UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EPA NEW ENGLAND-REGION I
J.F.K. FEDERAL BUILDING, BOSTON, MA 02203-2211

MEMORANDUM

DATE: April 7, 1999

SUBJ: Five Year Reviews

FROM: Patricia Ludwig, Data Administrator

TO: Carol Bass

Enclosed please find a copy of the Five Year Review Report for F.T. Rose Disposal Pit. This review was also completed in the 2nd quarter of this fiscal year.

If you have any questions you may contact me directly at (617) 918-1245

cc: Brenda Haslett, IMC

FIVE YEAR REVIEW FOR

THE F. T. ROSE DISPOSAL PIT SUPERFUND SITE
LANESBOROUGH, MASSACHUSETTS

March 1999

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SECTION 1.0
INTRODUCTION

This document is a comprehensive and interpretive report on the five- year review conducted for the F.T. Rose Disposal Pit Superfund site (the Site) in Lanesboro, Massachusetts, (see Figure 1).

1.1 BACKGROUND

The five-year review was undertaken to review remedial actions completed at the site to date, to ensure that the remedial actions remain protective of human health and the environment. This review is required by federal statute for any site remedy which results in hazardous substances remaining on-site (CERCLA §121(c) and 40 CFR §300.430(f)(4)(ii) of the National Oil and Hazardous Substances Contingency Plan).

1.1.1 Purpose of Report

The purpose of the five-year review is to: (1) confirm that the remedy as spelled out in the Record Of Decision (ROD) and/or remedial design remains effective at protecting human health and the environment; and (2) to evaluate whether original cleanup levels remain protective of human health and the environment. This report presents the results of a “Level II” five-year review, in accordance with OSWER Directive 9355.7-02 “Structure and Components of Five Year Reviews.” This review includes elements of a Level II review (document reviews, regulatory review, site inspection, site sampling, statement of protectiveness and recommendations) except for the quantitative recalculation of risk.

1.1.2 Site Background

The Rose Disposal Pit Superfund Site (Rose Site) is located on Balance Rock Road in Lanesborough, Massachusetts, and is approximately one-half mile from the town of Pittsfield, Massachusetts. The Rose property was used for the disposal of waste oils and solvents from General Electric Company (GE) during the 1950s and possibly later. The one and one-half acre disposal area occupies the northern section of a 14-acre residential lot and was formerly a trench into which the waste oils and solvents were dumped. The property encompassing the Site is bounded on the north and northeast by the deciduous forest of Balance Rock State Park, on the east and southeast by cropland and pasture, on the west by mixed forest, and on the southwest by a residential area. A small wetland exists west of the disposal area and a larger forested wetland exists to the southeast of the property on the southern side, of Balance Rock Road. A small man-made pond is located approximately 200 feet south of the disposal area. The Site, currently owned by Mr. Rose, is located on a small hill north of the Rose’s house. The areal extent of the disposal area is approximately 200 feet by 350 feet and the depth of contaminated soil varies between 10 and 30 feet.

Polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs) are the principal contaminants in the soil and groundwater, respectively. PCB soil concentrations in the disposal area varied considerably. The western portion of the disposal area had concentrations up to 53,000 pprn at depths between 10-25 feet, with decreasing contamination in shallower soils. The eastern area of the Site had soil PCB concentrations up to 440,000 ppm, in a very limited area. Other portions of the disposal area, had concentrations that were considerably lower. The average soil concentrations ranged from 500 to 1,000 ppm.

1.1.3 Summary of Remedy Stipulated by Records Of Decision

GE has performed the majority of the technical activities at the Site. After the preliminary assessment, site inspection, and field investigation were performed by EPA between 1980 and 1982, all subsequent Site activities have been conducted by GE.

GE provided a permanent potable water supply for the Rose household in August 1983 by connecting the residence to the Lanesborough Municipal Water System. In May 1984, EPA issued GE an Administrative Order under Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). In compliance with this Order, GE performed numerous activities in 1984, including: site fencing and posting; covering contaminated soil with a polyethylene film; installing a recovery well to capture a localized free oil layer; and connecting private properties with permanent potable water via connection to the Lanesborough Municipal Water System.

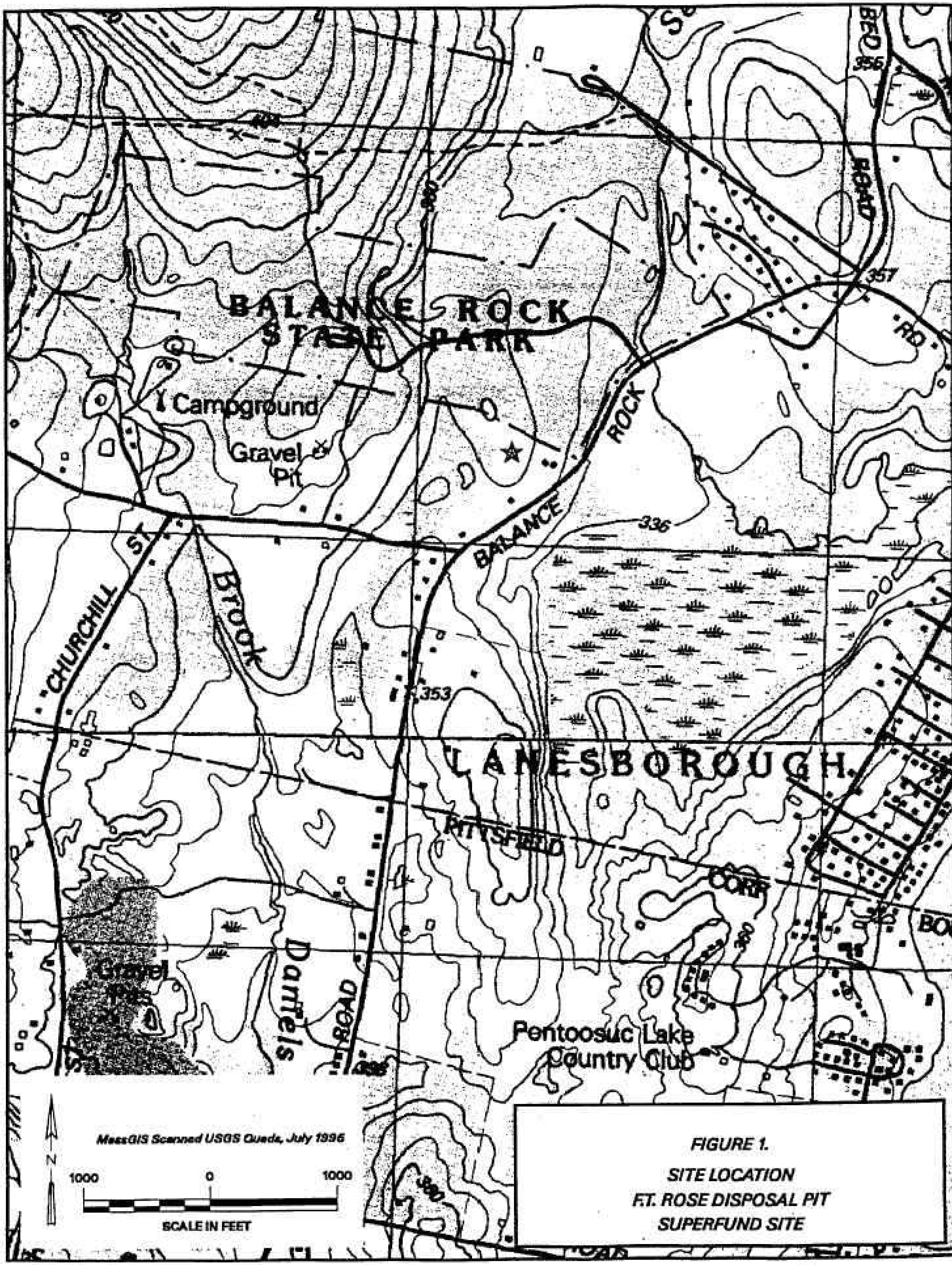


FIGURE 1.
SITE LOCATION
F.T. ROSE DISPOSAL PIT
SUPERFUND SITE

In September 1988, EPA signed a Record of Decision for the Site. The selected remedy was a comprehensive approach for Site remediation which includes both a source control and a management of migration component, and included:

- Excavation and on-site incineration of contaminants consisting of approximately 15,000 cubic yards of contaminated soil and sediment. Excavation and incineration of soils to a cleanup concentration of 13 ppm of PCBs to the water table and limited excavation in the saturated zone to remove the subsurface free product portion of the disposal area.

- Active restoration of the shallow overburden aquifer contaminated with VOCs using on-site treatment involving air stripping and carbon adsorption. Installation of a bedrock well in the vicinity of the free product area to prohibit migration into the fractured rock. Groundwater treatment to reduce contaminant levels to drinking water standards or other appropriate guidelines. Treatment of sediments and surface water in Rose's pond and restoration of the pond to its original wetlands character after remediation.

- Implementation of institutional controls to prevent groundwater use and excavation into the saturated zone within the disposal area.

In September 1988, GE entered into a Consent Decree (CD) with EPA to perform the above work. Excavation in the source area portion of the disposal area extended into the saturated zone (below the water table). For the remaining portion of the disposal area, excavation of contaminated soil was restricted to the unsaturated zone (above the water table). This was due to the impracticability of excavating the entire saturated zone of the disposal area and possible adverse impacts to adjacent wetlands. Approximately 51,197 tons of PCB contaminated soil were excavated in both the saturated and unsaturated portions of the disposal area. Because some PCBs remained in the saturated soil layer, it was also determined that institutional controls would be necessary.

The management of migration portion of the remedial action was designed to treat contaminated groundwater located in a shallow aquifer to drinking water standards. Two trenches were constructed to intercept the plumes of contaminated groundwater. From the collection trenches, contaminated groundwater is pumped to a groundwater treatment facility, where it is treated using a combination of air stripping and carbon adsorption. In addition, Rose’s Pond was excavated, treated, and restored.

The above work was initiated in July 1992 and completed July 1994. Treatment of contaminated groundwater is ongoing.

Selected remedial actions for the site were developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Contingency Plan (NCP) at 40 CFR Part 300. Remedial alternative selection was documented in the ROD.

1.1.4 Report Organization

This document is organized for a Level II review. It presents the results of the five- year review within the following discussions:

Section 1.2, Remedial Objectives presents ROD-specified remedial objectives.

Section 1.3, Standards Review describes the results of a review of existing site documents which pertain to the remedial actions implemented at the site.

Section 1.4, Risk Assessment Review describes the risk factors and equations used during the RI/ FS and proposes update alternatives.

Section 2.0, Present Site Conditions describes the on- going groundwater treatment remedial action, results of data collected during the five year review and the information obtained during site inspections.

Section 3.0, Evaluation of Data presents both an evaluation of current groundwater conditions and a reassessment of risk based on updated risk factors and site data.

Section 4.0, Conclusion

Section 5.0, References contains references cited in the report.

1.2 REMEDIAL OBJECTIVES

Pursuant to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by Section 121(c), and Section 300,430(f)(4)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a statutory five-year review is required for remedial actions selected on or after October 17, 1986. The review must be completed within five years of the initiation of the remedial action, and every five years thereafter, for sites which will not allow for unlimited use and unrestricted exposure after attainment of the performance standards stated in the ROD.

This five-year review will consider whether applicable or appropriate and relevant requirements (ARARs) for substances not addressed under contaminants of concern have been changed such that the remedy is no longer protective. The review also will consider pending or actual changes in zoning or land uses that will undermine the remedy. The review will also consider the need for institutional controls at and near the site.

The overall project objectives of the assignment are to confirm that the remedy selected for the Rose Disposal Pit Superfund Site continues to be protective based on a review of current standards.

1.3 STANDARDS REVIEW

In order to conduct the first five- year review at this site, existing site documents were reviewed and other materials that are the basis for the source control and groundwater treatment, including documents that outline the objectives, cleanup goals, and implementation of the remedial action. These documents include:

- Record of Decision (ROD)
- Consent Decree
- Close-Out Report
- Groundwater Monitoring Plan
- Remedial Investigation Report

Complete citations for these documents are provided in the references section of this report.

1.3.1 Standards Review Approach

A review of applicable or relevant and appropriate requirements (ARARs) was conducted to update regulatory standards promulgated since the ROD was issued in 1988. The review is intended to evaluate whether the response is protective of human health and the environment.

Chemical-specific ARARs, including criteria to be considered (TBC), used during development of the ROD were updated and any changes will be evaluated to determine the effects of the changes on the chosen remedial action and action effectiveness. The standards review was based on review of EPA-provided documents as well as published federal, state and local rules and regulations.

An analysis of newly promulgated or modified requirements of state or federal environmental regulations was conducted to determine if they are ARARs. The analysis was also used to determine if ARARs; call into question the protectiveness of the remedy. Within this report, chemical-, location-, and action-specific requirements are tabulated. Changes to the requirements since the ROD was signed are highlighted.

