic is discussed further in this Five-Year Review in Sections VIII and IX, Issues, and Recommendations and Follow-up Actions, respectively.

VI Five-Year Review Process

Administrative Components

The Remedial Project Manager for the site, Darryl Luce, conducted this five-year review with assistance from Kenneth Kettenring, NHDES Project Manager. The Five-Year Review consisted of:

- Reviewing relevant documents listed in the Reference Section of this document.

[13] New Hampshire Department of Environmental Services, Final 1999 - 2001 Environmental Monitoring Data Assessment, Gilson Road Superfund Site, April 28, 2003.

- Conducting a number of interviews with interested parties.
- Performing a site inspection.

These activities are documented in a checklist appended as Appendix B to this document.

Community Involvement

No public meetings were held regarding this Five-Year Review for the Site. The EPA Remedial Project Manager spoke with the Assistant to the Mayor for the City of Nashua and the Director of the Department of Public Works. The Assistant to the Mayor, Mary Nelson, stated that there had been no interest expressed by the public or others regarding the Site in the recent past. The Director of the Department of Public Works, Richard Seymour, stated that there had been no problems or complaints regarding the site. Mr. Seymour stated that the Town did have an interest in storing some equipment in the now inactive treatment plant, but is still talking to NHDES about that use. An inspection of the document repository at the Town Library did reveal that those documents should be replaced with updated documents. EPA did publish a notice of the initiation of the Five-Year Review in the local paper, the Nashua Telegraph.

Document Review

This Five-Year Review consisted of a review of relevant documents including O&M Records and monitoring data. The previous Records of Decision, Explanation of Significant Differences and various other literature sources were consulted. A Reference Section is provided at the end of this Five-Year Review.

Risk Information and ARARs Review

Data provided and analyzed below indicate no change in site conditions which would warrant a re-evaluation of risk.

The 1982 ROD and 1983 ROD pre-dated SARA and do not require the restoration of the ground water at the site to drinking water quality. Instead, EPA established pre-SARA ACLs to address the threat of migration of contaminated ground water to Lyle Reed Brook. EPA also required the extension of the municipal water supply to this area. The City of Nashua has supplied drinking water to this area since 1983. Thus, drinking water standards are not ARARs at the site.

The only change in ARARs has been that EPA revised the drinking water Maximum Concentration Level (MCL) for arsenic from 50 parts per billion (ppb) to 10 ppb effective February 22, 2002. The change in arsenic MCL will not affect the risk calculated at the site.

EPA has endorsed the State Comprehensive State Ground Water Protection Program embodied in

RSA 485C. New Hampshire law holds that all ground water should be drinking water quality. The exception is for areas in which Ground Water Management Zone ("GMZ") permits have been issued to address contamination and in that case the purpose of the permit is to regulate the restoration of the aquifer to drinking water quality. GMZ permits establish areas within which it is acknowledged that ground water is contaminated above drinking water standards and includes mechanisms to prevent the use of ground water for any purpose. Within a GMZ, actions are required to eventually return ground water to drinking water standards.

The contamination of the aquifer at the Sylvester Superfund Site has been issued a GMZ permit by the State of New Hampshire. Therefore, the aquifer will ultimately be a potential source of drinking water. GMZ permits do expire every five years, the permit for the Sylvester site expires, and will be renewed, in 2005. The institutional controls provided by the GMZ permit do not expire until removed from the deed.

At this time, sampling indicates that Lyle Reed Brook is in compliance with current New Hampshire surface water quality regulations. For these reasons, EPA finds that there are no newly promulgated ARARs that call into question the protectiveness of the remedy at this site.

Data Review

Although active remediation ceased in 1997, ground water remained contaminated with vinyl chloride, benzene, tetrachloroethylene, trichloroethylene, chlorobenzene, and toluene at concentrations that, although not higher than ACLs, are above health-based concentrations established for other sites. One of the concerns is that contaminants may either leak through or escape out the top or bottom of the slurry wall that surrounds the site. Indeed a 1997 EPA modeling report found the potential for contaminants to flow through either "...a window or zone of high permeability..." or to escape the seal with the wall and cap or flow through the bedrock.[14] The EPA report found the most likely pathways for contaminant migration to be over and under the wall. To that end NHDES maintains sampling at a number of points, as described below.

Ground Water Monitoring

Current ground water sampling has two major divisions: outside the slurry wall and inside the slurry wall. Each of these major divisions is divided into two further divisions, the overburden aquifer and the bedrock aquifer. The results of sampling wells outside the slurry wall are of more interest to this analysis because that area underlies portions of the trailer park and contaminants in that area may have a more direct impact on human health and the environment. The location of monitoring points is shown in Attachment 1, Figures 1 - 8. Sampling in the Spring of 2004 yielded the following results outside the slurry wall, as shown in Table 3.

[14] Michael Backers and Milovan Beljin, University of Cincinnati, Department of Civil and Environmental Engineering, Review of Ground Water Models of The Gilson Road Hazardous Waste Site, April 1996.

Concentrations of Contaminants Outside the Slurry Wall
Sylvester Superfund Site, Nashua, New Hampshire

	Vinyl Chloride	Benzene	Chloroform	1,1,2 TCA	PCE	TCE	MEK	Chlorobenzene	Methylene Chloride	Toluene	1,1 DCA	1,2 DCA	1,1,1 TCA	Methyl Methacrylate	Arsenic
ACL	95	340	1505	1.7	57	1500	8000	110	12250	2900	1.5	1800	200	350	
AGQS	2	5	6	5	5	5	170	100	5	1000	81	15	200	NS	
Overburden, Outside Slurry Wall															mg/l
HA-5C	BDL	5.8	BDL	BDL	BDL	BDL	BDL	84	BDL	BDL	6.3	BDL	BDL	BDL	**0.55**
T-48-3	BDL	6	BDL	BDL	BDL	BDL	BDL	85	BDL	BDL	4.8	BDL	BDL	BDL	**0.507**
T-48-2	BDL	5.5	BDL	BDL	2.3	BDL	BDL	74	BDL	BDL	3.4	BDL	BDL	BDL	**0.495**
HA-5A	2.2	6.1	BDL	BDL	BDL	BDL	BDL	**110**	BDL	BDL	6.4	BDL	BDL	BDL	**0.639**
HA-13B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
HA-14	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0142
HA-9A	BDL	BDL	2.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0023
T-98	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
HA-4B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-54-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0202
T-42-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0016
T-97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-44-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-32-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-60-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	19	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-61	BDL	BDL	BDL	BDL	BDL	BDL	BDL	23	BDL	BDL	BDL	BDL	BDL	BDL	0.001
T-60-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	23	BDL	BDL	BDL	BDL	BDL	BDL	0.0052
T-62-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-100-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
Bedrock, Outside Slurry Wall															
HA-7A	BDL	2	BDL	BDL	BDL	BDL	BDL	32	BDL	BDL	3.6	BDL	BDL	BDL	**0.509**
HA-5B	2.7	6.6	BDL	BDL	BDL	BDL	BDL	**111**	BDL	BDL	6.1	BDL	BDL	BDL	**0.68**
T48-5	BDL	4.8	BDL	BDL	BDL	BDL	BDL	85	BDL	BDL	BDL	BDL	BDL	BDL	**0.645**
T-99	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-54-3	BDL	46	BDL	BDL	BDL	BDL	BDL	38	BDL	BDL	BDL	BDL	BDL	BDL	**0.4538**
HA-4A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**0.4657**
T-38-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0099
T-44-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-32-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0079
T-62-3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<.001
T-100-2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0055
Surface Water															
SW-23															0.0013
SW-208															0.0262
SW-201															0.0019
SW-204															0.0263
SW-204 DUP															0.0258

Table 3, Concentrations outside the slurry wall, in Spring 2004. Red cells mean that the compound exceeds the ACL established in the 1983 ROD. Yellow cells indicate that although the 1983 ROD ACL standard is not exceeded, the concentration in that well exceeds health standards typical of other sites. Arsenic is included here although it does not have an established ACL; however, it will be assessed in determining the protectiveness of the site. For arsenic, red means that the concentration exceeds the old Safe Drinking Water Act standard of 50 ppb and yellow indicates it violates the new 10 ppb standard. Lead was not included in this table because out of all the wells outside the slurry wall, only T-62-2 has concentrations that exceed the cleanup level of 15 ppb (26 ppb).

Table 3 demonstrates that some contamination still exists outside of the slurry wall. In terms of exceeding ACLs, the one compound for which there is an exceedence, chlorobenzene, the concentration (111 ppb) is just over the ACL (110 ppb) which is just over the Safe Drinking Water Act ("SDWA") Maximum Contaminant Level ("MCL") (100 ppb) established as the

cleanup level at other sites. Ambient Ground water Quality Standards ("AGQS") are standards set by the State and mirror MCLs with a few exceptions.

Inside the slurry wall, concentrations are also low with only chlorobenzene exceeding the ACL, lead is below MCLs in all wells on the site.

Concentrations of Contaminants Inside the Slurry Wall
Sylvester Superfund Site, Nashua, New Hampshire

	Vinyl Chloride	Benzene	Chloroform	1,1,2 TCA	PCE	TCE	MEK	Chlorobenzene	Methylene Chloride	Toluene	1,1 DCA	1,2 DCA	1,1,1 TCA	Methyl Methacrylate	Arsenic
ACL	95	340	1505	1.7	57	1500	8000	110	12250	2900	1.5	1800	200	350	
AGQS	2	5	6	5	5	5	170	100	5	1000	81	15	200	NS	
Overburden, Inside															mg/l
T-33-1	BDL	BDL	BDL	BDL	6.4	18	BDL	5.4	BDL	BDL	7.1	BDL	BDL	BDL	0.0358
T-34-1	BDL	27	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1150	BDL	BDL	BDL	BDL	0.0862
T-27-1	BDL	2.8	BDL	BDL	BDL	BDL	BDL	5.8	BDL	BDL	BDL	BDL	BDL	BDL	0.1092
T-24-1	BDL	18	BDL	BDL	BDL	BDL	BDL	154	BDL	BDL	12	BDL	BDL	BDL	0.546
T-13-1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	43	BDL	BDL	11	BDL	BDL	BDL	0.1357
T-13-3	3.3	16	BDL	BDL	BDL	BDL	BDL	50	BDL	BDL	6.6	BDL	BDL	BDL	0.986
T-13-2	BDL	9	BDL	BDL	BDL	BDL	BDL	41	BDL	BDL	6	BDL	BDL	BDL	0.601
T-12-1	BDL	2.8	BDL	BDL	BDL	BDL	BDL	40	BDL	BDL	8.6	BDL	BDL	BDL	0.3531
Bedrock, Inside															
T-33-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0196
T-19-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10	BDL	BDL	BDL	BDL	0.1765
T-8-3	BDL	6.9	BDL	BDL	BDL	BDL	BDL	14	BDL	BDL	BDL	BDL	BDL	BDL	0.755
T-12-4	BDL	7.4	BDL	BDL	BDL	BDL	BDL	81	BDL	BDL	6.1	BDL	BDL	BDL	0.845

Table 4: Concentrations of contaminants in wells inside the slurry wall, Spring 2004. Red indicates concentrations that exceed ACLs, yellow exceeds health standards. Arsenic exceeds the Safe Drinking Water Act Standard in all wells inside the slurry wall. Lead does not exceed MCLs inside the slurry wall.