The standards review also includes examination of analytical data collected from the site and the groundwater treatment plant, including quarterly monitoring and its subsequent review against federal and state standards. Groundwater data review is provided in Sections 2.2 and 3.1 of this report.

1.3.2 ARARs Review

An analysis of newly promulgated or modified requirements of federal and state environmental laws was conducted to determine if they are applicable or relevant and appropriate requirements (ARARs) and to determine if they call into question the protectiveness of the remedy.

The basis for the site ROD was developed prior to promulgation ofthe revised National Contingency Plan (40 CFR Part 300, March 1990) and prior to publication of the CERCLA Compliance With Other Laws Manual: Parts I and II, (OSWER Directives 9234.1-01 and 9234.1-02, respectively), although existing Draft ARAR procedures were followed in the ROD. Some changes to the ARARs have occurred since ROD development. These changes are presented in this section via several tables:

Table 1-1: Potential chemical-specific ARARs and guidance identified in the ROD are re-evaluated in this table. The re-evaluation includes a determination of whether the rule is currently ARAR or TBC and whether the remediation is in compliance with the ARAR.

Table 1-2: This chemical-specific ARARs table presents a comparison of the ROD-specified standards (1988) to current (1998) standards for groundwater chemicals of concern.

Table 1-3: This chemical-specific ARARs table presents a comparison of the ROD-specified standards (1988) to current (1998) standards for surface water and sediment chemicals of concern.

Table 1-4: Potential location-specific ARARs and guidance identified in the ROD are presented.

Table 1-5: Potential action-specific ARARs and guidance identified in the ROD are re-evaluated. The re- evaluation includes a determination of whether the rule is currently ARAR or TBC.

Table 1-6: This chemical-specific ARARs table presents a comparison of the ROD-specified oral reference dose levels and cancer slope levels (1988) to current (1998) standards for chemicals of concern.

Following is a summary of newly promulgated or modified state and federal requirements.

1.3.2.1 Chemical-Specific ARARs. Standards specified by the various chemical-specific ARARs have undergone some revision since ROD completion in 1988. These revisions are reflected in the tables accompanying this text. For future use, a summary of 1998 ARARs as determined by this review is provided as Table 1-1.

Another requirement on the chemical-specific ARAR list for the site is the Massachusetts Surface Water Discharge Permit Program. These regulations apply to discharges to surface water bodies, such as the wetland and Secum Brook. Although a Massachusetts surface water discharge permit is not required, equivalent documentation must be attained.

Federal ambient water quality criteria are non-enforceable guidance developed under the Clean Water Act, and therefore cannot be applicable by definition. However, section 121 (d) of CERCLA specifies that these criteria should be attained when relevant and appropriate.

Criteria to-be-considered are also modified from the 1988 presentation. Massachusetts Drinking Water Health Advisories have been replaced by Massachusetts Office of Research and Standards Guidelines (ORSGs). Federal acceptable intake chronic and subchronic values are no longer used, having been replaced by Risk Reference Doses (RfDs). In addition, RfDs and Carcinogen Assessment Group (CAG) slope factors are two of several factors that may be used to calculate risk at a site. These criteria do not need to be identified in the ARAR section as they are covered under the risk assessment discussion.

1.3.2.2 Location-Specific ARARs. Table 1-4 summarizes current potential location-specific ARARs and criteria. The wetlands ARARs identified in the 1988 ROD still apply today. The Resource Conservation and Recovery Act (RCRA) contains a number of explicit limitations on where on- site storage, treatment, or disposal of hazardous waste may occur. RCRA location requirements and land disposal restrictions are considered to be location-specific ARARs. Other siting requirements are also considered ARAR.

Based upon the 1997 site visit, areas impacted by remedial actions were assessed. Rose Pond was excavated and re-filled during remediation activities; the pond still maintains wetland species.

1.3.2.3 Action-Specific ARARs. Action-specific requirements were identified in the 1988 ROD, although the regulatory considerations were not clearly distinguished. An attempt has been made to clarify the requirements. The requirement status identified in Table 1- 5 is accurate for on- going remedial actions.

1.4 RISK ASSESSMENT REVIEWS

1.4.1 Human Health Risk Assessment

Site-related human health risks were estimated in the Endangerment Assessment Report prepared by Geraghty & Miller, Inc. (G&M, 1988). Human health risks were estimated to exceed the EPA target cancer risk range of 10 -6 to 10-4 and/or a hazard index of 1.0 from the following exposures:

1. Dermal contact with and incidental ingestion of soils containing PCBs at the disposal area for theoretical child and adult residents (carcinogenic risk associated with maximum and average levels of PCBs of 8.5 x 10-2 and 3.2 x 10-3 , respectively; noncarcinogenic risk associated with maximum and average levels of PCBs of 4,700 and 170, respectively).

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Groundwater				
Federal Regulatory Requirements	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	Relevant and Appropriate	MCLs have been promulgatd for a number of common organic and inorganic analytes. These levels regulate the concentration of analytes in pubic drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water. When risks to public health due to consumption of groundwater were assessed, concentrations of contaminants of concern, including Polychlorinated Biphenyls, Tetrachloroethene, Trichloroethene, and Vinyl Chloride, were compared to their MCLs. SDWA MCLs also were used in setting discharge requirements.	MCLs and non-zero MCLGs have the status of ARARs for areas not directly overlain by waste. Some MCLs and MCLGs have changed since ROD completion. A comparison of changes to MCL/MCLG to those used for the ROD is provided in Table1-2. An identification of the most stringent numerical standards and criteria is provided in Table 1-2. Polychlorinated Biphenyls, Tetrachloroethene, Trichloroethene, and Vinyl Chloride still exceed their respective MCL/MCLGs. Groundwater still requires remediation under this rule.
	RCRA - Subpart F, Groundwater Protection Standards, Concentration Limits (40 CFR 264.94(a))	Relevant and Appropriate	Standards for 14 toxic compounds have been adopted as part of RCRA groundwater protection standards. These limits were originally set at MCLs.	RCRA sets the limit for organic constituents at background levels. Constituents in site groundwater still exceed RCRA MCLs for arsenic and choromium, and exceed MCLs for most organic COCs. Groundwater still requires remediation under this rule.

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Massachusetts Regulatory Requirements	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Applicable	Massachusetts Groundwater Quality Standards have been promulgated for a number of contaminants. When state levels are more stringent than federal levels, the state levels will be used. DEP Groundwater Standards were considered when determining discharge levels.	Current Massachusetts groundwater standards are updated and compared to site groundwater in Table 1-2. Groundwater underlying the site is designated Class A. Polychlorinated Biphenyls, Tetrachloroethene, Trichloroethne, and Vinyl Chloride still exeed their respective MMCLs. Site groundwater still requires remediation under this rule.
	Massachuetts Drinking Water Requirements (310 CMR 22.05 to 22.09)	Relevant and Appropriate		
Federal Criteria, Advisories, and Guidance	SDWA - Maximum Contaminant Level Goals (MCLGs)	Relevant and Appropriate/ To Be Considered	MCLGs are health-based criteria that are to be considered for drinking water sources as a result of SARA. These goals are available for a number of organic and inorganic contaminants. Projected groundwater concentrations of trans-1,2-dichloroethene, toluene, benzene, and TCE were compared to their MCLGs. For benzene, vinyl chloride and TCE, MCLGs are set at zero.	Non-zero MCLs have the status of ARAR for areas not directly overlain by waste. Zero MCLGs cannot have the status of ARARs but are, however, to be considered in developing site remedies. Some of the MCLGs have changed since ROD completion. A comparison of MCLG changes to those used for the ROD is provided in Table 1-2. An identification of the criteria to be considered is provided in Table 1-2. Polychlorineated Biphenyls, Tetrachloroethene, Trichloroethene, and Vinyl Chloride exceed their respective MCL/MCLGs. Groundwater still requires remediation under this rule.

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. Health Advisories were considered for contaminants in groundwater that may be used for drinking water.	Contaminated groundwater at the site is not being used as a drinking water source.
	EPA Office of Water Guidance-Water-related Fate of 129 Priority Pollutants (1979)	To Be Considered	This guidance manual gives transport and fate information for 129 priority pollutants. The manual was used to assess the transport and fate of a variety of contaminants.	There is no change from the ROD presentation for this ARAR.
Massachusetts Criteria, Advisories, and Guidance	Massachusetts Office of Research and Standards Guidelines (ORGs)	To Be Considered	DEP Health Advisories are guidance criteria for drinking water. DEP Health Advisories were used to develop discharge levels for surface water and groundwater.	The Massachusetts DEP Office of Research and Standards issues guidelines for chemicals for which state MCLs have not yet been promulgated. These guidelines apply to non-chlorinated water supplies and represent a level at or below which adverse, non-cancer health effects are not expected to occur, and which generally has associated with it an excess lifetime cancer risk of less than or equal to one in one million.

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Discharge to Surface Water				
Massachusetts Regulatory Requirements	Massachusetts Surface Water Quality Standards (314 CMR 4.05)	Applicable	DEP Surface Water Quality Standards are given for dissolved oxygen, temperature increase, pH, and total coliform and there is a narrative requirement for toxicants in toxic amounts. In the absence of a state standard for a compound, federal AWQC would be appropriate. Requirements were considered; however, no numerical standards exist for contaminants found in site groundwater which would be discharged to surface water. Federal AWQC will be used in the absence of narrative standards.	These regulations classify the surface waters of the Commonwealth according to the users of those waters. The wetland has a class A waterway classification. Class B waters are designated as habitat for fish, other aquatic and wildlife, and for primary and secondary contact recreation. The state surface water minimum criteria for class B waters are consistent with federal AWQC. These rules are applicable to Secum Brook and Pontoosuc Lake.
	Massachusetts Surface Water Discharge Permit Program (314 CMR 3.00)	Applicable	These regulations identify the list of toxic pollutants to be controlled with effluent limitations and are applicable to any current or planned discharge to Secum Brook and Pontoosuc Lake.	Pollutant discharges to surface water must comply with NPDES permit requirements. Permit conditions and standards for different classes of water are specified.
Surface Water				

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Federal Criteria, Advisories, and Guidance	Federal Ambient Water Quality Criteria (AWQC)	Relevant and Appropriate	Federal AWQC are health-based and ecologically based criteria which have been developed for 95 carcinogenic and non-carcinogenic compounds. AWQC were considered in characterizing public health risks to aquatic organisms due to contaminant concentrations in surface water at Flint Pond. Because this water is not used as a drinking water source, the criteria developed for aquatic organisms were considered.	CERCLA Sec. 121 (d)(2)(A) specifically states that remedial actions shall at least attain federal AWQC established under the Clean Water Act if they are relevant and appropriate. The AWQC for the contaminants of concern have not changed since the ROD; however, some of the AWQC for other site contaminants have changed since ROD completion, as illustrated by Table1-3. Current AWQC are listed in Table 1-3.

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
<u>Air</u>				
Massachusetts Regulatory Requirements	Massachusetts - Air Quality, Air Pollution (310 CMR 6.00-8.00)	Formerly Relevant and Appropriate, now Not ARAR	These standards were primarily developed to regulate stack and automobile emissions.	310 CMR 6.00 provide ambient air quality standards for the Commonwealth, standards for dust are contained in 310 CMR 7.09, and 310 CMR 7.08 provides incinerator standards. These standards were used in establishing dicharge limits from the incinerator. The incinerator has been dismantled and these requirements are no longer applicable, relevant or appropriate.
Federal Criteria, Advisories, and Guidance	Threshold Limit Values (TLVs)	Formerly To Be Considered now Not ARAR	These standards were issued as consensus standards for controlling air quality in workplace environments. TLVs could be used to assess site inhalation risks for soil removal operations	The incinerator has been dismantled and these requirements are no longer applicable, relevant or appropriate.
Massachusetts Criteria, Advisories, and Guidance	Massachusetts Guidance on Acceptable Ambient Air Levels (AALs)	Formerly To Be Considered now Not ARAR	These are guidelines in emission permit writing. AALs were considered when assessing the significance of monitored and modeled residential contamination from air emissions.	The incinerator has been dismantled and these requirements are no longer applicable, relevant or appropriate.

TABLE 1-1
POTENTIAL CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS
(continued)

MEDIA and AUTHORITY	REQUIREMENT	ROD STATUS	ROD REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Soil/Sediment				
Federal Regulatory Requirements				
There are no set maximum allowable residual levels for chemicals in sediments under federal law.				
National Oceanic and Atmospheric Administration (NOAA)	Effects Range-Low and Range-Median (ERL and ERM) Values for Marine and Estuarine Sediments (Long et., 1995; Long and Morgan, 1991)	Not identified in ROD - Add as To be Considered	None.	
Ontario Ministry of Environment and Energy (OMEE)	Lowest and Severe Effect Levels (LELs and SELs) for Freshwater Sediments (Persaud et al., 1993).	Not identified in ROD - Add as To be Considered	None.	