Based on concentrations found in 1994 (when shutdown was considered), contrasted with concentrations shown on Figures 1 through 8 of Attachment 1, ground water contamination should continue to decline. In Attachment 1, Figure 1 is an overall site map, Figures 2 and 3 show the trends in contaminant concentrations in overburden wells, Figure 4 shows the trends in interior bedrock wells. Figures 5 and 6 show concentration trends in overburden and bedrock wells, respectively. Figures 7 and 8 show concentrations of arsenic and lead, respectively, in ground water.

Figures 1 through 8 of Attachment 1 show that concentrations rebounded in the period following shutdown of the treatment plant in 1997. These figures only display what happened with contaminant concentrations until 2000. Comparing those concentrations to those in Tables 3 and 4, above, demonstrate the continued down-ward trend in contamination at the site of those compounds with ACLs established. The data for arsenic has only one year as of the construction of those maps. Therefore, no conclusions can be drawn at this time regarding trends in arsenic concentrations.

Surface Water and Sediment Monitoring

Surface water sampling indicates that concentrations of organic compounds do not exceed concentrations detrimental to aquatic life or pose a human health risk from vapors. Arsenic does not exceed Surface Water Quality Criteria ("SWQC"), the highest concentration is approximately 26 ppb at point SW-204 that lies just north of the site in Lyle Reed Brook (see Table 3). The concentration at SW-204 is sufficient to raise concerns regarding sediment concentrations. Sediment samples were recently taken; however, they were compromised during shipping. Rather than resample, the State determined that an ecological assessment would be preferable. The ecological assessment was performed in the past year, the State is still finalizing the full report. The 1983 ROD set an "expanded population of aquatic organisms" in Lyle Reed Brook as a goal. The results of the ecological assessment will be compared to that goal.

Summary

Over the operational history of the site arsenic was not sampled, making any speculation regarding its origin difficult. Regardless, since 1999, when arsenic was first sampled, the concentrations have been shown to be much higher than the MCL of 10 ppb. The table below summarizes the present status of arsenic:

Table 5,
Concentration of Arsenic in Ground Water and Surface Water at Gilson Road Site - Spring 2004

	Regulatory limits	Frequency of exceedence	Maximum (ppb)	Average (ppb)	Standard Deviation (ppb)
Inside slurry wall, overburden	MCL: 10 ppb	8 / 8	986	357	333
Inside slurry wall, bedrock		4 / 4	845	490	412
Outside slurry wall, overburden		6 / 19	639	391	279
Outside slurry wall, bedrock		5 / 11	645	551	105
Surface water in Lyle Reed Brook	SWQC Freshwater, Chronic: 150 ppb	0 / 4	26	14	14

The concentrations outside the slurry wall, down-gradient of the site, are such that NHDES will need to extend Institutional Controls to the Nashua River. This will result in an extension of nearly ½ mile. It should be noted that the State of New Hampshire implements institutional controls through its GMZ permitting process and that a similar permit exists for the Four-Hills Landfill that lies directly to the northeast of the site.

Lead was initially a concern as well; however, following extensive sampling it was found to have concentrations that exceeded MCLs in only one well which is outside the slurry wall (26 ppb). Only six wells out of fifty-one had detectable concentrations of lead and most of those wells were in the vicinity of the trailer park perhaps indicating the source of lead is not the site.

The EPA analyzed trends in ground water, surface water, and sediment contamination from 1999 to the present. A summary of the general trends in contamination levels are:

- Volatile organic compounds are declining in concentration both within the slurry wall and in the ground water outside the wall.

- Only one organic compound, chlorobenzene, exceeds ACLs in some wells at the site. The ACL for chlorobenzene is 110 ppb and the MCL and AGQS is 100 ppb. Two wells outside of the slurry wall exceed ACLs for chlorobenzene; HA-5A and HA-5B, overburden and bedrock wells, respectively, had concentrations of 110 and 111 ppb. One well inside the slurry wall, T-24-1, an overburden well, exceeded the ACL for chlorobenzene with a concentration of 154 ppb.

- Arsenic concentrations in ground water exceed MCLs and AGQSs. No ACLs were established for arsenic in the 1983 ROD. Arsenic contamination is pervasive inside the wall and more sporadic outside. The low concentrations in surface water, despite the high ground water concentrations, suggests that much of the arsenic may be sequestered in the sediments. NHDES has conducted a biological assessment of Lyle Reed Brook and has not yet completed the preparation of a report.

Site Inspection

EPA conducted a site inspection on July 23, 2004. Present for the inspection was Mr. Andrew Hoffman, the former NHDES Site Manager, Kenneth Kettenring, the present NHDES Site Manager, John Fritsch and Henry Staples, both of U.S. Filter, Michael Jasinski, the EPA New Hampshire Section Chief, and Darryl Luce, the EPA Site Manager.

The inspection included a walk-through of the closed treatment plant and a walk-over of the capped area. Following the on-site portion of the inspection a further tour of the off-site surface water bodies was performed. EPA and NHDES personnel inspected Lyle Reed Brook and Trout Brook as well as where the streams discharge into the Nashua River.

Interviews

Interviews were conducted with various parties connected to the site. John Fritsch and Henry Staples have worked on the site for many years and did not cite any concerns associated with the site. Mr. Staples and Fritsch have spoken to several of the abutting residents in the recent past. Those residents stated that their concerns were associated with the aesthetics of the site. One resident, Mary Jo Thompson, had expressed a desire to see the building removed. As stated previously, the Assistant to the Mayor and the Director of the Department of Public Works were interviewed. Both cited no problems or concerns with the site.

VII Technical Assessment

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

The review of documents, ARARs, risk assumptions, and the results of the data analysis and site inspection indicates that the remedy is functioning as intended by the previous decision documents. The installation of the slurry wall and cap, coupled with 10 years of pumping-and-treating contaminated ground water has lowered concentrations inside the slurry wall sufficiently so that natural processes can attain the established ACLs. Seven years after shutdown of the treatment plant, concentrations for all compounds except chlorobenzene have attained ACLs, or lower human health-based MCLs. Chlorobenzene levels are declining and are expected to attain ACLs and AGQS in the near future.

Although arsenic did not have an established ACL and its concentrations in ground water exceed concentrations protective of human health, the slurry wall, cap and institutional controls on the site are sufficient to prevent exposure. Off-site, institutional controls are presently insufficient because they end at Troutbrook Drive. The State will be extending the institutional controls approximately ½ mile further to the northwest to cover the remaining area of arsenic contamination. The area over which additional institutional controls are needed is lightly populated with a few residences and businesses; all of which use municipal drinking water. No activities have been observed that would indicate a violation of the institutional controls.

The maintenance of the cap has been effective. Although there are some concerns regarding the presence of woodchucks, no holes have been found on the site and it is possible that they have constructed dens outside the capped area. The cap and slurry wall appear to be functioning as intended and the fence is in good repair.

There is no opportunity for optimization of the system since the current ground water remedy is monitored natural attenuation. However, the monitoring well network and monitoring scheme is continually being re-examined to yield data that conforms to the needs of EPA's protocols.

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

There have been no changes in exposure assumptions, toxicity data, or cleanup levels that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered items consist of Applicable and Relevant and Appropriate Regulations (ARARs) for ground water concentrations. Except as noted in the preceding sections, ground water ACLs have been met at the site. In a similar fashion, the goals established in the 1983 ROD with respect to remedial goals for surface water have also been determined to be met. Therefore, considering the site data against standards in-place for other sites indicates that the risk to human health and the environment has been controlled. The only relevant change was lowering the MCL for arsenic from 50 to 10 ppb as discussed in Section VI, Risk Information and ARARs Review beginning on page 12 of this document.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics has seen no effective change that would cause a re-assessment of the site conditions. No change to assumptions or cleanup levels is warranted.

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

The arsenic data gap determined in the 1999 Five-Year Review demonstrated the potential for an ecological risk. There have been previous studies that found that aquatic diversity in Lyle Reed Brook existed such that it met the goal in the 1983 ROD. However, the concentrations of arsenic in ground water and surface water indicate that high concentrations of arsenic may exist in the sediment in Lyle Reed Brook. Surface water concentrations do not exceed Surface Water Quality Criteria (SWQCs) set at 150 ppb for freshwater chronic exposure to arsenic.

To address ecological risk due to arsenic in sediments, NHDES conducted an Ecological Community Assessment in the summer of 2003. NHDES is still finalizing that report.[15] The 1983 ROD set as a goal for ecological receptors in Lyle Reed Brook an "expanded aquatic population." Conditions at the site are such that some impacts were expected even with full implementation of the remedy; therefore, the overall goal was that some degradation was expected.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the 1982 and 1983 RODs. The only change in the conditions at the site that may

[15] Personal communication from Andrew Hoffman, NHDES to Darryl Luce, USEPA, July 23, 2004.

affect the protectiveness of the remedy is arsenic in ground water. It is anticipated that the State will extend institutional controls to the area of arsenic ground water contamination and ameliorate this condition. Most of the ACLs have been attained except for one compound, chlorobenzene, that is close to the ACL in the three wells where it exceeds the ACL of 110 ppb. Comparing the analytical results to MCLs, most contaminants are either below, or very close to the appropriate MCL, except for arsenic.

There have been no changes in exposure or risk that would affect the protectiveness of the remedy. There is a potential for ecological risk from arsenic in the sediments of Lyle Reed Brook; however, that potential is currently being evaluated by the State. There is no other information that calls into question the protectiveness of the remedy.

VIII Issues

Arsenic has emerged as a potential contaminant of concern since the 1999 Five-Year Review. There is no ACL or other cleanup levels established for arsenic in ground water, surface water or sediment at the site. Although the presence of arsenic in sediments is not likely to affect the protectiveness of the remedy with respect to human health, there is potential to affect ecological receptors in Lyle Reed Brook.

IX Recommendations and Follow-up Actions

Additional monitoring needs to be conducted to fully assess impacts of arsenic to surface water, sediments, and ground water. The existing Environmental Monitoring Plan will need to be modified over the next year to fulfill the data needs. The results of an Ecological Community Assessment being prepared by the State, coupled with consideration of the MNA protocol, will assist in modifying the present monitoring plan. An important component to be developed will be a conceptual Site model. This model will assist in assessing monitoring efforts and to determine more accurate cleanup times. The site repository needs to have a copy of all recent documents and data relevant to the site.

Institutional controls will need to be extended, into an area down-gradient of the current area of restrictions, to the Nashua River. These controls must eliminate the use of ground water for any purpose. Table 6, on the following page, summarizes the necessary actions:

TABLE 6: Recommendations and Followup Actions				
Recommendation / Follow-up Action	**Party Responsible**	**Milestone Date**	**Follow-up Actions: Affects Protectiveness**	
			Current	**Future**
Extend Institutional Controls to the Nashua River.	NHDES	June 2005	No	No
Expand surface water and sediment monitoring of arsenic.	NHDES	September 2005	No	No
Re-evaluate current ground water monitoring strategy.	NHDES / EPA	September 2005	No	No
Improve data reporting and develop conceptual site model.	NHDES / EPA	September 2005	No	No
Add and update documents in the repository.	EPA	Continual	No	No

X Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon extension of the institutional controls. The remedy will be protective outside of the slurry wall and capped area upon attainment of ground water ACLs inside the slurry wall and protective standards outside the wall. These standards are being attained through MNA. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls will prevent exposure to, or the ingestion of, contaminated ground water. All threats at the site have been addressed through the installation of a fence around the affected area, provision of municipal drinking water to the area, stabilization of the contaminant plume with a slurry wall around a twenty-acre area, construction of a cap over that area, and 10 years of pumping and treating the ground water within that capped area. Current data indicate that the contamination remains secure within the slurry wall and that the remedy attained the cleanup goals cited in the 1983 ROD.