TABLE 1-2. COMPARISON OF 1988 AND 1988 R0D-SPECIFIED NUMERICAL, CHEMICAL-SPECIFIC ARAS AND CRITERIA [A] FOR GROUNDWATER COMPOUNDS OF CONCERN WITH CURRENT STANDARDS AND CRITERIA, F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS (All Criteria in mg/L)

CHEMICAL	SDWA [c]				Mass [tts] ORSG [E]		Mass [tts] Drinking Water Stdds. (310 CMR 22.0) [F]	
	MCL		MCLG					
	1988	1998	1988	1998	1988	1998	1988	1998
COCs[A]								
t-1,2-Dichloroethylene	--	0.1	0.070	0.1	#	na	#	0.1
Ethylbenzene	--	0.7	0.68	0.7	#	na	#	0.7
PCBs	--	0.0005	--	0	#	na	#	0.0005
Tetrachloroethylene	--	0.005	0	0	#	na	#	0.005
Toluene	--	1	2.0	1	#	na	#	1
Trichloroethylene	0.005	0.005	--	0	#	na	#	0.005
Vinyl chloride	0.002	0.002	--	0	#	na	#	0.002
Other Site Contaminants[G]								
Benzene	0.005	0.005	--	0	#	na	#	0.005
Carbon Disulfide	#	na	#	na	#	na	#	na
Chlorobenzene	--	0.1	0.06	0.1	#	na	#	0.1
o-Dichlorobenzene	--	0.6	--	0.6	#	na	#	0.6
p-Dichlorobenzene	0.075	0.075	--	0.075	#	na	#	0.005
m-Dichlorobenzene	--	na	--	na	#	na	#	na
1,2 -Dichloroethane	#	0.005	#	0	#	na	#	0.005
1,1-Dichloroethylene	0.007	0.007	--	0.007	#	na	#	0.007
cis-1,2-Dichloroethylene	#	0.7	#	0.07	#	na	#	0.07
2,4-Dimethylphenol	#	na	#	na	#	na	#	na
Methylene chloride	--	0.005	--	0	#	na	#	0.005
Naphthalene	#	na	#	na	#	na	#	na
1,2,4-Trichlorobenzene	#	0.07	#	0.07	#	na	#	0.07
1,1,2-Trichloroethane	--	0.005	--	0.003	#	na	#	0.005
Xylenes	--	10	0.44	10	#	na	#	10

Footnotes

[A] This table provides an update of the regulations and criteria identified in Table 5 of the 1988 Record of Decision.
[B] Chemicals of Concern (COCs) drawn from 1988 Record of Decision, Table 62 entitled *Site Contaminants and Contaminants of Concern.*
[C] Federal Safe Drinking Water Act, Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). 40 CFR 141, National Primary Drinking Water Standards.
[D] U.S. Environmental Protection Agency, Drinking Water Regulations and Health Advisories, October 1996. Lifetime advisory is for 70 kg adult.
[E] Massachusetts Department of Environmental Protection, Office of Research and Standards Guidelines, drinking water guidelines. Spring 1997.
[F] Massachusetts Department of Environmental Protection, 310 CMR 22.00, Drinking Water Regulations, Massachusetts maximum contaminant levels.
[G] Other chemicals detected as site contaminants, but not selected as contaminants of concern.
na Not available (Standards have not been generated)
Not identified in the 1988 ROD.

TABLE 1-3. COMPARISON OF 1988 AND 1998 ROD-SPECIFIED NUMERICAL, CHEMICAL-SPECIFIC ARARS AND CRITERIA FOR SURFACE WATER AND SEDIMENT CHEMICALS OF CONCERN, F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS [A]
(All criteria µg/L)

Chemical	Water Quality Criteria			
	Aquatic Life[D]			
	Acute		Chronic	
	1988	1998	1988	1998
COCs [B]				
t-1,2-Dichloroethylene	11,600	11,600	na	na
Ethylbenzene	32,000	32,000	na	na
PCBs	2.0	2.0	0.014	0.014
Tetrachloroethylene	5,280	5,280	840	840
Toluene	17,500	17,500	na	na
Trichloroethylene	45,000	45,000	21,900	21,900
Vinyl chloride	na	na	na	na
Other Site Contaminants [C]				
Benzene	#	5,300	#	na
Carbon Disulfide	#	na	#	na
Chlorobenzene	#	na	#	na
o-Dichlorobenzene	#	na	#	na
p-Dichlorobenzene	#	na	#	na
m-Dichlorobenzene	#	na	#	na
1,2-Dichloroethane	#	118,000	#	20,000
1,1 -Dichloroethylene	#	na	#	na
cis-1,2-Dichloroethylene	#	na	#	na
2,4-Dimethylphenol	#	2,120	#	na
Methylene chloride	#	na	#	na
Naphthalene	#	2,300	#	620
1,2,4-Trichlorobenzene	#	na	#	na
1,1,2-Trichloroethane	#	na	#	9,400
Xylenes	#	na	#	na

na - not available

[A] PCBs are COCs in sediment. As in 1988, there are currently no human health screening benchmarks or criteria were available for evaluating PCBs. Sets of ecological screening benchmarks for PCBs which were not available in 1988 include NOAA ERLs and ERMs (Long et al., 1995; Long and Morgan, 1991) and Ontario Ministry of Environment and Energy LELs and SELs (Persaud et al., 1993). PCB concentrations in sediment samples collected in 1998 are compared to these benchmarks in Section 3.4.

[B] Chemicals of concern were drawn from the 1988 Record of Decision

[C] and # - Other chemicals detected as site contaminants, but not selected as Chemicals of Concern.

[D] US Environmental Protection Agency Water Quality Criteria or Lowest Observed Effects Levels

TABLE 1-4
POTENTIAL LOCATION-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, MASSACHUSETTS

SITE FEATURE and AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Wetlands				
Federal Regulatory Requirements	Clean Water Act (CWA) - (40 CFR Part 230)	Applicable	Under this requirements, no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available. During identification, screening, and evaluation of alternatives, the effects on wetlands are evaluated.	This ARAR has been met. Adversely impacted wetlands were remediated according to the plan.
	Fish and Wildlife Coordination Act (16 U.S.C. 661)	Applicable	This regulation requires that any federal agency proposing to modify a body of water must consult with the U.S. Fish and Wildlife Service. This requirement is addressed under CWA Section 404 requirements.	This ARAR was met; consultation occurred as part of the RI/FS process.
State Regulatory Requirements	Massachusetts - Wetlands Protection (310 CMR 10.00)	Applicable	These requirements are promulgated under Wetlands Protection Laws, which regulate dredging, filling, altering, or polluting inland wetlands. Work within 100 feet of a wetland is regulated under this requirement. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. If alternatives require that work be completed within 100 feet of a defined wetland, these regulations are to be considered. Mitigation of impacts on wetlands are addressed under CWA 404.	This ARAR has been met. Adversely impacted wetlands were remediated according to the plan.
	Hazardous Waste Facility Siting Regulations (990 CMR 1.00)	Relevant and Appropriate	These regulations outline the criteria for the construction, operation, and maintenance of a new facility or increase in an existing facility for the storage, treatment, or disposal of hazardous waste. Specifically, no portion of the site may he located within a wetland or bordering a vegetated wetland.	This ARAR was met. These regulations were addressed during the design phase of the treatment facility construction. The facility was designed to meet needs of project.
Federal Requirements to be Considered	Wetlands Executive Order (EO 11990)	To Be Considered	Under this regulation, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.	This ARAR has been met. Many of the requirements of this EO were addressed under CWA Section 404. Adversely impacted wetlands were remediated according to the plan.

TABLE 1-4
POTENTIAL LOCATION-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
F.T. ROSE DISPOSAL PIT, MASSACHUSETTS
(continued)

SITE FEATURE and AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS and CONSIDERATION IN RI/FS	FIVE-YEAR REVIEW
Floodplains				
Federal Regulatory Requirements	RCRA Location Standards 40 CFR 264.18(b)	Relevant and Appropriate	RCRA-defined listed or characteristic hazardous waste (40 CFR 261) facility must be designed, constructed, operated, and maintained to prevent washout by 100-year flood.	This ARAR has been met.
	Executive Order 11988; Clean Water Act (40 CFR 6.302(b), Appendix A)	Applicable	Federal agencies shall take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values of floodplains. Federal agencies shall also evaluate potential effects of actions in floodplains and ensure consideration of flood hazards and flood plain management. If action is taken in floodplains, alternatives to avoid adverse effects, and minimize potential harm must be taken.	This ARAR has been met.
State Regulatory Requirements	MassachusettsWetlands Protection (310 CMR 10.57 (2), 10.04)	Applicable	Actions in “bordering land subject to flooding” shall provide compensatory storage for flood storage volume lost as a result of the project, shall not restrict flows so as to cause an increase in flood stage or velocity, and shall not impair its capacity to provide important wildlife habitat functions or alter vernal pool habitat. Actions in “isolated land subject to flooding” shall not result in flood damage because of lateral displacement of water that would otherwise be confined within the area, adverse effects on water supply, adverse effects on the capacity of the area to prevent groundwater pollution, or adverse effects on vernal pool habitat.	This ARAR has been met

2. Ingestion of shallow groundwater located from within the disposal area to 500 feet from the center of the disposal area (i. e., Areas 1 and 3) containing PCBs, tetrachloroethylene, and vinyl chloride as drinking water (carcinogenic risk associated with average concentrations of 2.3 x 10 0 and 1.4 x 10 -2 , respectively; noncarcinogenic risk associated with average concentrations of 8,700 and 1.2, respectively).

Massachusetts Surface Water Discharge Permit Program (314 CMR 2.00 - 4.00)

This section outlines the requirements for obtaining an NPDES permit in Massachusetts - Applicable.

Pollutant discharges to surface water must comply with NPDES permit requirements. Permit conditions and standards for different classes of water are specified.

314 CMR 3.00 establishes the program whereby discharges of pollutants to surface waters are regulated. Outlets for such discharges and any associated treatment works are also regulated. Surface water at the site is classified “B - warm water, treated water supply” under 314 CMR 4.06. Since the groundwater treatment facility discharges to the wetland, these rules apply. Although a permit is not required, its substantive equivalent is.

Risks were estimated as within or below the EPA target cancer risk range and/or below a hazard index of 1.0 from residential dermal and ingestion exposures to off-site soils in Rose Garden and from potable use of groundwater 500 feet to 1,000 feet beyond the center of the disposal area (i.e., Areas 4 and 5). In addition, recreational exposures to contaminants in Rose Pond sediments (via dermal contact), Rose Pond surface waters (via dermal contact, incidental ingestion and inhalation of volatiles), and Rose Property Stream surface waters (via dermal contact) were estimated as within or below regulatory criteria.

In this five-year review, potential risks from contaminants in soil, groundwater, surface water and sediment are re-evaluated to determine whether the remedy and the original cleanup levels, as contained in the ROD, remain effective at protecting human health. In addition, human health risks from exposure to off-site groundwater, sediment and surface water are qualitatively re-evaluated, using data from 1998 (see Section 3.3).

Several factors differ in the current risk evaluation of these environmental media, compared to the 1988 assessment. One of these factors is that the list of chemicals evaluated differs. The 1988 Endangerment Assessment Report selected indicator contaminants of concern (COCs) for all media based on groundwater contaminant detection data only. The seven indicator chemicals that posed the greatest potential risk to human health were carried thorough the risk assessment. These included PCBs, trans-1,2-dichloroethylene, ethylbenzene, tetrachloroethylene, toluene, trichloroethylene and vinyl chloride. Other detected chemicals, including benzene, methylene chloride, and inorganics, were eliminated from further evaluation in the risk assessment. Some of the eliminated chemicals (methylene chloride, 1,1-dichloroethylene, benzene, 1,1,2-trichloroethane, chlorobenzene, xylenes and dichlorobenzenes) were included in the ROD. Other historically detected organic compounds which did not appear in the ROD include naphthalene, 1,2-dichloroethane, 2,4-dimethylphenol and 1,2,4-trichlorobenzene. For this evaluation, these organic compounds, plus any additional organic chemicals detected in more recent sampling events (cis-1,2-dichloroethylene and carbon disulfide), have been included and are listed on tables in this report as "Other Site Contaminants". Inorganics have not been evaluated since more recent sampling has not included inorganics as target analytes.

Oral reference doses and cancer slope factors have changed since 1988, as shown in Table 1-6. Also included are oral reference doses and cancer slope factors for "Other Site Contaminants". This information is useful for the qualitative re-evaluation of the recent 1998 data. For most contaminants, changes to toxicity information have been minimal. For PCBs, the oral slope factor for drinking water exposures has been decreased by an order of magnitude and a reference dose has been derived. These changes would result in a decrease in the estimation of cancer risk associated with PCBs, and an increase in the noncarcinogenic risk estimates for all media containing PCBs.

Only PCBs were historically measured in on-site and off-site soils. The selected remedy included excavation and incineration of on-site soils containing PCBs in excess of 13 ppm. The incinerated soils were placed back on- site and covered. No confirmatory sampling results are available to estimate residual risk associated with exposures to these on-site soils. In the absence of these data, the incinerated soils should remain covered and the fence intact to limit potential exposures. A future five-year review will incorporate soil sampling to determine the level at which residual soil may require additional institutional controls once groundwater remediation is complete. PCB levels in off-site soils (i.e., in the Rose garden) were 2.8 mg/kg, a level not associated with either a risk outside the acceptable excess risk range of 1 x10-4 to 1x10-6 or an HI_1 in the 1988 Endangerment Assessment Report.

The ingestion of Rose Pond and Rose property stream sediments were not quantitatively evaluated in the 1988 Endangerment Assessment Report. Only PCBs were analyzed for in this medium of concern, with a maximum detected result reported in 1988 of 1.1 ppm total PCBs. Inclusion of the ingestion pathway would increase the risk estimates contained in the 1988 Endangerment Assessment Report, but not to levels in excess of regulatory guidelines.

The evaluation of groundwater in the 1988 Endangerment Assessment Report included only the ingestion of groundwater as a drinking water source. Institutional controls should eliminate the potential risk associated with residential groundwater use.

1.4.2 Ecological Risk Assessment

The Endangerment Assessment Report (G&M, 1988) concluded that contaminant concentrations in surface water were below USEPA National Ambient Water Quality Criteria (NAWQC), and that ingestion of surface water did not pose a risk to white- tailed deer. The report also indicated that, because fish were not present at the site, there was no complete exposure pathway to PCBs in sediment. The Endangerment Assessment Report generally indicated that contaminants in all media, including sediment, posed some risks. PCB-contaminated soils and some sediments were removed and incinerated. Excavated sediments from the Rose Pond were replaced.

The evaluation of surface water analytical data and subsequent conclusions presented in the Endangerment Assessment Report were appropriate; there were no exceedances of NAWQC.

The evaluation of PCB data for sediment was not complete. PCBs in sediment may pose risks to many fauna other than fish (e.g., invertebrates, amphibians, reptiles, wading birds, and dabbling ducks), and these pathways were not evaluated. Although not available in 1988, conservative PCB screening benchmarks for benthic invertebrates are now available and commonly used to determine if sediment contamination potentially poses a risk.

In this five-year review, potential risks from contaminants in surface water and sediment are re-evaluated to determine whether the remedy and the original cleanup levels, as contained in the ROD, remain effective at protecting the environment. In addition, potential ecological risks associated with discharge of groundwater to surface water are also evaluated. Groundwater, sediment and surface water are re-evaluated using data collected in 1998 (see Section 3.4).

As discussed in Section 1.4.1, inorganics in groundwater were not evaluated in the Endangerment Assessment Report because, the report indicates, concentrations appeared to be representative of background and inorganics were not easily attributable to past disposal practices. Inorganics in groundwater are also not evaluated in this five- year review since more recent sampling has not included inorganics as target analytes.

The ecological risks associated with PCBs in soil were not evaluated in the Endangerment Assessment Report. The selected remedy for soil included excavation and incineration of on- site soils containing PCBs in excess of 13 ppm. Since the incinerated soils were covered once placed back on- site, no exposure to ecological receptors exists. Soil below the water table that was not cleaned up by the incinerator is being addressed by the ground water treatment plant. Therefore, the potential for residual soil contamination to impact ecological receptors is not of concern at this time.

TABLE 1-5
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
Federal Regulatory Requirements			
RCRA - Standards for Owners and Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10 - 264.18)	General facility requirements outline general waste analysis security measures, inspections, and training requirements - **Relevant and Appropriate**	All facilities on-site will be constructed, fenced, posted, and operated in accordance with this requirement. All workers will be properly trained. Process wastes will be evaluated for the characteristics of hazardous wastes to assess further requirements. Treatment residuals from wastewater treatment will be disposed of according to RCRA Subtitle C.	These requirements remain relevant and appropriate, and are being complied with.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
RCRA - Preparedness and Prevention (40 CFR 264.30-264.37)	This regulation outlines safety equipment and spill control requirements for hazardous waste facilities. Part of the regulation includes a requirement that facilities be designed, maintained, constructed, and operated so that the possibility of an unplanned release which could threaten public health or the environment is minimized - **Relevant and Appropriate.**	Safety and communication equipment will be installed at the site; local authorities will be familiarized with site operations. RCRA requirements must be considered when evaluation extensions to the present landfill.	These requirements remain relevant and appropriate, and are being complied with.
RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56)	This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc. This regulation also requires that threats to public health and the environment be minimized - **Relevant and Appropriate.**	Plans will be developed and implemented during site work including installation of monitoring wells, and implementation of site remedies. Copies of the plans will be kept on-site. RCRA requirements must be considered when evaluation extensions to the present landfill.	These requirements remain relevant and appropriate, and are being complied with.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70-264.77)	This regulation specifies the recordkeeping and reporting requirements for RCRA facilities - **Relevant and Appropriate.**	Records of facility activities will be developed and maintained during remedial actions.	These requirements remain relevant and appropriate, and are being complied with.
RCRA - Groundwater Protection (40 CFR 264.90-264.109)	This regulation details requirements for a groundwater monitoring program to be installed at the site - **Relevant and Appropriate**	A groundwater monitoring system must be installed as part of any alternative. During site characterization, the location and depth of monitoring wells will be evaluated for use in this monitoring program.	A groundwater monitoring program has been implemented at the site.
RCRA - Closure and Post-Closure (40 CFR 264.110-264.120)	This regulation details specific requirements for closure and post-closure of hazardous waste facilities - **Relevant and Appropriate.**	Those parts of the regulations concerned with long-term monitoring and maintenance of the site will be considered during remedial design. A post-closure plan will be developed.	A post closure plan is currently being managed by the EPA and USACE.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
Clean Water Act - 40 CFR Parts 122, 125	Any point source discharges must meet NPDES permitting requirements, which include compliance with applicable water quality standards; establishment of a discharge monitoring system; and routine completion of discharge monitoring records. **Applicable.**	If groundwater that has been treated by on-site treatment processes is discharged to surface waters on-site, treated groundwater must be in compliance with applicable water quality standards. In addition, a discharge monitoring program must be implemented. Routine discharge monitoring records must be completed.	A groundwater collection, treatment and monitoring program is being implemented.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
CWA - 40 CFR Part 230	This regulation outlines requirements for discharges of dredged or fill material. Under this requirements, no activity that impacts a wetland will be permitted if a practicable alternative that has less impact on the wetland is available. If there is no other practicable alternative, impacts must be mitigated - **Applicable**	During the identification, screening, and evaluation of alternatives, the effects on wetlands must be evaluated.	An evaluation of the effects of remedial actions on wetlands is on-going.
CAA - NAAQS for Total Suspended Particulates (40 CFR 129.105,750)	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter - **Applicable.**	Fugitive dust emissions from site excavation activities will be maintained below 260 $\mu g/m^3$ (primary standard by dust suppressants, if necessary.	These requirements are only applicable if land disturbing activities are conducted.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
DOT Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-171.5)	This regulation outlines procedures for the packaging, labeling, manifesting, and transportation of hazardous materials - **Applicable**	Contaminated materials shipped off-site will be packaged, manifested, and transported to a licensed off-site disposal facility in compliance with these regulations.	Shipping of hazardous materials has been in compliance.
State Regulatory Requirements			
Massachusetts Hazardous Waste Regulations, Phase I and II (310 CMR 30.000, MGL Ch. 21C)	These regulations provide a comprehensive program for the handling, storage, and recordkeeping at hazardous waste facilities. They supplement RCRA regulations - **Relevant and Appropriate**	Because these requirements supplement RCRA hazardous waste regulations, they must also be considered at the site.	These requirements remain relevant and appropriate, and are being complied with.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
Massachusetts General Laws, Ch III, Sec. 150B	Under this regulation, the local board of health may require a local site assignment for hazardous waste treatment, storage, and/or disposal facilities - **Relevant and Appropriate**	The local board of health should be made aware of any hazardous waste activities.	The local board of health is made aware of alternations to any hazardous waste activities of which they are not currently aware. In the past, the local board of health was a participant in the incineration of soils component of remediation efforts.
Massachusetts Wetlands Protection (310 CMR 10.00)	This regulation outlines the requirements necessary to work within 100 feet of a coastal or inland wetland. The act sets forth a public review and decision-making process by which activities affecting waters of the state are to be regulated to contribute to their protection - **Applicable.**	Wetland remediation will comply with the substantive by not the administrative requirements for wetland protection.	Wetland remediation according to the plan has was conducted.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
Massachusetts Surface Water Discharge Permit Program (314 CMR 2.00 - 4.00)	This section outlines the requirements for obtaining an NPDES permit in Massachusetts - **Applicable.**	Pollutant discharges to surface water must comply with NPDES permit requirements. Permit conditions and standards for different classes of water are specified.	314 CMR 3.00 establishes the program whereby discharges of pollutants to surface waters are regulated. Outlets for such discharges and any associated treatment works are also regulated. Surface water at the site is classified "B - warm water, treated water supply" under 314 CMR 4.06. Since the groundwater treatment facility discharges to the wetland, these rules apply. Although a permit is not required, its substantive equivalent is.

TABLE 1-5 (Continued)
POTENTIAL ACTION-SPECIFIC ARARS
F.T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS

ARAR	REQUIREMENT SYNOPSIS AND STATUS	ACTION TO BE TAKEN TO ATTAIN ARARS	FIVE-YEAR REVIEW
Certification for Dredging, Dredged Material Disposal, and Filling in Waters (314 CMR 9.00, MGL Ch. 21, ss. 26-53)	This regulation is promulgated to establish procedures, criteria, and standards for the water quality certification of dredging and dredged material disposal - **Not ARAR.**	Applications for proposed dredging/fill work need to be submitted and approved before work commences. Three categories have been established for dredge or fill material based on the chemical constituents. Approved methods for dredging, handling, and disposal options for the three categories must be met.	No dredging, discharge of dredge material, of filling in of navigable waters is occurring or planned to occur. However, during remedial actions the discharge of pollutants into surface water bodies will occur; this situation triggers Wetlands Protection Act (MGL Ch. 131) and waterways (MGL ch. 91) requirements.
Implementation of M.G.L. C.111F, Employee and Community "Right to Know" (310 CMR 33.00)	The regulation establish rules and requirements for the dissemination of information related to toxic and hazardous substances to the public - **Applicable**	Information applicable to site activities and characteristics will be made available to the public.	The EPA has implemented an active community relations program to disseminate information about the site to the local community.

TABLE 1-6. COMPARISON OF 1988 AND 1998 ORAL REFERENCE DOSES AND ORAL CANCER SLOPE FACTORS FOR COMPOUNDS OF CONCERN, F. T. ROSE DISPOSAL PIT, LANESBOROUGH, MASSACHUSETTS[A]

	Oral Reference Dose (mg-kg/day)		Oral Slope Factor (mg-kg/day)	
CHEMICAL	1988	1998	1988	1998
COCs[B]				
t-1,2-Dichloroethylene	0.01	0.02	--	--
Ethylbenzene	0.1	0.1	--	--
PCBs	na	0.00002	4.34	0.4 (1)
Tetrachloroethylene	0.02	0.01	0.051	0.052
Toluene	0.3	0.2	--	--
Trichloroethylene	0.0074	na	0.011	0.011
Vinyl chloride	0.013	na	2.3	1.9
Other site Contaminants[C]				
Benzene	#	na	#	0.029
Carbon disulfide	#	0.1	#	--
Chlorbenzene	#	0.02	#	--
o-Dichlorobenzene	#	0.09	#	--
p-Dichlorobenzene	#	na	#	0.024
m-Dichlorobenzene	#	0.089	#	--
1,2-Dichloroethane	#	0.03	#	0.091
c-1,2-Dichloroethylene	#	0.01	#	--
1,1-Dichloroethylene	#	0.009	#	0.6
2,4-Dimethylphenol	#	0.02	#	--
Methylene chloride	#	0.06	#	0.0075
Naphthalene	#	na	#	--
1,2,4-Trichlorobenzene	#	0.01	#	--
1,1,2-Trichloroethane	#	0.004	#	0.057
Xylenes	#	2	#	--

Footnotes
[A] This table provides an update of the criteria identified in Table 12 of the 1988 Endangerment Assessment Report. Updated values have been obtained from the Integrated Risk Information System (1998) or the Health Effects Assessment Summary Tables (1997).
[B] Chemicals of Concern (COCs) drawn from 1988 Endangerment Assessment Report.
[C] Other chemicals listed are site contaminants detected in groundwater, but not selected as indicator contaminants of concern.
Not identified in the 1988 Endangerment Assessment Report.
-- Not a Class A, B or C carcinogen.
na Not Available
(1) This value is applicable to drinking water exposures. A separate oral slope factor applicable to sediment and soil exposures has been derived and is reported as 2 $(mg\text{-}kg/day)^{-1}$

SECTION 2.0

PRESENT SITE CONDITIONS

2.1 SUMMARY OF FIVE- YEAR ACTIVITIES

This section summarizes the activities performed at the site. Site activities performed as part of the five-year review include:

- A site visit and inspection of groundwater treatment facility
- Community interviews
- Groundwater sampling

2.1.1 Groundwater Treatment Plant Inspection

An inspection of the groundwater treatment plant at the F.T. Rose Disposal Pit SuperfUnd Site (the Site), located in Lanesborough, Massachusetts, was conducted of September 10, 1997. The inspection included a physical inspection of the site, the groundwater recovery trenches, the groundwater treatment plant, and the treatment plant records. Concurrent with the inspection, an interview of the site manager and senior treatment plant operator was conducted. This report includes the finding of the inspections and interview, as related to the scope of operations and maintenance (O&M) of the groundwater treatment facility at the Site, and provides an assessment of how changes in O& M affect the protectiveness of the remedy.