XI Next Review

This site requires on-going, policy, five-year reviews. The next review will be conducted and issued before September 2009, five-years from the date of signature of this report.

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Sylvester Superfund Site, Five-Year Review, U.S. Environmental Protection Agency, Region I, September 30, 1999.

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Attachment1

Monitoring Figures for Five-Year Review

Figure 1: Site Plan showing monitoring wells, surface water sampling locations, and proposed sediment sampling locations.

Figure 2: Analytical Data Trends of Interior Overburden Wells (east half of site)

Figure 3: Analytical Data Trends of Interior Overburden Wells (west half of site)

Figure 4: Analytical Data Trends of Interior Bedrock Wells

Figure 5: Analytical Data Trends of Exterior Overburden Wells

Figure 6: Analytical Data Trends of Exterior Bedrock Wells

Figure 7: Relative Arsenic Concentrations in On- and Off-site Overburden and Bedrock Wells

Figure 8: Relative Lead Concentrations in On- and Off-site Overburden and Bedrock Wells

Click on the Bookmarks shown to the left of view each Figure.

Appendix A
Memo to File to Start Five-Year Review

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 Congress Street, Suite 1100
BOSTON, MA 02114-2023

Memorandum

Date: **May 21, 2004**

Subj: **Sylvester (a.k.a. Gilson Road), Start of Five-year Review**

From: **Darryl Luce, RPM, New Hampshire & Rhode Island Superfund Section, Remediation and Restoration I, OSRR (HBO)**

To: **File**

A Five-Year Review is required by CERCLA and the National Contingency Plan to assess the threat to public health and the environment of any operable unit where waste remains in place. By definition, such a Five-Year Review begins five years following construction completion. This is a policy review, based on the remedial action at the site was a pre-SARA remedial action that left hazardous substances on site above levels that allow for unlimited use and unrestricted exposure. This is the third Five-Year Review conducted for this site.

This memorandum is to detail the background information and set the basis for a Five-Year Review. This Five-Year Review is scheduled to start on June 30, 2004 and be completed by September 30, 2004. This Review will be conducted in-house.

The general conditions are that the 28 acre site has a fenced area and a large, empty building. Ground water restoration operations ceased at the treatment plant in January 1996. Since that time the State of New Hampshire Department of Environmental Services has monitored and maintained the site. An area of approximately 20 acres is capped by a low-permeability liner and the aquifer is confined by a slurry wall that excludes contaminants within the wall from migrating laterally. The capped area has an unlined bottom which consists of fractured bedrock.

Several residences lie within 500 feet of the property. However, all of the residences are supplied with municipal water. A ground water, surface water, and sediment monitoring program is in-place.

The EPA has issued Records of Decision (ROD) for the Sylvester Site in the following years:

- July 29, 1982 for installing the slurry wall and cap around most contaminated section of the aquifer.
- September 22, 1983 for building 300 gallon-per-minute ground water treatment plant and establishing alternate cleanup levels for ground water at the site.
- July 10, 1990 issued an Explanation of Significant Differences that required additional wells, required the treatment plant to operate for at least four more years (until July 1994), and required further study at the site if ACLs were not met.
- September 23, 2002 issued an Explanation of Significant Differences, adjusted ACLs for two compounds that had unrealistic cleanup goals.

EPA has also conducted two Five-Year Reviews to-date:

- September 22, 1994; the general finding was that the on-going remedial action at that time was protective of human health and the environment. No specific deficiencies were noted.

- September 30, 1999; the general finding was that the site was protective of human health and the environment. There were some items noted that should be address in the next five-year review, specifically data gaps in surface water and sediment in Lyle Reed Brook as well as some with respect to ground water in the bedrock aquifer.

To perform this Five-Year Review I will need to gather pertinent Site documents such as the RODs and Five-Year Reviews noted above, all sampling results from the environmental monitoring, and various PRP deliverables. I expect this effort will require consultation with appropriate personnel from the State, U.S. Fish & Wildlife, New Hampshire Department of Public Health, ATSDR, and EPA risk assessors.

Appendix B
Checklist to Five-Year Review

Five-Year Review Inspection Checklist

for: Sylvester (a.k.a. Gilson Road) Superfund Site, Nashua, New Hampshire

I. SITE INFORMATION

Site name: Sylvester (a.k.a. Gilson Road)	**Date of inspection:** July 23, 2004
Location and Region: Nashua, NH; EPA Region I	**EPA ID: NHD099363541** **Site ID: 0101115**
Agency, office, or company leading the Five-year Review: USEPA Region I	**Weather/Temperature: clear temperature approx. 72° F**

Remedy Includes: Disposal area cover and containment, access controls, Institutional controls, and Monitored natural attenuation. Because the cleanup levels have been attained, all active components of the remedy have been discontinued. Maintenance and monitoring are the only activities occurring at the site.

Attachments: Site map, Technical Assessment.

II. INTERVIEWS

1. On-Site O&M Site Manager

John Fritsch
Name Title

Interviewed at: Gilson Road site on July 23, 2004
Problems, Suggestions: Mr. Fritsch cited no problems; however, was concerned by observations of woodchucks on the capped area. He stated that he had observed no holes that compromise the cap.
Report attached: None.

2. State O&M Site Manager

Kenneth Kettenring Project Manager, NHDES
Name Title

Interviewed at: Gilson Road site on July 23, 2004. Also present was the former, State site-manager, Andrew Hoffman.
Problems, Suggestions: No problems; however, there were a few concerns regarding neighborhood aesthetics, such as an old wooden fence (not to deny access) needed fixing. However, nothing with respect to the protectiveness of the remedy.
Report attached: None.

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3. Local Regulatory authorities and response agencies

Agency

Contact Mary Nelson (Name) Assistant to Mayor, City of Nashua (Title) 7/20/04 (Date) 603-589-3260 (Phone number)

Problems, suggestions: None.

Report attached: None

Local Regulatory authorities and response agencies

Agency

Contact Richard Seymour (Name) Director, Department of Public Works (Title) 8/12/04 (Date) 603-594-3500 (Phone number)

Problems, suggestions: None.

Report attached: None.

4. Other Interviews:

None.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED

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: The site building is very large and because it is inactive, it is used to store not only many of the site records, but other site records as well.

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: The manuals are right on the wall as one walks into the treatment plant.

3. O&M and OSHA Training Records ✔ Readily Available ✔ Up-to-date ❒ N/A

Remarks: None.

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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: The site is used by NHDES as an air monitoring station to determine the ambient air entering the state from the west.

5. Gas Generation Records ❒ Readily Available ❒ Up-to-date ✔ N/A

Remarks: The nature of waste disposal at the site was such that gas generation did not occur. There was volatization of chlorinated organic compounds in the 1980's; however, that ceased with the implementation of the remedy in the mid 1980s.

6. Settlement Monument Records ❒ Readily Available ❒ Up-to-date ✔ N/A

Remarks: This is not a landfill cap. The cap is on the original ground surface.

7. Ground Water Monitoring Records ✔ Readily Available ✔ Up-to-date ❒ N/A

Remarks: None.

8. Leachate Extraction Records ❒ Readily Available ❒ Up-to-date ✔ N/A

Remarks: None.

9. Discharge Compliance Records

Air	❒ Readily Available	❒ Up-to-date	✔ N/A
Water (effluent)	❒ Readily Available	❒ Up-to-date	✔ N/A

Remarks: None.

10. Daily Access/Security Logs ✔ Readily Available ✔ Up-to-date ❒ N/A

Remarks: Site is low-key.

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:	

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2. O&M Cost Records

✔ Readily available ❒ Up-to-date ❒ N/A

❒ Funding mechanism/agreement in place

Original O&M cost estimate $19 million ❒ Breakdown attached.

Total Annual cost by year for review period if available:

When ground water treatment plant was running full-scale costs escalated gradually from 1986 to the last year of operation, 1996:

From December, 1995 to December, 1996 approximately $2.6 million.

Since that time O&M costs have shifted entirely to the State and have generally been below $150,000 per year although costs would be difficult to assess since the state uses the building for several activities now such as the air monitoring station, boat storage, and records storage (for several sites and state agencies). The costs are limited to two O&M personnel who are there two days per week, oil to heat the building, mowing, and ground water monitoring.

3. Unanticipated or Unusually high O&M Costs during review period (describe costs and reasons): None.

V. ACCESS AND INSTITUTIONAL CONTROLS

✗ Applicable ❒ N/A

A. Fencing

1. Fencing damaged ❒ Location shown on map ✔ Gates secured ❒ N/A

Remarks: Fence consists of six-foot high chain-linked fence topped with three-strands of barbed wire. Fence is in great shape and completely encloses the site.

B. Other Access Restrictions

None.

1. Signs and other security measures ❒ Location shown on map ❒ N/A

Remarks:

Sign is in place, all is secured.

C. Institutional Controls (ICs)

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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: Visual inspections.
Frequency: aperiodic, but at least annual.
Responsible Party/Agency: State of New Hampshire
Contact: Kenneth Kettenring (Name) Project Manager, NHDES (Title) 1-603-271-4060 (Phone number)

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 decisions documents have been met	✔ Yes	❒ No	❒ N/A
Violations have been reported	❒ Yes	✔ No	❒ N/A

Other problems or suggestions: None.

2. Adequacy ❒ ICs are adequate ✔ ICs are inadequate ❒ N/A
Remarks: As outlined in the technical analysis, arsenic has migrated in ground water outside of the area with institutional controls. NHDES will extend the area of institutional controls to encompass this area in February 2005.

D. General

1. Vandalism/trespassing ❒ Location shown on map ✔ No vandalism evident
Remarks: None.

2. Land use changes on-site ✔ N/A
Remarks: None.

3. Land use changes off- site ❒ N/A
Remarks: There have been new houses built on the west and east side of the site. To the southeast a large recreational area was built in the past 5 years.

VI. GENERAL SITE CONDITIONS

A. Roads ❒ Applicable ✔ N/A

1. Roads damaged ❒ Location shown on map ❒ Roads adequate ✔ N/A
Remarks: None.

B. Other Site Conditions

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1. Off-site wetlands ✔ Location shown on map ❒ N/A

Remarks: The wetlands are associated with Lyle Reed Brook as it flows to the Nashua River. The wetlands appear to have been impacted by the discharge of inorganic compounds and in particular, iron. Down-gradient from the site are several places where small breakouts are evident. However, these discharges are dwarfed by what appears to be a discharge from the nearby Four Hills Landfill that lies approximately 400 meters to the east of the site. This discharge comes through a pipe that heads in the direction of the landfill. The outlet of the pipe into Lyle Reed Brook is stained a brilliant orange and contains much floc. The water has a slight landfill odor.

VII. LANDFILL COVERS

✗ Applicable❒ N/A

A. Landfill Surface Although this is not a landfill, a cover is in-place to minimize infiltration.

1. Settlement (low spots) ❒ Location shown on map ✔ Settlement not evident
Areal extent _____ Depth _____
Remarks: None.

2. Cracks ❒ Location shown on map ✔ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks: The site is well-vegetated with meadow-like materials.