During the inspection and interviews, the Site and Site facilities, including the groundwater treatment plant, were found to be in good condition. General Electric his instituted an O&M program for the Site which includes the continual improvement of the plant and the O&M procedures. This program has prevented substantial deterioration of the plant from occurring and, in some cases, increased the efficiency and decreased the O&M requirements of the plant. A few minor flaws were noticed during the inspection, however, these were all minor maintenance issues, which have been subsequently corrected during the routine maintenance of the plant.

2.1.1.1 Inspection And Interview Process. An inspection of the Site was conducted on September 10, 1997. Glen Gordon; Metcalf & Eddy Groundwater Treatment Engineer, and Sandra McCarron and Scott Moxham; Metcalf & Eddy Community Relations Specialists conducted the inspection. Others present at the Site during the inspection were John Ciampa, General Electric Site Remediation Manager; John Levesque, General Electric Manager of Operations; and John Powers, Earth Tech Treatment Plant Operator. Earth Tech is currently under contract with General Electric (GE) to operate the Site treatment plant; GE is conducting necessary maintenance of the treatment plant. GE and Earth Tech personnel participated in the interview and responded to questions regarding the O&M of the treatment plant.

The groundwater treatment plant was designed to remove dissolved phase volatile organics (VOCs) and polychlorinated biphenyls (PCBs) from the groundwater. To accomplish this, groundwater is collected from two recovery trenches, treated with an air stripper and granular activated carbon (GAC) prior to discharge to a nearby wetland. Off- gas from the air stripper is treated with GAC prior to discharge to the atmosphere. The discovery of separate phase PCBs as a dense non- aqueous phase liquid (DNAPL) at the Site was not expected and was not addressed by the original treatment plant design.

During the Site visit, GE provided access to the plant and Site, described the process and controls of the treatment plant, answered specific questions about the plant and Site, and lead a tour of the Site and treatment plant facility. GE also provided examples of the routine inspection logs kept for the Site, and an explanation of system modifications which have been implemented, and the routine and non-routine maintenance which has taken place at the treatment plant since startup.

2.1.1.2 DNAPL Collection At The West Collection Trench. Early in the groundwater treatment process, a significant quantity of DNAPL was unexpectedly drawn into the west collection manhole.

From there, the DNAPL flowed through the entire treatment system, forcing the treatment plant to be shutdown, and requiring the entire treatment system to be decontaminated. In order to prevent this from reoccurring, GE installed a pneumatic pump in a well (stand pipe) adjacent to the west collection manhole. GE has been manually removing DNAPL from the well with this pump on a weekly basis.

GE reported that an air compressor is brought to the site for the DNAPL collection, and DNAPL is pumped into five gallon containers. Typically, two to five gallons of DNAPL are collected each week, although as much as ten gallons has been recovered at one time. The DNAPL is stored onsite, prior to transport off- site under hazardous waste manifest by a licensed hazardous waste hauler.

The continued collection of DNAPL, is necessary to the continue operation of the groundwater treatment plant. Evidence supporting this includes: the continued and consistent quantity of DNAPL recovered from the well on a weekly basis, and the effect of a build-up of DNAPL in the past, which required an unscheduled shut- down and decontamination of the treatment plant.

Since the collection of the DNAPL is necessary to the continue operation of the groundwater treatment plant, and the plant is designed to operate automatically with only periodic maintenance, GE is currently in the process of collecting data to determine if an automated system would be more efficient than manual collection of the DNAPL. EPA will review these data and make a determination as to whether GE must design and install an automatic DNAPL recovery and storage system. An automated DNAPL recovery and storage system would continually recover the DNAPL through automatic controls which start the recovery pump, as warranted by the level of DNAPL in the recovery well, and prevent a buildup of DNAPL which would adversely impact the operation of the groundwater treatment plant.

2.1.1.3 Plant Scheduled Operations. The treatment plant is operated automatically 24 hours per day, seven days per week. The treatment plant is inspected daily by a treatment plant operator. During the daily inspections, any maintenance issues are noted in the plant logbook and maintenance is scheduled. Manual operations, such as carbon bed backwash and air stripper acid washing are also conducted during daily inspections. The treatment plant operates automatically, with an on- site control system. The control system is capable of shutting the plant off in the event a component failure is detected. If the treatment plant shuts down due to a component failure, an auto-dialer will page a plant operator and give one of twelve preset alarm codes which indicates the reason for the shut down. Treatment plant operators are on- call 24 hours per day, and can respond to an alarm immediately to repair and restart the groundwater treatment plant.

The groundwater treatment plant is defined as an Industrial Grade 3 waste water treatment plant by 257 CMR 2.00. As such, the plant is required to be managed, operated, and maintained by a licensed wastewater treatment plant operator holding a current minimum rating of Industrial Grade 3. In compliance with this regulation, the operators of the plant all hold a minimum of an Industrial Grade 3 license, with most operators holding an Industrial Grade 4 license.

Currently, the groundwater treatment plant is operating at a flow of 70-72 gallons per minute. The treatment plant has recently been operating continually, with no unscheduled interruptions. The plant operation is temporarily suspended for scheduled maintenance such as carbon bed backwash, carbon change out, and air stripping tower acid washing.

2.1.1.4 System Condition By Item.

Extraction Trenches and Collection Manholes (East and West). The collection manholes were visibly in good condition. GE reported that the west collection manhole currently had a small, measurable level of DNAPL in it, but that the inlet to the transfer pump was sufficiently high to prevent the DNAPL from being drawn into the treatment system. The manholes are monitored weekly, and no build-up of sediment or significant accumulation of DNAPL in the manholes had been recorded. Other than the weekly measurement of DNAPL and water levels in the collection manholes, no maintenance is required for this part of the system.

Collection Manhole Transfer Pumps. GE reported that since startup, one of the collection manhole transfer pumps has burned out. That pump was replaced; there is no scheduled maintenance of these pumps. No other failures or maintenance issues were reported.

Influent Wet Well. The influent wet well was visually in good condition. GE reported that no maintenance was conducted on the influent wet well except the periodic cleaning of the pumps. A metal framework had been installed above the wet well to support two deep well pumps in the wet well. Plastic covers were installed over the pump entrances to the wet well.

Influent Wet Well Pumps. The original vertical shaft wet well pumps have been removed and replaced with Grundfos stainless steel deep well pumps. GE reported that, early in the project, the vertical shaft pumps experienced numerous maintenance problems related to the pump bearings. In order to reduce the operating costs and increase the reliability of the treatment plant, GE removed the vertical shaft pumps and replaced them with more reliable and equally powerful deep well pumps. The replacements are 5 hp stainless steel pumps, which have a capacity equal to that of the original pumps but require no maintenance other than periodic cleaning of the inlet screen. The pump's inlet screens are cleaned every three months. No failures have been experienced since the deep well pumps were installed.

Influent Valve Pit. The influent valve pit was visually in good condition. Several inches of water were accumulated in the bottom of the pit. The water included a visible build up of red iron deposits. The valves appeared to be in good condition with no signs of leaks. GE reported that the accumulated water was rainwater, and that the pit was periodically pumped out. Water removed from the valve pit is pumped to the influent wet well for treatment by the groundwater treatment system. No other maintenance was reported for the valve pit.

Air Stripping Tower. The air stripping tower is inspected daily by the treatment plant operator. Pressure gauges are present which indicate the air pressure in the stripping tower. The treatment plant operator monitors the air pressure in the air stripping tower to determine the extent of iron fouling of the stripper packing, and to schedule acid washing of the tower to remove the iron fouling. The treatment plant operator reported that the tower is acid washed approximately once per month. GE is currently experimenting with an acid solution that is stronger than the solution which they have used in the past. GE hopes to reduce the frequency of the acid washing to once every three months. GE also reported that the tower packing is replaced yearly to prevent a buildup of hard deposits from degrading the stripping tower performance.

Visually, the air-stripping tower appeared to be in good condition. There was no visible damage or leaks in the tower. Piping and valves associated with the air-stripping tower appeared to be in good condition with no signs of leaks or other significant damage.

Air Stripper Blowers. The air stripper is equipped with two blowers. One blower provides the necessary airflow to the stripper, with the second blower as a backup. The blowers are visually inspected by the treatment plant operator daily. After each air stripping tower is acid washed, the active blower is switched to backup status, and the backup blower is made the active blower. The blower bearings are lubricated monthly; other maintenance is scheduled as needed based on daily inspection reports. GE reported that the bearings in one blower have failed and been replaced. The blower drive belts are routinely replaced; no other blower maintenance has been required. The blower damper is adjusted periodically to provide an airflow of 750 cubic feet per minute using a portable air flow indicator. The blowers appeared to be in good condition. There were no unusual noises or vibrations from the operating blower.

GAC Wet Well. The GAC wet well appeared to be in good condition. As with the influent wet well, a metal frame was installed over the well to support the installed deep well pumps. One pulley, which was intended to position a pump support cable over the pump entrance of the wet well, has broken free of the metal frame. The broken pulley allows the pump's support cable to rub the concrete on the edge of the pump entrance. This pulley should be replaced at the next pump maintenance event. GE reported that no maintenance other than periodic cleaning of the pump inlet screens is required for the GAC wet well.

GAC Wet Well Pumps. As was the case with the influent wet well pumps, the GAC wet well pumps have been replaced with 5hp Grundfos stainless steel deep well pumps. This has eliminated the bearing problems which plagued the vertical shaft pumps which were originally installed as the wet well pumps. Since the pump replacement, the only maintenance required has been monthly cleaning of the inlet screens.

GAC Backwash Pump. The use of the GAC backwash pump, as described in the orig has been eliminated. GE has connected to city water and is using city water for the backflushing of the GAC beds. GE reported that a back flow preventer is installed on the water line. GE also reported that the city water can supply a higher pressure and flow than was available using the backwash pump, and that this has improved the efficiency of the backwashing operation.

Liquid Phase Granular Activated Carbon Beds. The liquid phase GAC beds provide a final polishing step in the treatment of groundwater. The two liquid phase GAC beds are manifolded to allow series, parallel, or single bed operation. GE reported that the beds have been operating in series. Valving permits the treatment operator to switch which bed is in the lead position and which bed is in the lag position. Switching of bed position is done after each carbon change out to keep the freshest carbon as the second (lag) bed. The treatment plant operator reported that carbon in a single bed is changed out approximately twice per year. The change out is scheduled based on the results of monthly sampling of water from the beds.

The carbon beds are backwashed based on the pressure drop through the beds. The treatment plant operator reported that backwashing is required two to three times per week.

Some minor maintenance issues were seen during the inspection of the liquid phase GAC beds and associated piping. One valve handle was missing, minor water drips were observed at the threads of the influent pressure gauges and at the effluent strainer, water was dripping from the GAC bed vents, and the seal of one GAC bed manway was leaking. All dripping water was collecting in the floor drains, which carry the water to the retention structure. This water is periodically pumped to the influent wet well and processed through the treatment system. These drips and leaks appeared to be causing a total water loss of only a fraction of a gallon per minute and are minor maintenance issues, which will be resolved during subsequent routine maintenance of the specific components.

Treated Water Outfall. The discharge end of the treated water outfall was not visible during the Site inspection. GE reported that the water is being distributed over an area of the wetland sufficient to prevent erosion or other degradation of the wetland. The outfall pipe consists of a four-inch diameter PVC pipe with solvent welded joints, except for two flexible rubber joints where the pipe emerges from the ground surface. The visible sections of the pipe appeared to be in good condition, with no visible leaks.

Retention Structure. The retention structure is used to collect any spilled or leaking water in the treatment plant building, as well as backwash water and neutralized air stripper acid wash water. All liquids in the retention structure are allowed to settle for a minimum of 24 hours, to remove solids, prior to being transferred to the influent wet well. GE reported that the solids in the retention structure were removed on one occasion, when PCBs were accidentally drawn into the treatment system. At that time, the entire plant, including the wet wells and retention structure was decontaminated. Sediments were removed and disposed of as PCB contaminated waste. Since that time, there has been a slight build up of sediment in the retention structure, but not to a degree which has required it's removal. The retention structure appeared to be in good condition.