3. Erosion ❒ Location shown on map ✔ Erosion not Evident
Areal extent _____ Depth _____
Remarks: None.

4. Holes ❒ Location shown on map ✔ Holes not Evident
Areal extent _____ Depth _____
Remarks: None.

5. Vegetative Cover ✔ Grass ✔ Cover properly established
✔ No signs of stress ❒ Trees/ Shrubs (indicate size and location on map)
Remarks: All vegetation is low-growing forbs. The only trees are on the perimeter, outside of the capped area. There are some shrubs, such as Autumn Olive, growing on the northern side of the site.

6. Alternative Cover (armored rock, concrete, etc.) ✔ N/A
Remarks: None.

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7. Bulges ❒ Location shown on map ✔ Bulges not Evident
Areal extent _____ Depth _____
Remarks: None.

8. Wet Areas/Water Damage ✔ Wet areas/water damage not Evident
❒ Wet areas ❒ Location shown on map - Areal extent _____
❒ Ponding ❒ Location shown on map - Areal extent _____
❒ Seeps ❒ Location shown on map - Areal extent _____
❒ Soft subgrade ❒ Location shown on map - Areal extent _____
Remarks: None.

9. Slope instability ❒ slides ❒ Location shown on site map Areal Extent _____
✔ No evidence of slope instability
Remarks: None.

B. Benches ❒ Applicable ✔ N/A

1. Flows Bypass Bench ❒ Location shown on map ❒ N/A or okay
Remarks:

2. Bench breached ❒ Location shown on map ❒ N/A or okay
Remarks:

3. Bench overtopped ❒ Location shown on map ❒ N/A or okay
Remarks:

C. Letdown Channels ❒ Applicable only to Solid Waste Landfill ✔ N/A

1. Settlement ❒ Location shown on map ❒ No evidence of settlement
Areal extent _____ Depth _____
Remarks:

2. Material Degradation ❒ Location shown on map ❒ No evidence of degradation
Material type _____ Areal extent _____
Remarks:

3. Erosion ❒ Location shown on map ❒ Erosion not Evident
Areal extent _____ Depth _____
Remarks:

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4. Undercutting ❒ Location shown on map ❒ No evidence of undercutting
Areal extent _____ Depth _____
Remarks:

5. Obstructions Type _____ ❒ No obstructions
❒ Location shown on 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 map Areal extent 1200 ft² _____
Remarks:

D. Cover penetration ✔ 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: None.

2. Gas Monitoring Probes
❒ Properly secured/locked ❒ Functioning ❒ Routinely sampled ❒ Good condition
❒ Evidence of leakage at penetration ❒ Needs maintenance ✔ N/A
Remarks: None.

3. Monitoring Wells (within surface area of the capped area)
✔ Properly secured/locked ✔ Functioning ✔ Routinely sampled ✔ Good condition
❒ Evidence of leakage at penetration ❒ Needs maintenance ❒ N/A
Remarks: NHDES is currently examining a number of wells to abandon. Some wells have developed problems such as blockages and may be replaced. It is anticipated that this will occur this year.

4. Ground Water Extraction Wells and Re-Injection points
❒ Properly secured/locked ❒ Functioning ❒ Routinely sampled ❒ Good condition
❒ Evidence of leakage at penetration ❒ Needs maintenance ❒ N/A
Remarks: Now inactive after ten-years of use. These areas appear to be in good condition with no ponding or other points appearing compromised.

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5. Settlement Monuments ❒ Located ❒ Routinely surveyed ✔ N/A
Remarks: None, cap is on solid ground.

E. Gas Collection and Treatment ❒ Applicable ✔ N/A
There is a very small cell on top of the cover at the site that took wastes from the metals removal process at the site. This small, less than one-acre, enclosure has a number of ambient gas vents surrounding it. There is no organic wastes deposited into this cell.

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: Drains to wetlands, no impacts.

2. Outlet Rock Inspected ✔ Functioning ❒ N/A
Remarks: Hidden by vegetation.

G. Detention/Sedimentation Ponds ❒ Applicable ✔ N/A

1. Siltation Areal Extent _____ Depth _____ ❒ N/A
❒ Siltation not evident
Remarks:

2. Erosion Areal Extent _____ Depth _____ ❒ N/A
❒ Erosion not evident
Remarks:

3. Outlet Works ❒ Functioning ❒ N/A
Remarks:

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4. Dam ❒ Functioning ❒ N/A
Remarks:

H. Retaining Walls ❒ Applicable ✔ N/A

1. Deformations ❒ Location shown on map ❒ Deformation not Evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks:

2. Degradation ❒ Location shown on map ❒ No evidence of degradation
Material type _____ Areal extent _____
Remarks:

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

1. Siltation Areal Extent _____ Depth _____ ❒ N/A
❒ Siltation not evident
Remarks:

2. Vegetative Growth ❒ Location shown on site map
❒ Vegetation does not impede flow
Areal extent: Type:
Remarks:

3. Erosion ❒ Location shown on site map ❒ Erosion not evident
Areal Extent _____ Depth _____
Remarks:

4. Discharge Structure ❒ Functioning ❒ N/A
Remarks:

VIII. VERTICAL BARRIER WALLS
❒ Applicable ✔ N/A

1. Settlement ✔ Location shown on map ✔ No evidence of settlement
Areal extent: 20 acre area, three-feet wide and approximately 8,000 feet long.
Depth: up to 90 feet.
Remarks: EPA and NHDES inspected the trench area visually during the site inspection on July 23, 2004 and inquired of the O&M operators, John Fritsch and Henry Staples, if they had observed anything that indicated the trench had any problems. They cited no problems.

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2. Performance Monitoring Type of Monitoring: Sampling by coring and survey
❒ Performance not monitored
Frequency: Coring and survey done in 1994. ❒ Evidence of breaching
Head differential indicated that any flow would be under the cap, into bedrock.
Remarks: The State hired Haley & Aldrich to assess the integrity of the wall. In 1995, after taking several borings and inspecting the trench area, Haley & Aldrich reported that the wall was performing as designed.