Retention Structure Transfer Pump. The portable submersible pump originally used to transfer water out of the retention structure is no longer in use. GE has installed a deep well submersible pump, similar to the pumps installed in the influent and GAC wet wells. The use of this pump has eliminated the need for periodic maintenance of the pump. GE reported that this pump has been operated without difficulty since it's installation. There is no scheduled maintenance for this pump.

Air Stripping Tower Wash System. The tower wash system appeared to be in good condition. GE reported that they are currently testing a new acid wash solution. They hope that this new solution will reduce the required number of acid washes from one per month to one per three months. The actual schedule will be based on measured back pressure in the air-stripping tower.

Off-Gas Treatment GAC Beds. The off-gas from the air stripper is heated to approximately 70° F by a duct heater which reduces the relative humidity of the airstream prior to treatment through three GAC beds. GAC beds include one 1,100 pound guard bed and two 2,000 pound main beds; the three beds are in series with the guard bed leading the main beds. The original main beds, Calgon Vapor-Pac 10 transportable units, were replaced with the two 2,000 pound main beds. This has allowed GE to reduce operating costs since the original main beds were rental units. The guard bed was designed to capture VOCs and PCBs in the airstream, and prevents PCB contamination of the main GAC beds. GE reported that PCBs have never been detected in the guard or main beds. This has allowed GE to treat the guard bed as a third bed, and allowed the time between carbon change outs in the off-gas treatment system to be increased.

GE monitors the off-gas treatment GAC beds for breakthrough weekly, using an HNu photo ionization detector. The airstream is monitored before and after each GAC bed. The treatment plant operation is temporarily suspended and the carbon in all three GAC beds is replaced when the effluent air VOC concentration reaches the established discharge limit. The off-gas GAC beds and associated piping were in good condition. No rust, dents, leaks, or other defects were observed.

Control System. The groundwater treatment plant control system is an electro-mechanical control system, equipped with an auto- dialer. The control system displays and records critical system parameters, as well as automatically shutting down the system in the event of a component failure. GE reported that the control system is fully tested every six months, including the testing of all possible automatic shut-down conditions and all auto- dialer call- out alarms. At the same time, all gauges, instruments, and sensors are calibrated. The control system was visually in good condition, with all indicators working.

2.1.1.5 Site General Conditions.

System Logs and Records. A system log book is stored on the site. This book is used by the treatment plant operators to record any maintenance such as backwashing, acid washing, or carbon change- out, as well as to note any required system maintenance. The book was neat and in good condition.

Additional maintenance and monitoring records are stored in Pittsfield at GE's office. Examples of these records were examined. These records were also neat and in good condition. The records for this Site appeared to be well kept, and typical for a facility of this type.

Treatment System Instrumentation. No missing or inoperative instruments were seen during the site inspection. Two pressure gauges, both on influent piping to the liquid phase GAC beds, were seeping small quantities of water. This is a minor maintenance issue, which will be corrected during normal system maintenance. No other defects were observed in the system instrumentation. The general condition of the system instrumentation is excellent.

Piping, Tanks, GAC Beds, and Treatment Equipment. The treatment plant piping, tanks, and equipment were generally in very good condition. Several modifications were observed and have been noted above in the specific component sections. These modifications include: replacement of the off-gas treatment main GAC beds, replacement of all vertical shaft pumps with deep well pumps, and replacement of the portable submersible pump in the retention structure with a deep well pump. These modifications have all increased the reliability of the treatment plant or reduced the O& M requirements, without adversely affecting the system effectiveness.

Some small drips and leaks were observed in the liquid phase GAC beds, effluent strainer, and associated piping. These leaks were minor, and all dripping water was being collected for future treatment through the facility. Due to the nature of these systems, and the minor nature of these leaks, these conditions were not cause for a special maintenance interval, but will be corrected at the next scheduled maintenance for the specific item affected.

Treatment Plant Electrical System. The conditions of the treatment plant's general wiring, control systems, circuit panels, lighting, and electrical system labeling were very good. However , the wiring to the deep well submersible pumps in the wet wells needs improvement and will be improved during subsequent maintenance.

Mechanical Systems, Building, Fences, and Non-Treatment System Equipment. The building, fences, signs, and other non-system equipment on the Site were in excellent condition. GE reported that fences, signs, and other items are inspected twice per year, during the routine groundwater monitoring event, and repaired as necessary. The Site was generally neat, clean, and had a very well kept appearance.

2.1.1.6 Conclusions. The groundwater treatment plant, Site facilities, and the Site were all in excellent condition for the age of the plant and the use of the Site. General Electric is maintaining the groundwater treatment plant, and maintaining the effectiveness of the installed equipment. In addition, GE is continuing to examine the O& M operations at the site, trying alternate maintenance methods, and improving system equipment as and when appropriate. GE appears to have not only prevented the required O&M activities to grow over time, but has further been able to reduce the O&M activities by the implementation of well planned modifications to the treatment plant equipment and maintenance activities. GE's O&M of this groundwater treatment plant appear to have prevented any significant deterioration of the facility, and have ensured the effective continued operation of the installed equipment.

Since the collection of the DNAPL is necessary to the continue operation of the groundwater treatment plant, and the plant is designed to operate automatically with only periodic maintenance, GE is currently in the process of collecting data to determine if an automated system would be more efficient than manual collection of the DNAPL. EPA will review these data and make a determination as to whether GE must design and install an automatic DNAPL recovery and storage system. An automated DNAPL recovery and storage system would continually recover the DNAPL through automatic controls which start the recovery pump, as warranted by the level of DNAPL in the recovery well, and prevent a buildup of DNAPL which would adversely impact the operation of the groundwater treatment plant.

2.1.2 Community Interviews

Two M&E community relations specialists, Sandra McCarron and Scott Moxham, interviewed residents near the site, PRPs, and state and local government personnel. An M&E engineer, Glen Gordon, also participated in the interview of two GE treatment plant operators and the GE project manager. These interviews took place in Lanesborough, Massachusetts, on September 10th and 11th, 1997.

Most residents would like an update as to what the status is with regard to the ground water remediation, and how long it will take until cleanup is complete. One resident complained about property values decreasing, while assessment values were not. The Rose's are very pleased with GE's work, and say that they get along fine with GE.

2.2 SAMPLE COLLECTION SUMMARY

2.2.1 Groundwater Sample Collection Summary

Groundwater sampling took place at wells MW-11B, MW-10B, and MW-10C on February 11, 1998. Samples were purged for the following parameters: volatile organic compounds (VOC), total and dissolved polychlorinated biphenyls (PCBs). EPA requested that M&E not split any samples. Each monitoring well was purged via a Low Flow method until three well volumes were collected or the well went dry, according to their approved SAP. Purge rates were one to two liters per minute. The intake for the Waterra® device used to purge the wells was positioned approximately one foot from the bottom of the screened interval of the well. Most wells produced large amounts of sediment initially; some wells cleared slightly as purging progressed. Turbidity was not monitored during purging. All monitoring well purge water was contained in plastic containers and poured into the treatment system sump on site.

VOC samples were collected in three pre-preserved 40 ml vials using disposable Teflon® bailers. Aqueous samples for PCBs were collected into four, one liter amber glass bottles. Disposable filters were used at each monitoring well location to collect the dissolved PCB samples. The field parameters of pH, temperature, and turbidity were measured after sample collection. All tubing and bailers associated with the sample collection was dedicated to the specific monitoring well and disposed of afterward. Waterra® foot valves were decontaminated between uses with an Alconox® wash, deionized water rinse, and a methanol rinse. The weather this day was sunny and warm, with temperatures in the high 40s° F.

Groundwater sampling took place at wells MW-8C, MW-8B, and at residences located at: 140 Balance Rock Road, 29 Potter Mountain Road, 24 Potter Mountain Road, and 18 Potter Mountain Road February 12, 1998. These wells were sampled for the same parameters as was sampled for on February 11 th. Residential sampling consisted of purging the household system for approximately ten minutes then collecting the sample from the outlet nearest the well. Usually, a hose bib in the basement was used: at 24 Potter Mountain Road the outside hose bib was used. Two wells (shallow and deep) were sampled at 18 Potter Mountain Road. Parameters sampled included VOCs and PCBs. No field filtering took place at the residences. Both of the wells sampled on the 12 th were purged dry and allowed to recover during the residential sampling. The weather on Thursday the 12 th was intermittent rain after steady rain all night. Temperatures were in the mid 40s° F.

2.2.2 Surface Water and Sediment Sample Collection Summary

Surface water and sediment sampling took place on Thursday, February 12 th. Surface water was collected at location SW-2 and sediment samples were collected at locations SW-4 and SW-7. The overnight rain provided a swift current of water in the stream/wetland area west of the disposal area. In addition, location SW- 2 is downstream of the water treatment plant discharge.

Sediment samples were collected from depositional areas in the main stream channel. Snow cover at location SW-4 made sample location and collection difficult. Both sediment samples were collected in jars with minimal headspace for VOC and PCB analyses. John Ciampa (GE) provided a copy of their sediment sampling protocol as sediment sampling was not detailed in the POP (Attachment A). The "Appendix N, Sediment Sampling Procedures" (General Electric Co., May 1994) are better suited to river or lake sampling than the stream sampling which took place onsite, however, the sampling team made appropriate adaptations to the procedures and representative samples were collected. The surface water and both of the sediment sampling locations were not marked or staked in any way. If future monitoring rounds are scheduled, permanently marking these locations may assist with sample continuity and comparability. Samples were sent to Quanterra Laboratory in Pittsburgh, Pennsylvania.

SECTION 3.0

EVALUATION OF DATA

3.1 EVALUATION OF GROUNDWATER DATA

This section describes the evaluation of groundwater data collected during this five-year review.

3.1.1 Groundwater Flow

The site is underlain by up to almost 100 feet of glacial till. Bedrock underlies the till. The till is a dense, heterogeneous, poorly permeable deposit, made up of soil particles ranging in size from clay to boulders. The upper 10 to 15 feet of the till reportedly contains higher percentages of sand and gravel and may be somewhat more permeable (Geraghty & Miller, 1984).

The contaminant source area is situated on a topographic spur that projects from the hillside west of the site and curves to the south (see Figure 2). The water table occurs in the till, at depths that vary from about 0 to 10 feet. The conceptual model of groundwater flow at the site is that the water table forms a "ridge" along the axis of the spur. The resulting groundwater divide beneath the spur causes flow from the source area to move both eastward and westward. A downward component of flow into the lower till and bedrock also exists at the site; however, downward movement is impeded by the low permeability and thickness of the till (Geraghty & Miller, 1984).

The management of migration portion of the remedial action included the construction and operation of groundwater collection trenches in the till, designed to capture the contaminant plumes that were migrating east and west from the source area. The portions of the plumes that had already migrated beyond the capture zones of the trenches were not addressed by the remedial action.

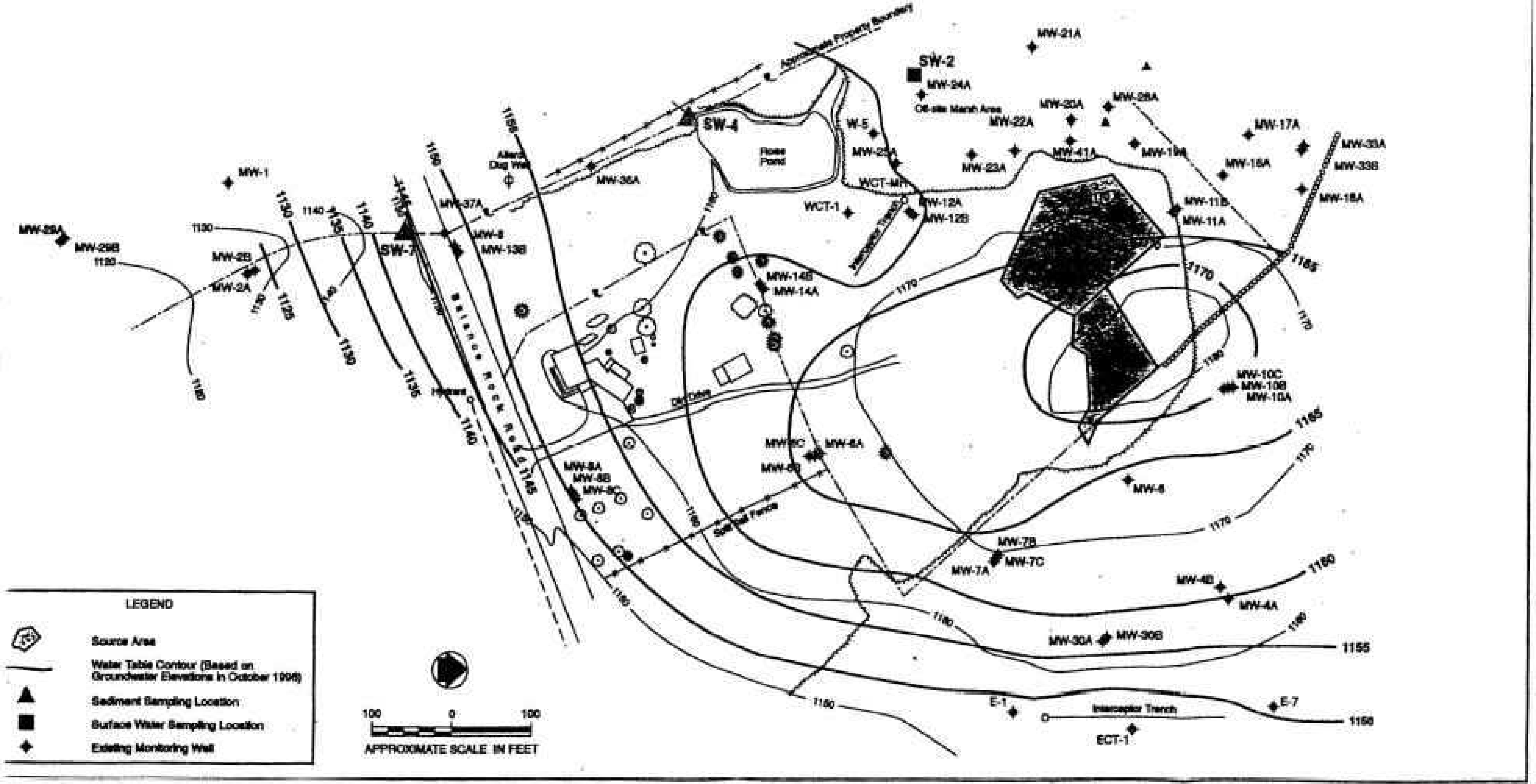
3.1.1.1 Groundwater in the Till. The remedial investigations indicated that downward hydraulic gradients exist at the site (Geraghty & Miller, 1984). Contaminated groundwater, or DNAPL if it was not all removed during the source area remediation, could slowly migrate downward through the till to the bedrock aquifer. During the remedial investigations at the site, some apparent downward movement was detected at wells MW-10B, MW-11B, MW-9B, MW-8B, and MW-8C (see Figure 2). Since contaminant concentrations fell in some of these wells in later sampling rounds, it was suggested that, rather than representing downward migration through the dense till, the contamination may have been moved down from shallow portions of the aquifer by the drilling process (Geraghty & Miller, 1984).

Conversely, during the second round of sampling of "baseline" monitoring wells in March, 1994, VOCs were detected for the first time in well MW- 10C, which is screened at a depth of about 80 feet. These results suggest that downward migration may be occurring; in fact, since the annuli of the wells were sealed with a mixture of drill cuttings and bentonite rather than pure bentonite or grout (Geraghty & Miller, 1984), the boreholes themselves may represent enhanced pathways for downward migration. Therefore, it was decided that wells MW-10B, MW-10C, MW-8B, MW-8C, and MW-11B would be sampled and tested for the five year review.

Volatile organic compounds (VOCs) were detected above reporting limits in monitoring wells MW-10B, MW-10C, and MW-11B. The greatest concentration detected was 300 μg/L of trichloroethene in MW-10B. The VOCs and concentrations detected in MW-10C were almost identical to those detected in 1994. VOCs were not detected in MW-8B and MW-8C.

Polychlorinated biphenyls (PCBs) were detected above reporting limits in monitoring wells MW-8C, MW-10B, MW-10C, and MW-11B. The highest concentration detected was for Aroclor 1254 in MW-10B at 2.0 g/L. PCBs were not detected in MW-8B.

3.1.1.2 Bedrock Aquifer and Private Wells. As suggested in the ROD (USEPA, 1988), the private water supply wells near the site are suspected to be bedrock wells in most cases. As part of the remedial action, the Rose residence, the Allard residence, and the Balance Rock Cafe were connected to the Lanesborough municipal water system, to stop the use of the private wells at these locations for water supplies. Bedrock supply wells can have wide- ranging and highly eccentric zones of capture. Therefore, if the migration of contamination were not being completely controlled by the groundwater remediation system, then the remaining active private supply wells downgradient of the site would be possible receptors. The Groundwater Monitoring Plan in Volume 4 of the Site Remediation Plan (GE, 1993), in section 2.6 (p. 2-12), indicated that the sampling of residential wells might be an appropriate future modification to the management of migration-related monitoring activities. To increase the certainty that the remedy is still protective, EPA decided that five private water supply wells downgradient of the site would be sampled and tested for the five year review.



LEGEND
Source Area
Water Table Contour (Based on Groundwater Elevations in October 1996)
Sediment Sampling Location
Surface Water Sampling Location
Existing Monitoring Well
100
0
100
APPROXIMATE SCALE IN FEET
Approximate Property Boundary
SW-2
SW-4
SW-7
Rose Pond
Off-site Marsh Area
Interceptor Trench
Dirt Drive
Hydrant
Balance Rock Road
MW-1
MW-2A
MW-2B
MW-29A
MW-29B
MW-36A
MW-37A
MW-13B
MW-14A
MW-14B
MW-21A
MW-24A
MW-20A
MW-26A
MW-22A
MW-17A
MW-33A
MW-33B
MW-23A
MW-41A
MW-15A
MW-18A
MW-11B
MW-11A
MW-12A
MW-12B
WCT-1
W-5
MW-10C
MW-10B
MW-10A
MW-6A
MW-8A
MW-8B
MW-8C
MW-6
MW-7A
MW-7B
MW-7C
MW-4B
MW-4A
MW-30A
MW-30B
E-1
E-7
ECT-1
1120
1125
1130
1135
1140
1145
1150
1155
1160
1165
1170

The wells that were sampled for this five-year review are located on Balance Rock Road (#140) and Potter Mountain Road (# 29, #24, and two wells at #18). No VOCs or PCBs were detected at concentrations above the reporting limits in any of the residential wells sampled.

3.1.1.3 Review of Ongoing Monitoring Data. Review of the results of the groundwater quality monitoring that has been conducted at the site through 1996 indicates that PCBs have decreased slowly over time and are below MCLs in most wells. The exception is W-5, where a marked increase in PCB concentration was noted in the October 1996 sampling round. Table 3-1 lists the wells and compounds at or exceeding the maximum contaminant levels (MCLs) during the most recent monitoring round for which data are available.

Wells MW-6 and MW-12A are upgradient of the east and west collection trenches, respectively. The detection of contaminants at concentrations exceeding the MCLs at these locations, as well as at the trenches themselves, indicates that the plumes still exist, and the collection systems must continue to operate.

TABLE 3-1. WELLS EXCEEDING PERFORMANCE STANDARDS
(February 1998 data)

Well/Trench	Compound	MCL (ug/l)	Concentration (ug/l)
E-1	PCBs	0.5	1.1 (ND filtered)
E-7 R	PCBs	0.5	0.97 (ND filtered)
W-5	PCBs	0.5	29.5 (1.1 filtered)
W-5	Trichloroethene	5	11
MW-12A	Trichloroethene	5	9
MW-12A	PCBs	0.5	6.3 (ND filtered)
MW-12A	Vinyl Chloride	2	2
MW-6	Trichloroethene	5	250
MW-6	Tetrachloroethene	5	100
ECT-1	Trichloroethene	5	7.5
WCT-1	PCBs	0.5	8.7 (0.77 filtered)

Hydraulic control of the two plumes at the collection trenches cannot be conclusively demonstrated with water level measurements from the existing network of monitoring wells. However, groundwater quality results can be used to draw some conclusions regarding the degree of containment of the plumes. In the case of the eastern collection trench, TCE and PCE are present in the upgradient groundwater as shown by samples from MW-6. These two compounds are also detectable in the collection trench itself; however, neither of these VOCs is detectable in the monitoring wells (E-1 and E-7R) that flank the trench to the north and south, indicating that contamination is not migrating around the ends of the trench at the depths of the wells. Low concentrations (< 10 μg/l) of TCE are present in the groundwater immediately downgradient of the eastern trench, at well ECT-1. It is believed that this contamination may be lingering in a zone of stagnant groundwater flow downgradient of the trench.

Unlike the eastern collection trench, where the total VOC concentration was 11 ug/l in late 1996, the total concentration of VOCs in the western collection trench is high (just over 4,000 ug/l). Since this concentration is much higher than that in any of the nearby monitoring wells, the flow path along which the most highly-contaminated groundwater moves to the trench is not known; presumably it enters the collection system southeast of MW-12A. The groundwater at well W-5, in the wetland to the west of the collection trench, has concentrations of TCE that slightly exceed the MCL. The ability of the trench to capture the western edge of the plume beneath the wetland is not demonstrated by water level data; however, the decline of contaminant concentrations at W-5 suggests that the plume is no longer moving into this area, so the issue of whether or not the trench is capturing this groundwater is not thought to be a major concern.

3.2 EVALUATION OF SURFACE WATER AND SEDIMENT DATA

Data from two sampling events were evaluated for the surface water location SW-2 (see Figure 2). Previous data for the surface water location is last available from December of 1993. Low levels of volatile organic compounds (trichloroethene, 8.8 μg/L and vinyl chloride, 2.4 μg/ L) were detected in the December 1993 sample; both exceeded the Federal MCLs and Massachusetts MMCLs. In February 1998, one volatile organic compound, cis-1,2-dichloroethene at 0.81 µg/L, was detected. This concentration is below the MCL and MMCL (both 70 µg/L). No polychlorinated biphenyls (PCB) were detected in samples from either sampling event.

Sediment data from the February 1998 sampling event was evaluated. No previous data is available for sediments. The sample from sediment location SW-4 contained methylene chloride at 3.5 µg/Kg, PCB Aroclor 1254 at 700 µg/ Kg and PCB Aroclor 1260 at 460 µg/Kg. The sample from sediment location SW-7 contained Aroclor 1254 at 770 µg/ Kg and Aroclor 1260 at 460 µg/Kg. There are no set Federal maximum allowable levels for contaminants in sediments. Massachusetts sets a state limit of 2,000 µg/Kg total PCBs.

3.3 EVALUATION OF HUMAN HEALTH RISKS

On-site groundwater monitoring wells resampled and analyzed for VOCs and PCBs in February 1998 included MW-8B, MW-8C, MW-10B, MW-10C, and MW-11B (Figure 2). All of these wells are greater than 30 feet below ground surface. Exceedances of MCLs for trichloroethylene, tetrachloroethylene and PCBs were noted. However, the placement of institutional controls to prevent residential groundwater use of on-site groundwater should mitigate any risks associated with the MCL exceedances. No VOCs or PCBs were detected in any of the off-site residential wells sampled in February 1998.

There are several shallow wells (i.e., less than 15 feet below ground surface) located near or upgradient of the nearby residential area. These wells include MW-6A, MW-8A, MW-14A, MW-36A and MW-37A (Figure 2). The presence of VOCs in these wells may represent a risk to the nearby residences should infiltration of volatiles into the homes occur. This exposure pathway was not addressed by the 1988 Endangerment Assessment Report. Three of these wells (MW-14A, MW-36A and MW-37A) have not been sampled since 1983. MW-6A and MW-8A were most recently sampled in 1994. Available results from 1983 and 1994 indicate the presence of volatile contaminants in three of the five wells (MW-8A, MW-36A and MW-37A). However, these levels do not exceed any standards developed to be protective of residential indoor air exposure. In addition, private wells directly downgradient of the site recently sampled did not contain any detectable levels of VOCs.

Surface water sampling location SW- 2 was resampled in February 1998. The only compound detected was cis-1,2-dichloroethene at a concentration of 0.81 µg/ L. A risk-based concentration for cis-1,2-dichloroethylene, protective of the ingestion of surface water as drinking water, is 6.1 µg/L (HI of 0.1; EPA, 1997). Because the detected concentration is far lower than the risk- based concentration, cis-1,2-dichloroethene is not expected to pose a risk above regulatory guidelines for human receptors exposed to surface water during recreational activities.

Previous sediment sampling locations SW-4 and SW-7, located in the stream downgradient of the site, were also resampled in February 1998. In 1986, total PCB results at these locations were 1.1 ppm at SW- 4 and 1.06 mg/ kg at SW-7. In the 1998 sampling round, total PCBs were detected at SW-4 and SW-7 at levels consistent with the historical detections (1.16 and 1.23 mg/kg, respectively). Therefore, the recent sediment PCB detections would not represent a risk in excess of regulatory guidelines for human receptors exposed to sediment during recreational activities.

3.4 EVALUATION OF ECOLOGICAL RISKS

Surface water sampling location SW-2 was resampled in February 1998. The only compound detected was cis-1,2-dichloroethene at 0.81 µg/L. The Tier II Secondary Chronic Value for 1,2-dichloroethene is 590 µg/L (Suter and Tsao, 1996). The method of calculating Tier II values is similar to that used to derive National Ambient Water Quality Criteria (NAWQC). Because the detected concentration is far lower than the Tier II screening value, cis-1,2-dichloroethene is not expected to pose a risk of harm to aquatic receptors.