IX. GROUND WATER/ SURFACE WATER REMEDIES

✔ Applicable ❒ N/A

A. Ground water extraction wells, pumps, and pipelines ❒ Applicable ✔ N/A

Although this site was the first-in-the-nation ground water pump and treat facility, the site was decommissioned in 2001 after four years of verification monitoring. When the facility was decommissioned all pipes, pumps and devices associated with ground water extraction were removed.

1. Pumps, wellhead plumbing, and electrical
❒ Good condition ❒ All required wells properly operating
❒ Needs maintenance ❒ N/A
Remarks:

2. Extraction system pipelines, valves, valve boxes, and other appurtenances
❒ Good condition ❒ Needs maintenance
Remarks:

3. Spare parts and equipment
❒ Good condition ❒ readily available ❒ Requires up-grade ❒ Needs to be provided
Remarks:

B. Surface water collection structures, pumps, and pipelines ❒ Applicable ✔ N/A

1. Collection structures, pumps, and electrical
❒ Good condition ❒ Needs maintenance
Remarks:

2. Surface water collection system pipelines, valves, valve boxes, and other appurtenances
❒ Good condition ❒ Needs maintenance
Remarks:

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3. Spare parts and equipment
❒ Good condition ❒ readily available ❒ Requires up-grade ❒ Needs to be provided
Remarks:

C. Treatment System ❒ Applicable ✔ N/A

When the treatment plant was operating it consisted of metals removal, air stripping, incineration of volatile organic compounds, and biopolishing of the water effluent before it was recharged onto the site. That equipment was removed when the treatment plant was decommissioned in 2001. Only the treatment building remains.

1. Treatment Train
❒ Metals Removal ❒ Oil/Water separation ❒ Bioremediation
❒ Air Stripping ❒ Carbon adsorbers
❒ Filters
❒ Additive (e.g. chelation agent, flocculent) _____
❒ Others _____
❒ Good condition ❒ Needs maintenance
❒ Sampling ports properly marked and functional
❒ Sampling/maintenance log displayed and up-to-date
❒ Equipment properly identified
❒ Quantity of ground water treated annually _____
❒ Quantity of surface water treated annually _____
Remarks:

2. Electrical enclosures and panels (properly rated and functional)
❒ N/A ❒ Good Condition ❒ Needs maintenance
Remarks:

3. Tanks, vaults and storage vessels
❒ N/A ❒ Good condition ❒ Proper secondary containment ❒ Needs maintenance
Remarks:

4. Discharge structures and appurtenances
❒ N/A ❒ Good Condition ❒ Needs maintenance
Remarks:

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5. Treatment building(s)

❒ N/A ✔ Good Condition (esp. roof and doorways) ❒ Needs repair

❒ Chemicals and equipment properly stored

Remarks: This is a large building that the State is using for a variety of purposes now. It is used as an air monitoring station to establish the air baseline conditions for air entering the state of New Hampshire from the west. It is also used for storage by various state agencies. The Selectmen for the City of Nashua are currently considering petitioning the state to use a portion of the building for equipment storage.

6. Monitoring wells (engineered remedy)

❒ Properly secured/locked ❒ Functioning ❒ Routinely sampled

❒ Good condition ❒ Needs maintenance ❒ N/A

Remarks:

D. Monitored Natural Attenuation

Since the ground water treatment ended in December 1996, monitored natural attenuation has been relied upon to address contaminants that remain in the ground water.

1. Monitoring wells (natural attenuation remedy)

✔ Properly secured/locked ✔ Functioning ✔ Routinely sampled

❒ Good condition ✔ Needs maintenance ❒ N/A

Remarks: As cited earlier, the state is evaluating abandoning and replacing some of the existing wells. Additionally, there may be changes based on a re-evaluation of the monitoring considering the 2002 EPA protocol on MNA.

E. Monitoring Data

1. Monitoring data

✔ Routinely submitted on time ✔ Is of acceptable quality

Remarks: EPA is re-evaluating how monitoring data is presented based on the MNA protocol.

2. Monitoring data suggests

✔ Ground water plume effectively contained

✔ Contaminant concentrations are declining

❒ Inconclusive results or that remedy should be adapted to new data

Remarks: Contaminants for which cleanup levels are established are contained and their concentrations are declining. Arsenic and lead, which did not have cleanup levels established in the 1983 ROD are being evaluated through an augmented monitoring program initiated in 2001.

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X. OTHER REMEDIES

If there are other 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 is soil vapor extraction.

✔ N/A
❒ Other _____

XI. OVERALL OBSERVATIONS

A. Implementation of the remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.)
The remedy is designed to contain contaminants behind a slurry wall and beneath a cap to minimize migration to ground water outside the site. Alternate Cleanup Levels were established for the contaminants inside the slurry wall, and those ACLs have been attained. Although many of the ACLs were higher than typical cleanup levels, the contaminant concentrations within the slurry wall are declining and many of them are below health-based standards. The pump-and-treat remedy, active from 1986 to 1997 removed and destroyed over 216 tons of contaminants while treating over 1.2 billion gallons of ground water. The present MNA remedy, operating since 1997, is the sole remedy now operating at the site.

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.
The primary consideration is maintaining the cap and the slurry wall, which does not appear to be a problem. However, periodic inspections of the wall should be maintained to determine if the wall is functioning correctly.

C. Early indicators of potential remedy problems

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Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

The outcome of further investigations with respect to arsenic and lead may change the cost and scope of O&M but will not compromise the protectiveness of the remedy with respect to human health. Ecosystem monitoring has been performed in Lyle Reed Brook in 2003; however, the results have yet to be published by the state.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Monitoring will be adjusted in the future to correspond with the MNA protocol.