There are several shallow wells located near or upgradient of wetland areas that have been sampled subsequent to the completion of the Endangerment Assessment (G&M, 1988). Wells 2-A, W-5, E-1, and ECT-1 (see Figure 2) were last sampled in October 1996. Groundwater collected from these wells represents water which has a slight potential of eventually discharging into wetland areas due to the possibility that some of these wells may be outside the capture zone of the collection trenches. Contaminant concentrations detected in October 1996 samples from these four wells were compared against NAWQC (Table 3-2). Prior to the comparison, detected concentrations were diluted by a factor of ten to represent the attenuation which would likely occur between the well and the receptor.

The results of the comparison of analytical data from shallow wells to NAWQC show that concentrations of PCBs, diluted by a factor of 10, are greater than the chronic NAWQC in all four of the shallow wells sampled in 1996. However, taking into account the slow rate of groundwater movement, and that the extraction system is likely prohibiting the movement of the groundwater toward the wetland, currently the risks of this groundwater discharging into wetland areas is minimal. Therefore, additional surface water and sediment monitoring will be conducted during the next five year review to determine if groundwater discharge to surface water poses a risk of harm to ecological receptor populations living in the wetland areas.

TABLE 3-2. COMPARISON OF OCTOBER 1996 CONTAMINANT DETECTIONS IN GROUNDWATER WELLS UPGRADIENT OF WETLANDS TO NAWQC

	Shallow Well				
Contaminant (µg/L)	2A	W-5	E-1	ECT-1	Chronic NAWQC
Trichloroethylene	nd	11	nd	7.5	
Adjusted Trichloroethylene1	nd	1.1	nd	0.75	21,900 A
Total PCBs	0.22	29.5	1.1	0.7	
Adjusted Total PCBs1	0.022	2.95	0.11	0.07	0.014

NAWQC - National Ambient Water Quality Criteria
nd - not detected
1- Detected concentrations divided by 10
A- Lowest Observed Effect Level

Previous sediment sampling locations SW-4 and SW-7 (see Figure 2), located in the stream downgradient of the site, were also resampled in 1998. In 1986, Aroclor 1242 was detected at SW-4 at 1,100 µg/kg. At SW-7, Aroclor 1242 and 1260 were detected at 680 µg/kg and 380 µg/kg, respectively. In the 1998 sampling round, Aroclor 1254 and 1260 were detected at SW-4 at 700 µg/ kg and 460 µg/kg, respectively. Both Arochlors were also detected at SW-7 (1254 at 770 µg/kg and 1260 at 460 µg/kg). Assuming a sediment organic carbon content of 1%, these concentrations exceed Ontario Ministry of Environment and Energy Severe Effect Levels (340 and 240 µg/kg for 1254 and 1260; Persaud et al., 1993). The sum of the Arochlors also exceed the National Oceanic and Atmospheric Administration (NOAA) Effects Range-Median (ERM) value for total PCBs of 180 µg/kg (Long et al., 1995). Both of these criteria have "To Be Considered" status in this five- year review, although they were not identified in the ROD as ARARs.

Al though exceedances of these criteria suggest that benthic invertebrate populations inhabiting the stream may be impacted, levels of these compounds have decreased since the remedial action, and are likely to decrease further in the future. Therefore, an evaluation of benthic invertebrate exposure will be conducted in the next five-year review. Methylene chloride was also detected in sediment sample SW-4 at 3.5, µg/kg. Jones et al. (1997) reported a Secondary Chronic Value of 370 µg/kg based on 1% organic carbon content. Therefore, methylene chloride is not expected to pose a risk of harm to aquatic receptor populations.

PCBs in sediments may bioaccumulate in aquatic organisms that live in or frequently contact sediments (Eisler, 1986). In turn, these organisms may be a source of PCB exposure to predators which consume them. Based on the Endangerment Assessment Report (G&M, 1988) and recent site reconnaissance by M&E, the stream is small and shallow with a rocky bottom, does not likely support fish, and is located within a forested area with a relatively closed canopy. These characteristics also suggest that the stream is not frequently utilized by semi- aquatic birds that may consume fish and/or macroinvertebrates. However, insects which utilize the stream and emerge as adults may be consumed by bats and insectivorous birds foraging in nearby open areas. To determine if PCB contamination in sediments could result in impacts to insectivores, a model was constructed to estimate the amount of PCBs ingested by bats via the consumption of emerging insects. The model, as described below, determined that PCBs in stream sediments are unlikely to pose a risk via trophic transfer.

The indicator species used in the model was the little brown bat, Myotis lucifugus, a common inhabitant of the Northeast. Individuals were assumed to consume 0.0025 kg/day (wet weight) (Anthony and Kunz, 1977 in Sample et al, 1996). Body weight was set at 0.0075 kg (wet weight) (Gould, 1955 in Sample et al., 1996). The daily ingestion rate was divided by body weight to obtain the food intake rate (FI; 0.33 kg insects/kg BW-day).

Equation (1) was used to calculate the PCB daily dose that M. lucifugus would be expected to be exposed to from the ingestion of emerging insects:

$$Dose = F1 * Cdiet \quad (1)$$

where

Dose = PCB ingested per day via ingestion of insects (mg/kg BW-day);
FI = food intake rate (kg insects/kg BW-day); and
Cdiet = estimated PCB concentration in diet (mg/kg).

The estimated PCB dietary concentration(Cdiet) was calculated using the following equation:

$$Cdiet = Pinsects * Cinsects \quad (2)$$

where

Cdiet = estimated concentration of PCB in diet (mg/kg)
Pinsects = proportion of diet consisting of insects (unitless); and
Cinsects = estimated concentration of PCBs in insects (mg/ kg wet weight).

The proportion of the diet consisting of insects (Pinsects) from the stream was conservatively set at 100%. A site use factor of 100% was also assumed in calculating the exposure dose.

The concentration of PCBs in insect tissue(Cinsects) was determined using the following equation:

$$Cinsects = Csediment * BAF \quad (3)$$

where

Cinsects = estimated concentration of PCBs in insects (mg/kg wet weight);
Csediment = Concentration of total PCBs detected in sediment (1.2 mg/kg dry weight); and
BAF = sediment-to-insect bioaccumulation factor (unitless).

Based on sediment and invertebrate tissue sampling results reported in Charter (1991 in Boucher, 1993), a PCB BAF of 0.19 was selected for use in equation (3).

A relative oral bioavailability factor of one was also assumed for PCBs. The use of a factor of one is conservative because it assumes that 100% of the chemical ingested in the diet is bioavailable, and that bioavailability is similar to that of the bioassay from which the toxicity reference value (TRV) is derived. Furthermore, it assumes that there is no difference in uptake of a chemical between that of the receptor species and the species from which the TRV was derived.

A calculated lowest observed adverse effect level (LOAEL) of 0.795 mg/kg/day (based on exposure to Aroclor 1254) was used as the TRV for M. lucifigus (Sample et al., 1996). The estimated PCB exposure dose was compared to TRV using Equation (4):

$$\text{Hazard Quotient} = \frac{\text{Calculated (estimated) exposure dose}}{\text{Toxicity Reference Value}} \quad (4)$$

The HQ for the ingestion. of insects by M. lucifigus was 0.09. An HQ less than 1 indicates harm is unlikely. PCBs in stream sediments are unlikely to pose a risk of harm via trophic transfer.

SECTION 4.0
CONCLUSION

The objective of this five year review is to confirm that the site's remedial actions completed to date adequately protect human health and the environment. For remedial actions not yet complete, the cleanup standards set in the RODs are reviewed as well as the technologies chosen for remedial action implementation.

4.1 CONCLUSIONS

Neither VOCs nor PCBs were detected in the five private water supply wells that were sampled for the five year review. These result suggest that, at this time, contaminants from the site are not present in this part of the bedrock aquifer, southwest of the site. The collection trenches appear to be capturing contaminants that are migrating laterally from the source area to the east and southwest in the upper till. Conversely, the appearance in 1994 and 1998 of about 13 μg/l of VOCs and 0.24 to 0.43 μg/l of PCBs in well MW-10C, screened at a depth of about 80 feet, suggests that contaminants may be migrating downward through the till toward the bedrock at or near the source area. The till is thick and poorly permeable, and the contaminants are present at concentrations below the MCLs in the deepest wells. Notwithstanding, future five- year reviews will need to reassess the bedrock supply wells to determine if they have become adversely affected. In addition, the sampling of residential wells might be an appropriate future modification to the management of migration- related monitoring activities, the frequency of which will be discussed with GE.

4.2 STATEMENT OF PROTECTIVENESS

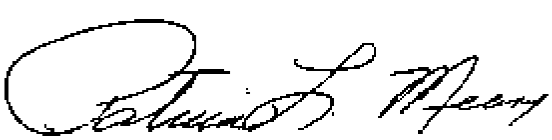
There is no indication that an uncontrolled risk to human health exists at the site. Management of Migration of the groundwater plume is on- going and is expected to continue until groundwater is cleaned up to MCLs.

The evaluation of surface water data collected in 1998 indicated that 1,2-dichloroethene, the only detected compound, did not pose a risk to aquatic receptors in the stream or human receptors that may contact the stream during recreational activities.

Sediment concentrations of Aroclor 1254 and 1260 exceeded Ontario Ministry of Environment and Energy (OMEE) Severe Effect Levels (340 and 240 μg/kg for 1254 and 1260; Persaud et al., 1993), and the sum of the congeners exceeded the National Oceanic and Atmospheric Administration (NOAA) Effects Range-Median value for total PCBs of 180 μg/kg (Long et al., 1995). Although exceedances of these criteria suggest that benthic invertebrate populations inhabiting the stream could be impacted, levels of these compounds have decreased since the remedial action, and are likely to decrease further in the future. Therefore, an evaluation of benthic invertebrate exposure will be conducted in the next five-year review. PCB concentrations detected in stream sediments are not expected to pose a risk of harm to bats or insectivorous birds. In addition, PCBs in sediments are not expected to result in a significant risk to human using the stream for recreational purposes.

Soils with PCB levels in excess of 13 mg/kg were incinerated, placed back on-site, and covered. These on-site soils are currently within a fenced area. No confirmatory sampling results are available to estimate residual risk associated with exposures to these on-site soils. In the absence of these data, the incinerated soils should remain covered and the fence intact to limit potential exposures. A future five- year review will incorporate soil sampling to determine the level at which residual soil may require additional institutional controls once groundwater remediation is complete. PCB levels in off-site soils (i.e., in the Rose garden) were 2.8 mg/ kg, a level not associated with either a risk outside the acceptable excess risk range of 1x10-4 to 1x10-6 or an HI_1 in the 1988 Endangerment Assessment Report.

I certify that the remedy selected for this site remains protective of human health and the environment. The next five-year review will be conducted by the end of 2002.



3/31/99

Patricia L. Meaney, Director
Office of Site Remediation and Restoration, Region 1

SECTION 5.0
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APPENDIX A
ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

AAL	Massachusetts Ambient Air Level
ACL	Alternate Concentration Level
AIC	Acceptable Intake - Chronic
AIS	Acceptable Intake - Subchronic
ARAR	Applicable or Relevant and Applicable Requirements
ARCS	Alternative Remedial Contract Services
AWQC	Ambient Water Quality Criteria
CAA	Clear Air Act
CAG	Carcinogen Assessment Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGRL	Charles George Reclamation Landfill
CMR	Code of Massachusetts Regulations
COC	Contaminant of Concern
CWA	Clean Water Act
DEHP	Di(ethylhexyl) phthalate
DEP	Massachusetts Department of Environmental Protection
EPA	Environmental Protection Agency
EO	Executive Order
ESAT	Environmental Services Assistant Team
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GCA	GCA Corporation
HEA	Health Effects Assessment
HEAST	Health Effects Assessment Summary Tables
HMM	HMM Associates, Inc.
IRIS	Integrated Risk Information System Kg Kilogram
LDR	Land Disposal Restrictions
MANHESP	Natural Heritage and Endangered Species Program, Massachusetts Division of Fish and Wildlife
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MEK	Methylethyl Ketone
MGL	Massachusetts General Laws
mg/L	Milligrams per Liter
NAAQC	National Ambient Air Quality Standards
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NTCHS	National Technical Committee for Hydric Soils
NUS	NUS Corporation
NWI	National Wetlands Inventory
O& M	Operation and Maintenance
ORSG	Massachusetts Office of Research and Standards Guidelines
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbon
POTW	Publicly Owned Treatment Works
RAF	Relative Absorption Factor
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
RME.	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TBC	To Be Considered
TCE	Trichloroethylene
TLV	Threshold Limits Value
ug/kg	Micrograms per Kilogram
USACOE	United States Army Corps of Engineers
USDA/SCS	United States Department of Agriculture/Soil Conservation Service
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey