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EPA Superfund
Record of Decision:

IRON HORSE PARK
EPA ID: MAD051787323
OU 03
BILLERICA, MA
09/30/2004

U.S. EPA New England, Region 1

Record of Decision

For

Iron Horse Park Superfund Site

Operable Unit 03

Billerica, Massachusetts

September 30, 2004

Iron Horse
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U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 1

IRON HORSE PARK SUPERFUND SITE, OU3
RECORD OF DECISION SUMMARY
SEPTEMBER 2004

Record of Decision
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PART 1: THE DECLARATION

DECLARATION FOR THE RECORD OF DECISION

Iron Horse Park
Billerica, Massachusetts
MAD051787323
Operable Unit 3

A. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Iron Horse Park Superfund Site, Operable Unit 3 (OU3)(Site), in Billerica, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC (9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, as amended. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Billerica Public Library and at the United States Environmental Protection Agency (EPA) Region 1 OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix E to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Commonwealth of Massachusetts concurs with the Selected Remedy

B. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

C. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for OU3 at the Iron Horse Park Superfund Site, which involves the capping (source control) of landfills and contaminated soil areas at six different Areas of Concern (AOCs) and the maintenance of an existing landfill cap at a seventh AOC. Institutional controls, in the form of land use restrictions, will be used to prevent exposures and preserve elements of the remedy. The selected remedy is a comprehensive approach for this operable unit that addresses all current and potential future risks caused by soil contamination. Specifically, this remedial action includes waste and contamination associated with the **B&M Railroad Landfill**, the **RSI Landfill**, the **B&M Locomotive Shop Disposal Areas**, the **Old B&M Oil/Sludge Recycling Area**, the **Contaminated Soils Area**, the **Asbestos Landfill** and the **Asbestos Lagoons**. The remedial measures will ensure that: soil from the **B&M Locomotive Shop Disposal Area**, the **Old B&M Oil/Sludge Recycling Area** and the Contaminated Soils Area will no longer present an unacceptable risk to human health via ingestion of lead; that the **Asbestos Landfill** and the **Asbestos Lagoons** will no longer present a potential human health risk via inhalation of asbestos; and, that the BdkM Railroad Landfill and the **B&M Locomotive Shop Disposal Area** will no longer present an unacceptable environmental risk from ecological receptors’ ingestion and direct contact with cadmium, copper, and lead. An additional expected outcome is that source control actions, specifically capping, will remove the **B&M Railroad Landfill**, the **RSI Landfill**, the **B&M Locomotive Shop** Disposal Areas, the **Old B&M Oil/Sludge Recycling Area**, the Contaminated Soils Area and the Asbestos Lagoons as ongoing contributors of contamination to local groundwater by volatile organic compounds (VOCs), semi-volatile organic compound (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganics.

The maior comgonents of this remedy are

1. Capping of source areas (with the capping standards that apply):

- At the **B&M Railroad Landfill** - Hazardous Waste Cap – *Region 1 Alternative Cap Design/Solid Waste Disposal lct (SWDA), Subtitle C* 1

- At the **RSI Landfill, B&M Locomotive Shop Disposal Areas** and the **Asbestos Lagoons** - Solid Waste Cap - *SWDA, Subtitle D* 2

- At the **Old B&M Oil/Sludge Recycling Area** and the **Contaminated Soils Area** - Solid Waste/Asphalt Cap – *Massachusetts DEP Landfill Technical Guidance Manual/Solid Waste Disposal Act (SWDA), Subtitle D*

- At the Asbestos Landfill – Maintenance of the existing Toxic Substances Control Act (TSCA)3 cap

2. Institutional Controls in the form of land use restrictions to be implemented by responsible parties

3. Groundwater monitoring to assess effectiveness of source control actions

The total estimated cost of the selected remedy for OU3 is: **$23.53 million**

This OU is one of four operable units at this site. While part of the same superfund site, OU1 (the B&M Wastewater Lagoons) and OU2 (Shaffer Landfill) are distinct areas of the Site, with unique contamination histories and which are essentially independent of other parts of the site with regards to remedial action. The intention of OU3 is to address the remaining source areas, while OU4 will address site-wide groundwater, surface water and sediment. EPA is in the process of gathering site specific toxicity data related to surface water and sediment. The OU4 ROD is scheduled for 2006.

The selected response action addresses low-level threat wastes at the site by: eliminating exposure to human and ecological receptors from contaminated soil and airborne asbestos. This is accomplished through source control actions at the affected AOCs (capping of landfills and contaminated soil areas). In addition, the source control actions will help eliminate the ongoing migration of contaminants from the source areas to groundwater or surface water. Long term monitoring/maintenance and institutional controls will ensure that the remedy remains protective in the future. There are no principal threat wastes at OU3.

D. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Based on the size and location of the landfills and contaminated soil areas, EPA concluded that it was impracticable to excavate and treat the chemicals of concern in a cost-effective manner. Thus, the selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

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1 As enacted under the Resource Conservation and Recovery Act, 42 U.S. §§ 6921 *et seq*.
2 42 U.S.C. §§ 6941 et seq.
3 15 U.S.C. §§ 2601 et seq.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater and/or land use restrictions are necessary), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Hazardous substances already remain at the Site due to previous actions (OU2 Shaffer Landfill closure). Because of this, the most recent Five–Year Review was completed by EPA in September 2003. The next review will be required by September 2008.

E. SPECIAL FINDINGS

Issuance of this ROD embodies specific determinations made by the Regional Administrator pursuant to CERCLA and section 404 of the Clean Water Act, 33 U.S.C. § 1251 et seq., the remedy is the least damaging practicable alternative for protecting aquatic ecosystems at the site under the standards of 40 CFR Part 230. Specifically, at the B&M Railroad Landfill EPA expects impacts to both wetlands and the 100-year floodplain. At the B&M Railroad Landfill, the RSI Landfill, and the B&M Locomotive Shop Disposal Areas, EPA proposes capping the waste in place, which will potentially result in minor to moderate disturbances to wetlands as landfill area is moved back; EPA anticipates potentially moderate loss of floodplain/ storage capacity at the B&M Railroad Landfill due to increased landfill cap elevation. At the Asbestos Landfill, EPA expects temporary and minor wetland disturbance due to fence installation. The potential need for replacement floodplain storage capacity will be addressed during the design process and alteration of wetlands will be addressed through mitigation measures. Due to the location of these AOCs in or near wetlands and/or floodplain areas, EPA cannot identify a less damaging practicable alternative for each AOC which would avoid impacting the wetland and/or floodplain areas while adequately addressing site risks.

E. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this site.

l. Chemicals of concern (COCs) and their respective concentrations
   (Table G-l, G-2, G-3, G-8, G-9, G-10)

2. Baseline risk represented by the COCs
   (Table G-6, G-7, 6-8, G-9, 6-10)

3. Cleanup levels established for COCs and the basis for the levels
   (Table CL-1 and CL-2, pages 56-57)

4. Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD (pages 17-19)

5. Land and groundwater use that will be available at the site as a result of the selected remedy (page 55)

6. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Table L-1 thru L-7)

7. Decisive factor(s) that led to selecting the remedy (page 26)

F. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for soil at OU3 at the Iron Horse Park Superfund Site. This remedy was selected by the EPA with concurrence of the Massachusetts Department of Environmental Protection.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By: Susan Studlien Date: 04/30/07

Susan Studlien
Director
Office of Site Remediation and Restoration
Region 1

PART 2: THE DECISION SUMMARY

A. SITE NAME, LOCATION AND DESCRIPTION

- Address
  Iron Horse Park
  High Street
  North Billerica, MA

- National Superfund electronic database identification number, e. g., CERCLIS identification number for Iron Horse Park is: MAD051787323

- The lead entity for Operable Unit 3 of Iron Horse Park is EPA

Site Description

The Iron Horse Park site, located in Billerica Massachusetts, is a 553-acre industrial complex which includes manufacturing and railyard maintenance facilities, open storage areas, landfills, and wastewater lagoons. A long history of activities at the site, beginning in 1913, has resulted in the contamination of soil, groundwater, and surface water. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601, et seq., the site was listed on the National Priorities List (NPL) in 1984 and was subsequently divided into three operable units (OU). Although part of the same NPL listing, these three operable units are distinct areas of the Site. OU1, which consists of a former 15 acre wastewater lagoon area and OU2, a 60-acre landfill have both completed remedial action. The OU3 study area encompasses the rest of the site.

Operable Unit 3 is characterized by numerous source areas, an extensive wetland system, multiple property owners, a complex history and widespread environmental impacts. Due to the complicated nature of the original operable unit, OU3 was ultimately divided into two operable units. This Record of Decision (ROD) addresses the 7 Areas of Concern located within the original OU3. What is now defined as Operable Unit 3 will address Capping and Source Control measures which will be implemented to address potential sources of contamination, and are intended to prevent further spread of contamination to groundwater, surface water and sediment. The potential remediation of site wide surface water, sediment and groundwater will be addressed as a part of Operable Unit 4.

The source areas addressed are (See Figure 1-2):

B& M Railroad Landfill - A 14-acre landfill near the commuter rail line.

RSI Landfill - A 6-acre landfill adjacent to the rail yard.

B& M Locomotive Shop Disposal Areas - There are two disposal areas which total approximately 1and 3 acres in area. They are separated by a man-made channel.

Old B&M Oil/Sludge Recycling Area - Approximate 6-acre area was established sometime prior to 1938 for the purpose of recycling oil. It was filled in at a later date and until recently was primarily owned by the Penn Culvert Company.

Contaminated Soils Area - Approximate 50 acre area is located in the center of the Iron Horse Park Superfund Site.

Asbestos Landfill - Previously utilized by Johns-Manville for disposal of asbestos- related materials, 13-acre landfill capped by EPA in 1984 as part of a removal action.

Asbestos Lagoons - Three unlined former asbestos lagoons on Johns-Manville (currently BNZ Materials) property which received an asbestos slurry pumped from the adjacent manufacturing operation. Asbestos from these lagoons was disposed of in the asbestos landfill.

A more complete description of the Site can be found in Section 1 of the Remedial Investigation Report.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of OU3 Activities

The 553 acres of land that now make up OU3 were first purchased by the B&M Railroad (now known as B&M Corporation) in 1911. Prior to that year, the Site consisted of approximately 18 privately owned parcels that B&M Corporation consolidated. Since 1911, a variety of industrial disposal practices have resulted in the creation of numerous lagoons, landfills, and open storage areas. At various times over the years, B&M Corporation has sold or leased several parcels of the land and some of the buildings on the Site to various companies. B&M operated an oil and sludge recycling area beginning sometime prior to 1938. This operation took place on property which was subsequently owned by Penn Culvert and currently, Cooperative Reserve Supply, Inc. In 1944, the B&M Railroad sold approximately 70 acres of land in the western portion of the Site to Johns-Manville Products Corporation, which at that time began to manufacture structural insulating board that contained asbestos. Three unlined lagoons were built to dispose of the resulting asbestos sludge waste. At approximately the same time, the B&M Railroad leased approximately 15 acres of land in the eastern portion of the Site to Johns-Manville to be used as a landfill for asbestos sludge and other asbestos mill wastes generated by their manufacturing operations. EPA capped this landfill in 1984 as part of an “Immediate Removal Action” under CERCLA. The B&M Landfill, the RSI Landfill, and the B&M Locomotive Shop Disposal Areas were unmonitored landfill/disposal operations.

A more detailed description of the Site history can be found in Section 1 of the Remedial Investigation Report.

2. History of Federal and State Investigations and Removal and Remedial Actions

Date	Action	Legal Authority	Who Undertook	Results	Related Documents
1984	Time Critical Removal	CERCLA	EPA	Consolidation and capping of asbestos waste	Action Memorandum
1987	Site Investigation	CERCLA	EPA	Division of Iron Horse Park into operable units	Phase 1A Remedial Investigation
1997	Site Investigation	CERCLA	EPA	Risk Assessment	Remedial Investigation Final Report (OU3)
2004	Feasibility Study	CERCLA	EPA		Proposed Plan

3. History of CERCLA Enforcement Activities

On May 6, 2004, EPA notified five (5) potentially responsible parties (PRPs) who either owned or operated the facility, generated wastes that were shipped to the facility, arranged for the disposal of wastes at the facility, or transported wastes to the facility of their potential liability with respect to the Site. In addition, on May 13, 2004, EPA issued Potentially Interested Party (PIP) letters to ten (10) parties. Negotiations with the PRPs have not yet commenced regarding the settlement of the PRPs’ liability at OU3.

The PRPs have been active in the remedy selection process for this Site. One PRP submitted comments on the Proposed Plan. The PRP comment letter (as well as other comments received during the comment period) is included in the Administrative Record. The comments are

summarized and responded to in the Responsiveness Summary section of this ROD.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement with OU3 has been moderate (historically the community has been most concerned and involved with OU2, Shaffer Landfill). EPA has kept the community and other interested parties apprized of OU3 activities through informational meetings, fact sheets, press releases and public meetings. Below is a brief chronology of public outreach efforts.

- In September and December of 1983, and March and August of 1984, EPA held meetings in Billerica regarding environmental sampling and the Asbestos Landfill.

- In August 1985, the EPA released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities.

- Local residents formed the Earthwatch Coalition to monitor Site activities. On September 29, 1993, they applied for a Technical Assistance Grant (TAG). The grant was awarded on March 4, 1994 and the Earthwatch Coalition retained a TAG consultant that has attended some technical project meetings.

- In November 1998, EPA issued a Fact Sheet which discussed the results of the Remedial Investigation and announced the upcoming informational meeting in Billerica.

- On December 1, 1998, EPA held an informational meeting in Billerica to discuss the results of the Remedial Investigation.

- On June 2, 2004, EPA made the administrative record available for public review at EPA's offices in Boston and at the Billerica Public Library, 15 Concord Road, Billerica. This was established as the primary information repository for local residents and has been kept up to date by EPA.

- EPA published a notice and brief analysis of the Proposed Plan on June 6, 2004 in the Lowell Sun and on June 10, 2004 in the Billerica Minuteman and made the plan available to the public at the Billerica Public Library, 15 Concord Road, Billerica.

- From June 16, 2004 to July 16, 2004, the Agency held a 30 day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. An extension to the public comment period was requested and as a result, it was extended to August 13, 2004.

- On, June 16, 2004 EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA answered questions from the public.

- Also on June 16, 2004, the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the Responsiveness Summary, which is part of this Record of Decision.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many Superfund sites, the problems at Iron Horse Park are complex. As a result, EPA has organized the work into 4 operable units (OUs):

- OU1: The **B&M Wastewater Lagoons** addressed contamination in an approximately 15 acre area, in and around the former wastewater lagoons. EPA selected a remedy for OU1 in a September 1988 ROD. The ROD selected bioremediation to address contamination in soil and sediment. This remedy was later modified to utilize off-site asphalt batching. The remedy for OU1 was completed in 2003 with an Remedial Action (RA) Report.

- OU2: The **Shaffer Landfill** addressed contamination at the 60 acre former mixed waste landfill. EPA selected a remedy for OU2 in a June 1991 ROD. The ROD selected capping and collection and disposal of leachate to address groundwater contamination. Construction of the remedy for OU2 was completed in 2003 with an Interim RA Report. OU2 is currently in the Operation and Maintenance phase.

- OU3: This ROD, for OU3, addresses the remaining, previously identified source areas within Iron Horse Park utilizing source control technologies to prevent direct contact with contaminants by human and ecological receptors and to prevent the spread of contamination to groundwater and surface water.

- OU4: During the OU3 Remedial Investigation and for most of the Feasibility Study (FS), it was intended that the OU3 ROD was to be the Final ROD for Iron Horse Park. During the FS, modeling was conducted on the alternatives being considered to address groundwater contamination. According to the modeling results, none of the remedial measures would have achieved cleanup requirements in a reasonable time period (modeling generally predicted in excess of 200 years). Groundwater will be re-evaluated as to whether further characterization is required or whether other measures are necessary in order to address site-wide groundwater in the ROD for OU4

  With regard to surface water and sediment, site-specific toxicity data has not been previously collected for these media. EPA feels that the lack of this data, prevents a high enough degree of confidence in ecological risk conclusions to be able to choose a remedy at this time. Therefore, the site-specific toxicity data will be collected and incorporated into an amended risk assessment and remedy decisions for surface water and sediment will be included in the ROD for OU4.

The selected response action for OU3 addresses low-level threat wastes by eliminating exposure to human and ecological receptors from contaminated soil and airborne asbestos. This is accomplished through source control actions at the affected AOCs (capping of landfills and contaminated soil areas). In addition, the source control actions will help eliminate the ongoing migration of contaminants from the source areas to groundwater or surface water. There are no principal threat wastes at OU3.

E. SITE CHARACTERISTICS

Section 1 of the Final Feasibility Study of May 2004 contains an overview of the Remedial Investigation. The significant findings of the Remedial Investigation are summarized below.

The 553 acres of land that comprise the Site (Figure 1-2) were first purchased by the B&M Railroad (now known as B&M Corporation) in 1911. Prior to that year, the Site consisted of approximately 18 privately owned parcels that B&M Corporation consolidated. Land-use records for these parcels prior to 1911 were not recorded. However, since 1911, a variety of industrial disposal practices have resulted in the creation of numerous lagoons, landfills, and open storage areas. Table 1-1 of the May 2004 FS Report provides a chronology of the activities at the Site.

As a result of the Phase 1A RI completed in 1987, areas of concern identified at the Site were divided into three operable units: the B&M Wastewater Lagoons (operable unit 1), the Shaffer Landfill (operable unit 2), and the remaining areas of concern (operable unit 3) including the B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas (A and B), the Reclamation Services Inc. (RSI) Landfill, the Old B&M Oil/Sludge Recycling Area, the Contaminated Soils Area, the Asbestos Landfill, the Asbestos Lagoons, and Site-Wide Surface

Water and Sediment Contamination. Operable unit 3 is addressed in the May 2004 FS Report. Selected surface water and sediment locations are being evaluated to further determine potential ecological effects as part of operable unit 4.

The area of study evaluated during the RI included not only the applicable portions of the Site, but also surrounding areas and water bodies that are potentially affected by operable unit 3 (the 3rd operable unit). For this reason, the entire study area evaluated during the RI is referred to throughout this report as "the Site." The area of study that was evaluated during the Remedial Investigation is shown in Figure 1-1.

Areas of concern (AOCs) in OU3 consist of the B&M Railroad Landfill, the B&M Shop Disposal Areas (A and B), the RSI Landfill, the Old B&M Oil/Sludge Recycling Area, the Contaminated Soils Area, and the asbestos contamination areas (including the Asbestos Landfill and the Asbestos Lagoons). Surface water and sediment contamination by wetland group (West Middlesex, Wetland 2, East Middlesex, Richardson Pond, and Content Brook) will be addressed in OU4. The media of concern in OU3 is surface and subsurface soil, while groundwater, surface water, and sediment will be the media of concern in OU4. Contaminants detected most frequently on site included volatiles, semi-volatiles, pesticides, polychlorinated biphenyls (PCBs), asbestos, and metals.

Waste Disposal Practices and Contaminant Sources by Area of Concern

B&M Railroad Landfill. The B&M Railroad landfill is approximately 14 acres in size and is located in a wetland area, north of the Middlesex Canal and east of the rail yard. The wetland was filled in by the B&M Railroad and used to dispose of various kinds of debris. Partially buried drums and railroad ties with creosote have been observed in this area.

RSI Landfill. The 6-acre RSI Landfill, located east of the B&M rail yard near the Johns-Manville Asbestos Landfill, is bounded on the south by an unnamed brook and on the east by a wetland, which the Middlesex Canal drains. This area was used by B&M as a borrow pit for sand and gravel sometime between 1961 and 1969.

From June of 1971 until August of 1971, the Massachusetts Division of Environmental Health granted RSI permission to use the B&M land to dispose of its loose, burnt refuse. The waste disposed of by RSI on B&M land was classified as municipal and light industrial solid wastes from the cities of Cambridge and Somerville.

B&M Locomotive Shop Disposal Areas. The B&M Locomotive Shop Disposal Areas consist of two disposal areas separated by a manmade channel that flows into an unnamed brook. The first area, located on the north side of the channel and approximately 1 acre in size is referred to as Area A.

The second area located on the south side of the channels is approximately 3 acres in size and is referred to as Area B. Prior to 1938 and until about 1979, Area B was used to dispose of various kinds of "light and dark-toned materials." Various kinds of debris, including deteriorated drums have been observed in this area.

Old B&M Oil/Sludge Recycling Area. The 6-acre, Old B&M Oil/Sludge Recycling Area was established sometime prior to 1938 for the purpose of recycling oil. A B&M Railroad site plan, dated 1972, shows two adjacent areas designated as "oil and sludge" which appear to be located about 300 feet west of the B&M locomotive shop repair facility. These two areas, where the oil and sludge pooled, had a combined dimension of 600 by 200 feet. In 1973, the Penn Culvert Company purchased the parcel of land containing these two disposal areas and sometime later filled them in.

Contaminated Soils Area. The Contaminated Soils Area is located in the center of the Iron Horse Park Superfund Site and is approximately 50 acres in size. The Contaminated Soils Area encompasses properties owned by Eastern Terminals, Inc., Wood Fabricators, and the Massachusetts Bay Transportation Authority (MBTA) (Figure 1-3).

Contaminated soil was first identified as a problem in the central portion of the Iron Horse Park Superfund Site after a random soil boring program conducted across the Site indicated elevated levels of lead (310 to 76,600 ppm) at nine out of forty locations.

Asbestos Landfill. The Site has historically been identified with asbestos contamination due to asbestos landfilling operations conducted by Johns-Manville over a 32-year period. Although EPA capped the Asbestos Landfill in 1984, "asbestos contamination" was identified as a potential operable unit because the cap was not maintained. The integrity of the cap was evaluated as part of the RI. The entire western boundary of the cap is not fenced.

In 1985, during the Phase 1A RI, surficial soils (0 to 3 inches) from 40 random boring locations were analyzed for the presence of asbestos. Asbestos was detected at 28 of the locations sampled and, at eight of these located on Johns-Manville (currently BNZ Materials), Penn Culvert, and B&M properties, asbestos was present at levels greater than 1%. This suggested that wind-blown deposition of asbestos had occurred in portions of the Site on B&M property adjacent to the landfill, as well as on Johns- Manville (currently BNZ Materials) property where the asbestos waste originated. These sample results outside BNZ Materials property, are sporadic in nature, and with two exceptions, the results are either non- detect for asbestos, or contain less than 1% asbestos. These results do not suggest a pattern of asbestos contamination outside of the BNZ Materials property.

An off-site soil sampling program was also conducted to determine the extent, if any, of wind**n**blown asbestos in residential areas bordering the Site. The results of the off-site soil sampling indicated that, with one exception, there were no detectable levels of asbestos in these residential areas and the Draft Phase 1A RI report, concluded that deposition of wind- blown asbestos from the Site on off-site areas most likely did not occur.

The Asbestos Landfill Cap Evaluation Report was submitted to EPA in February 1994. This report documents the evaluation of the current condition of the landfill cap surface and recommends corrective actions to be implemented to protect public health and comply with state and federal regulations.

Asbestos Lagoons. In addition to the Asbestos Landfill, there are three unlined asbestos lagoons on Johns-Manville (currently BNZ Materials) property. One of these lagoons has been filled and covered. When the lagoons were operated by Johns-Manville, they received an asbestos slurry pumped from the adjacent manufacturing operations. Asbestos from these lagoons was disposed of in the Asbestos Landfill; however, the lagoons still contain some asbestos, as well as other wastes.

The lagoons continued to receive wastewater from Johns-Manville operations after asbestos manufacturing operations closed. While this discharge allegedly did not contain asbestos, it may have contained some other hazardous substances. During the Remedial Investigation xylenes, toluene, manganese and other contaminants were detected in Asbestos Lagoons sediments.

Site-Wide Surface Water and Sediment Contamination. The Middlesex Canal, as well as several ponds, wetlands, and streams (which will be addressed under OU 4) flow through and are adjacent to the OU3 areas of concern at the Site. Potential contamination of surface water and sediment as a result of surface runoff and groundwater contamination migration and discharge are of concern and are addressed under source control provisions within the OU3 remedy.

The quantity/volume of waste that may need to be addressed by media and disposal area are presented in Table 2-12 of the May 2004 Feasibility Study Report.

Geographic Setting

The Site is located in North Billerica, Massachusetts, approximately 8 miles south of the New Hampshire border, at an elevation of about 115 feet above sea level.

Located in eastern Massachusetts, the Site is on the western side of the Seaboard Lowland section of the New England physiographic province, a subdivision of the Appalachian Highlands. The Seaboard Lowlands are characterized by extensive glacial outwash and till deposits overlying a complex of igneous and metamorphic rocks.

The Site lies on the western edge of the Shawsheen River drainage basin and is approximately 1.5 miles from the northward- flowing Shawsheen River. The Iron Horse Park Superfund Site is surrounded by upland areas on the southeast side, including several small forested hills near Pond Street, and low lying wetland areas on the western, northern, and northeastern side of the Site. Currently, 17% of the Site is characterized as wetlands.

Soils on and in the immediate vicinity of the Site are classified as predominantly urban land with other soil types to a lesser extent. Urban land is indicated in areas where the soil has been disturbed or altered, is obscured by cultural features (e.g., buildings, industrial areas, roads, rail yards) and where these features cover more than 75% of the surface area.

The Site is used for industrial purposes, with no residential use. Some parts of the Site are fenced, but most is accessible to passers- by. The area within one mile of the Site boundary is primarily forest and residential, consisting primarily of single-family residential properties.

Surface waters in the vicinity of the Shaffer Landfill (OU2) on the Site are classified as Class B waters by the Commonwealth of Massachusetts and are designated for use as warm water fisheries and contact recreation. The Middlesex Canal, linking the Merrimack River to the Boston basin, runs through the Site, and some of its original features remain. It is essentially impassable for recreation or economic purposes. Histories of the canal indicate that clay was used along the canal banks to limit seepage of the canal water into neighboring lowlands. However, use of the clay liner in the canal may have been limited in extent.

A town inventory of historical properties revealed two historical assets within the site boundaries. The Small Pox Cemetery, dating back to 1811, is located between the Middlesex Canal and the MBTA commuter railroad line. The Content Brook Mill is located at the eastern end of the Shaffer Landfill property.

Files on five historic locations within or adjacent to the Site are maintained by the Massachusetts Historical Commission (MHC). These include the Pond Street Bridge over the B&M Railroad at the Site boundary (inventoried as BIL. 917), the Middlesex Canal (BIL 934, BIL K and BIL P), the B&M Railroad Billerica Shop Complex (BIL. 299), the Equipment Storage Shed (BIL. 300), the Maintenance Shed (BIL. 301), and the Power Plant (BIL. 302), the last four being centrally located on the Site.

As shown in Figure 1-4, part of the Site overlies what is expected to be a medium-yield aquifer. The remainder is expected to be a low-yield aquifer. No public water supply sources are located within the medium-yield aquifer on the Site, but the groundwater beneath the medium-yield aquifer is considered a potential drinking water source by both EPA and the Commonwealth of Massachusetts.

Although not currently in use, community public water supply wells are located less than 1 mile east of the Site in Tewksbury. The ½-mile-radius Interim Wellhead Protection Area (IWPA) for one of the Tewksbury wells extends to within approximately 500 feet of the Site on the northeast side. Surface water and other groundwater community public water supplies are located at North Billerica on the Concord River, just north of the Route 3A bridge, where a filtration plant is located. The southwestern corner of the Site is close to the ½- mile IWPA for the North Billerica Well. However, like the Tewksbury wells, this well is not currently in use.

There may be private wells along Gray Street, which is east of the Shaffer Landfill section of the Site, based on the knowledge of personnel at the Billerica Health Department. It is not known whether any such private wells are used as sources of drinking water or for other domestic uses.

Geology

Bedrock underlying the Site is comprised of granite, schist, and diorite. Bedrock surface elevations suggest the presence of a trough in the bedrock surface trending northeast from the Old B&M Oil/Sludge Recycling Area to the Unnamed Brook, then northwest toward the Asbestos Lagoons. Bedrock fractures were found trending north-northeast and east-west.

The overburden primarily consists of glacial drift deposits including basal and ablation till and glacial outwash deposits. Basal till was found primarily on the southwestern portion of the Site, and ablation till was found primarily in the western and southern portion of the Site overlying basal till. Glacial outwash deposits were encountered throughout the Site. Peat deposits were encountered underlying fill materials near streams, ponds, and wetlands at the Site.

Hydrogeology

The overburden aquifer was subdivided into shallow and deep zones to aid in determining the potential migration pathways. Groundwater is also contained and transmitted in weathered and fractured bedrock zones. Groundwater in both the overburden and bedrock aquifers generally enters the Site from the southwest and flows to the northeast. Similarly, surface water flows onto the Site from the south and flows to the northeast, where it converges with B&M Pond and associated wetlands. Based on seepage meter, staff gauge, and mini-piezometer results, the potential for groundwater to discharge to surface water was evident throughout most of the Site. Vertical gradients measured throughout the site indicates groundwater movement is much more horizontal than vertical.

Remedial Investigation Sampling Strategy

Immediate Removal Sampling. On- and off-site sampling for asbestos was conducted associated with the immediate removal action which resulted in the cover being placed on the Asbestos Landfill in 1984. While off-site impacts were not indicated, on-site sampling documented significant asbestos containing material and aided in the consolidation of material prior to capping.

The Remedial Investigation sampling program included the sampling of surface soil, subsurface soil (test pits and borehole soil), surface water, sediment and (shallow overburden, deep overburden, and bedrock) throughout the Site.

Surface soils. A total of 79 surface soils including background and historical locations were collected throughout the Site from July 22 through September 5, 1993 at locations presented in Figure 2-12 of the September 1997 RI Report. Five samples collected over a one acre area were composited and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs, metals, cyanide, total petroleum hydrocarbons (TPH), total combustible organics (TCO), and moisture content.

Test Pits. Twenty seven test pits were excavated in the B&M Railroad Landfill, RSI Landfill, B&M Shop Disposal Area, and the Old B&M Oil/Sludge Recycling Area from August 16 to 24, 1993 at locations shown in Figures 2-7 to 2-9 of the September 1997 RI Report. Soil samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, and TPH. Test pit locations were selected in potential source areas based on results of the geophysical surveys.

Soil borings. A total of 46 soil borings were advanced in the B&M Railroad Landfill, RSI Landfill, B&M Shop Disposal Area, and the Old B&M Oil/Sludge Recycling Area from August 24, to September 3, 1993 at locations shown in Figures 2-7 to 2-10 of the September 1997 RI Report. Soil samples were analyzed for VOCs, SVOCs, pesticides/ PCBs, metals, cyanide, TPH, TCO, and grain size. Boring locations were selected in potential source areas based on results of the geophysical surveys.

Surface water and Sediment Sampling. Forty six surface water and sediment samples were collected across the Site and study area during periods of high and low flow from June 9

through 22, 1993 and September 14 to 22, 1993 as shown in Figure 2-6 of the September 1997 RI Report. Surface water samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, TOC, and alkalinity samples and sediment samples were analyzed for VOCs, SVOCs, pesticide/PCBs, metals, cyanide, TPH, TCO, moisture content, and grain size.

Groundwater Samples. Fifty groundwater screening samples were collected from shallow groundwater downgradient of suspected source areas and measured by field GC for chlorinated and aromatic VOCs from September 27 through October 8, 1993 to assist in the location of monitoring wells. Groundwater samples were collected from monitoring wells screened in shallow overburden, deep overburden, and bedrock during the RI. A total of 77 monitoring wells shown on Figure 2-13 of the September 1997 RI Report were sampled during each of two rounds: March 28 to April 10, 1995 and July 17 to 28, 1995. The strategy included sampling wells upgradient, downgradient, and in the vicinity of source areas in which groundwater contamination was of concern. These areas included: the B&M Railroad Landfill, the RSI Landfill, the B&M Shop Disposal Area, the Old B&M Oil/Sludge Recycling Area, and the Asbestos Lagoons.

The Conceptual Site Model (CSM) for groundwater, surface water, and sediment is provided in Figure E-1 and the CSM for soil is provided in Figure E-2. The CSM is a three- dimensional “picture” of site conditions that illustrates contaminant sources, release mechanisms, exposure path ways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the media at OU3 is based on this CSM.

Nature and Extent of Contamination

The distribution of contaminants by media and area of concern, as well as contaminant fate and transport, are described in the following sections. The Asbestos Landfill has been omitted, since analytical samples were not collected in that area during the Remedial Investigation. (Note: Confirmatory sampling of asbestos to aid in efforts to consolidate the landfill prior to capping, was conducted during the immediate removal in 1984).

The concentration ranges of detected compounds for samples collected by area, media and analyte group are presented in detail in the Section 4 text and tables of the September 1997 Final RI Report. The quantity/ volume of waste by media and disposal area that need to be addressed are presented in Table 2-12 of the 2004 Feasibility Study Report.

B&M Railroad Landfill. Similar types of organic compounds including VOCs, PAHs, phthalates, petroleum hydrocarbons, and pesticides were detected in surface and subsurface soils, with the highest concentrations occurring in subsurface soils. These contaminants were also present in lower concentrations in groundwater. Heavy metal concentrations in surface and subsurface soils were higher than background soils. For soils, the southeastern half of the landfill was more contaminated with both organic compounds and metals. High concentrations of PCBs in subsurface soils suggest that PCB- contaminated material, possibly oils, was disposed of. Aromatic VOCs, PAHs and petroleum hydrocarbons are indicative of petroleum- related products that probably include coal tar and creosote waste.

In groundwater, wells located in the vicinity of the landfill exhibited the highest concentrations of contaminants, especially organic compounds. Aromatic and chlorinated VOCs, PAHs, pesticides, PCBs, and elevated metal concentrations were measured in groundwater, but were present in lower concentrations than in soil. Although no non-aqueous phase liquids (NAPLs) were found, oily sands were observed at several depths; in conjunction with the types of organic compounds that were detected, this suggests the presence of NAPL. Degradation of trichloroethylene (TCE) is evidenced by the presence of its potential byproducts, including both isomers of dichloroethylene (DCE).

RSI Landfill. Waste and fill present in the west- central portion of the landfill include organic compounds and heavy metals, detected in subsurface soils, and pesticides, PCBs, and phthalates, found in subsurface and surface soils. Aromatic VOCs, pesticides, and PCBs were

detected in groundwater at low concentrations. The detection of chlorinated VOCs in upgradient, as well as downgradient and vicinity wells, indicates that upgradient sources may be affecting groundwater quality. The presence of elevated vinyl chloride and dichlorinated VOCs directly downgradient of landfilled wastes and near the water table (groundwater screening locations) are indicative of the degradation of chlorinated VOCs. Aromatic VOCs found in a groundwater cluster near the Asbestos Landfill and the RSI Landfill may be from the Asbestos Landfill. The basis for this statement is: these wells are located immediately downgradient of the Asbestos Landfill, the contaminant concentrations in these wells were consistent between sampling rounds, and concentrations of aromatic compounds at the levels detected in these downgradient wells were not found elsewhere on-site.

B&M Locomotive Shop Disposal Areas. Heavy metals and organic compounds including pesticides, PAHs, and petroleum hydrocarbons were detected in surface and subsurface soils in both areas, where waste or fill material was found. A few organic compounds (including one VOC, a few pesticides, and one PCB Aroclor) and heavy metals were detected in groundwater in the downgradient and vicinity wells. The detection of organic compounds and some heavy metals in the upgradient cluster indicate that other sources may be present in the vicinity. Mercury and copper were the only detected metals that were not found in the upgradient wells.

Old B&M Oil/Sludge Recycling Area. Two areas of oil/sludge, located on the northern and southern edges of the area, were found to extend beyond the Penn Culvert fence perimeter, with one area extending onto MBTA property. The predominant types of organic compounds found were consistent with the oil/sludge reportedly disposed of in these areas. Contaminants detected in surface and subsurface soils consist primarily of PAHs, long- chain alkanes, and petroleum hydrocarbons. Numerous pesticides and PCBs were detected in the northern area, and heavy metals were measured in both areas. Although aromatic VOCs, PAHs, and petroleum hydrocarbons were generally not present in groundwater, chlorinated VOCs and heavy metals were detected. Heavy metals, which were detected primarily in shallow overburden groundwater, include arsenic, chromium, cobalt, lead, mercury, nickel, and zinc. Petroleum hydrocarbons were measured in one well, and several inches of floating product were observed in one piezometer in the southern oil/sludge area.

Contaminated Soils Area. Since surface soil contamination was of key concern in this area, this was the only medium sampled. However, groundwater monitoring wells associated with other AOCs are also downgradient of the **Contaminated Soils Area**. Organic compounds, including PAHs, petroleum hydrocarbons, and pesticides, were measured in surface soils in localized areas. Lead and manganese were the heavy metals that were detected most often and in the highest concentrations. Cyanide was detected in a localized area along the southeastern boundary.

Asbestos Lagoons. Sediment soil samples were collected at these lagoons during the RI. Groundwater contaminants included VOCs (primarily aromatic and chlorinated VOCs), PAHs, PCBs and pesticides. Several of the chlorinated VOCs (perchloroethylene (PCE), trichloroethane (TCA), and dichloroethane (DCA)) and heavy metals (arsenic, cobalt, lead, and zinc) were detected in the shallow overburden, deep overburden and bedrock flow zones. The types of contaminants found were similar to those detected in the 1980s during investigations related to the Johns-Manville stormwater drainage system. Detected heavy metals and organic compounds were primarily found in downgradient wells near the lagoons.

Contaminant Fate and Transport

In the following sections, contaminant fate and transport are described by area of concern. In general contamination at the Site consists of low level threat wastes.

B&M Railroad Landfill. Since organic materials are prevalent in soils, PCBs, PAHs, and pesticides are not expected to migrate appreciably in the unsaturated zone. It is also expected that the mobility of metals will be limited due to adsorption and other processes in soil. A migration pathway for VOCs in the unsaturated zone may be via vapor phase, since VOCs were detected more often at the water table (in groundwater screening locations) than with depth below it.

With the exception of VOCs, most contaminants found in the saturated zone soils (pesticides, PCBs, PAHs, phthalates, and heavy metals) will not migrate significantly in the dissolved phase as evidenced by the groundwater quality in wells across from B&M Pond. The presence of PCBs and pesticides below the limits of the waste indicate that residual or pooled dense non-aqueous phase liquids (DNAPL) may be present, although none was observed. Groundwater levels and analytical data indicate that groundwater is migrating vertically. Contaminants in the dissolved phase may migrate from the landfill to the B&M Pond to the east and the Middlesex Canal to the south as evidenced by downgradient contamination.

Measured vertical gradients indicate groundwater discharges to the Middlesex Canal and B&M Pond. Contaminants are more prevalent in sediment than surface water due to attenuation processes. Contaminants detected in sediments were also found in upgradient reaches. PCBs in the Middlesex Canal may be a result of historic discharges from the stormwater drainage system at the former Johns-Mansville facility.

RSI Landfill. Borings indicate that wastes exist above and below the water table. The absence of a low-permeability cover allows for contaminant transport from the unsaturated to the saturated zone. Similar to the B&M Railroad landfill, relatively elevated concentrations of PCBs, PAHs, and phthalates are found in the unsaturated zone. These compounds in percolating water may be highly attenuated through adsorption to organic matter in the soils. Although these compounds may also migrate vertically in DNAPL form, no DNAPL was observed. Most metals are fairly immobile due to adsorption and low solubility; however, leaching is possible. Chlorinated VOCs (DCE and vinyl chloride) detected in groundwater screening samples indicate the partitioning of these compounds to the vapor phase. Therefore, vapor phase movement may be a prominent transport mechanism at the water table.

Most organic compounds with the exception of VOCs often do not migrate significantly in the dissolved phase. Pesticides, PAHs, phthalates, and PCBs adsorb to organic matter in soils. However, due to the presence of sandy soils with less organic material, contaminant transport is of greater concern. Based on the direction of groundwater flow, contaminants in the dissolved phase would likely migrate toward the Middlesex Canal to the northeast and the unnamed brook to the southeast. Although vertical gradients are low, the existence of shallow bedrock facilitates contaminant transport from the overburden to bedrock. The presence of pesticides and PCBs in the deep overburden and bedrock groundwater indicates the potential for localized DNAPL pools; however, this was not confirmed during the field activities.

B&M Locomotive Shop Disposal Areas. Borings indicate that wastes exist above and below the water table. PAHs were found in the highest concentrations, especially in subsurface soils, while pesticides, PCBs, VOCs, and petroleum hydrocarbons were found at lower concentrations. The absence of a low-permeability cover facilitates contaminant transport from the unsaturated to the saturated zone. However, pesticides, PCBs and PAHs in percolating water may be highly attenuated through adsorption to organic matter in the soils.

Aromatic VOCs, PAHs, and petroleum hydrocarbons were notably absent in groundwater, although they were prevalent in subsurface soils. The absence of PAHs may be attributed to adsorption to soils. The absence of aromatic VOCs and petroleum hydrocarbons may be due to the placement of well screens below the water table. The potential for biodegradation of chlorinated compounds is evidenced by the existence of the breakdown products DCE and vinyl chloride near the water table. Based on the direction of groundwater flow, contaminants in the dissolved phase from both areas will migrate toward the northeast with potential downgradient discharge to the unnamed brook. Although vertical hydraulic gradients tend to be downward, there is no evidence that vertical migration of contaminants has occurred at this point.

Old B&M Oil/Sludge Recycling Area. Subsurface soils exhibited the highest concentrations of contaminants including aromatic VOCs (BTEX compounds - benzene, toluene, ethylbenzene, xylenes), PAHs, petroleum hydrocarbons, and metals. Although some of the area is covered with asphalt, the absence of a low-permeability cover may facilitate contaminant transport to the saturated zone (especially VOCs). However, PAHs, pesticides, and metals will tend to adsorb to the organic matter (peat) prevalent in soils in this area. Based on observations of free product in the area and the occurrence of PAHs and petroleum hydrocarbons, light non-aqueous

phase liquids (LNAPL) in residual or mobile form may be widespread. It was not detected in wells most likely because they are screened as much as 1 foot or more below the water table. The presence of high concentrations of PAHs may also indicate the presence of DNAPL.

Contaminated Soils Area. Soil contamination is likely the result of surface discharge from various work-related activities and is probably limited to surface soils. Evidence of free product spills included visual observation of oil-soaked or stained soils. Elevated levels of lead were detected throughout the area. Since lead is relatively insoluble and strongly adsorbed, significant migration in the unsaturated zone is not expected.

Pesticides, PAHs, VOCs, and heavy metals (especially lead) were measured in sediment at nearby water bodies. Overland flow runoff is the most likely transport pathway for this area. Based on drainage patterns to the northeast, this area could be contributing to contaminants in surface water and sediments in the Middlesex Canal, the unnamed brook, wetlands and ponds in the vicinity, as well as drainage ditches that lead to these water bodies.

Asbestos Lagoons. The limits of waste relative to the water table were not defined, since drilling was not conducted within the lagoons. The predominant types of compounds found in groundwater include pesticides and PAHs, which are likely to be strongly adsorbed to soils. Concentrations of several metals were elevated, with calcium levels most elevated. This was to be expected due to the plasterboard materials that were disposed here.

Several metals, a few chlorinated VOCs, and PAHs were most prevalent in the deep overburden and bedrock groundwater. PCBs were detected in a shallow well adjacent to catch basins. Past wastewater discharges, stormwater drain leakages, and mounding caused by rainfall likely induced vertical migration of contaminants beneath the area. Low concentrations of pesticides in groundwater may be the result of percolating rainwater. Chlorinated VOCs are likely the most mobile contaminants. Groundwater flow is divided, with flow to the northwest toward Middlesex Canal and to the northeast. Vertical gradients tend to be downward from shallow to deep overburden near the lagoons, but upward from bedrock to shallow overburden at the downgradient wells.

Summary of Exposure Pathways and Receptors

Human Health. Surface soil exposures to human receptors were evaluated for five AOCs: B&M Railroad Landfill, RSI Landfill, B&M Locomotive Shop Disposal Areas, Old B&M Oil/Sludge Recycling Area, and Contaminated Soils Area. Subsurface soil exposures at the Old B&M Oil/Sludge Recycling Area were also addressed.

Human receptors were identified as current and future adult workers based on the current active industrial use of the Site. It was assumed that future land use will remain the same as current land use. Worker exposures to soil were assumed to occur. Because the Site is not completely secure, child/teenage trespassers were assumed to gain access to the Site currently and in the future. Trespassers were assumed to contact on-site soil along with sediment and surface water in the wetland and ponds associated with the Site. Area residents are not currently using groundwater impacted by the Site for potable purposes. However, residential groundwater use was evaluated as a future exposure medium. The following summarizes the exposure pathways evaluated for each of the identified receptor populations:

- Site adult worker, current and future
  Ingestion pathways: surface soil
  Dermal contact pathways: surface soil

- Site child/teenage trespasser, current and future
  Ingestion pathways: surface soil,
  Dermal contact pathways: surface soil,

Trespassers and workers potentially may be chronically exposed to asbestos fibers released from the Asbestos Lagoons as well as at the Asbestos Landfill, if the landfill cap is not maintained.

Effects on the lung resulting from inhalation of asbestos fibers is the major asbestos health concern. Chronic inhalation exposure to asbestos can result in a lung disease termed asbestosis which is characterized by shortness of breath and cough. Asbestosis may lead to severe impairment of respiratory function and ultimately death. Other effects include scarring of tissue surrounding the lungs. pulmonary hypertension and immunological effects. Inhalation of asbestos fibers can cause lung cancer and mesothelioma (a rare cancer of the thin membranes lining the abdominal cavity and surrounding internal organs).

Asbestos fibers in the Lagoons, have the potential to become airborne, posing a human health threat via the inhalation pathway. Disposal of asbestos in these lagoons as well as subsequent partial removal has been documented. Furthermore, sampling of material in the lagoons confirms the presence of asbestos.

Under the National Emissions Standards for Hazardous Air Pollutants (NESHAP), in 1973 EPA defined asbestos containing material as material containing 1% asbestos or greater based detection limits available at the time. More recent data demonstrates that materials containing less than 1% asbestos may also pose a potential health risk in some circumstances.

As discussed earlier, a random soil sampling effort was conducted as part of the Phase 1A RI to analyze for asbestos. Asbestos was detected at a number of locations outside of the BNZ Materials property. These sample results outside BNZ Materials property, are sporadic in nature, and with two exceptions, the results are either non-detect for asbestos, or contain less than 1% asbestos. These results do not suggest a pattern of asbestos contamination outside of the BNZ Materials property indicative of a release to be remediated.

Ecological. Soil exposures were evaluated for ecological receptor populations within seven distinct areas of concern (AOCs): Asbestos Lagoons, Old B&M Oil/Sludge Recycling Area, Contaminated Soils Area, B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, RSI Landfill, and site-wide surface water and sediment. The risk posed by exposure to contaminants in surface water and sediment will be further addressed by Operable Unit 4 of the Iron Horse Park Superfund Site. Two AOCs including the Asbestos Lagoons and the site-wide surface water and sediment focused on exposures to aquatic and semi-aquatic species to surface water and sediments. Consequently, this section focuses on the ecological exposure to soils at five AOCs: Old B&M Oil/Sludge Recycling Area, Contaminated Soils Area, B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, and RSI Landfill.

Terrestrial receptors species and exposure pathways evaluated included:

- earthworm (soil invertebrates)
  - Dermal absorption
  - Ingestion of contaminated soil, detritus, and animal matter
- short tail shrew (small terrestrial mammals)
  - Consumption of soil invertebrates
  - Incidental ingestion of soil and surface water
  - Ingestion of surface water

The Contaminated Soils Area and the Old B&M Oil/Sludge Recycling Area were not quantitatively evaluated because a qualitative evaluation indicated the lack of significant receptor populations. Habitat in both of these areas is limited, as is the total area over which significant populations of earthworms and other soil invertebrate would be expected. Without a substantial prey base, shrews would not be expected to use these areas extensively.

It should be noted that contaminants associated with the Contaminated Soils Area and the Old B&M Oil/Sludge Recycling Area that could be transported were included in the sediment and surface water sampling program for adjacent and downgradient areas. Impacts to ecological receptor populations exposed to surface water and sediment contamination will be addressed as part of Iron Horse Park Operable Unit 4.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The land associated with OU3 is used for industrial purposes, with no residential use. The Middlesex Canal is essentially impassable for recreation or economic purposes, although it is a historic structure that someday could be developed as parkland or utilized as a resource in some other manner. Some parts of OU3 are fenced, but most is accessible to passers-by. The area within one mile of OU3 boundary is primarily forest and residential, consisting primarily of single family residential properties.

The town zoning map indicates that aside from a small section of commercially zoned land toward the southwest corner, the Iron Horse Park Site is zoned industrial. Consultation with the Billerica Planning Board and MADEP indicated that future land use is expected to remain industrial. The industrial zoning extends beyond the boundary of Iron Horse Park. In addition, the immediate surrounding area consists of rural residence and neighborhood residence zoning categories with a few small areas of general business zoning.

- Ground/Surface Water Uses:

Massachusetts GIS has mapped water related resources in Massachusetts, including in the area around the Iron Horse Park Site (Figure F-1). Part of the Site overlies what is classified as a medium-yield aquifer. Due to the presence of a railyard over a portion of this aquifer, the Massachusetts Department of Environmental Protection reclassified most of this aquifer as a non-potential drinking water source and considered of low use and value. However, the portion of the aquifer without the railyard remains a potential drinking water source, and is considered of medium use and value. The remainder of the Site overlies what is expected to be a low- yield aquifer. No public water supply sources are located within the medium-yield aquifer on the Site.

The current use(s) of the surface water at the Site and surrounding areas is as a warm water fishery and for contact recreation. On Site contact recreation would primarily be by trespassers.

Community and stakeholder input was sought and incorporated through active outreach with the Billerica Planning Board.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The human health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the site were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non- carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the environmental risk assessment.

1. Human Health Risk Assessment

Fifty of the more than 110 chemicals detected at the site were selected for evaluation in the human health risk assessment as chemicals of potential concern. The chemicals of potential concern were selected to represent potential site related hazards based on toxicity,

concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 6-11 through 6-14 of the RI and in Table 2 of Appendix I to the FS. From this, a subset of the chemicals were identified in the Feasibility Study as presenting a significant current or future risk and are referred to as the chemicals of concern in this ROD and summarized in Tables G-1 through G-3 for surface soil, surface soil/subsurface soil, and groundwater, respectively. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline risk assessment for the chemicals of concern. Estimates of average or central tendency exposure concentrations for the chemicals of concern and all chemicals of potential concern can be found in Tables 6-15 through 6-18 of the RI and in Table 3 of Appendix I to the FS.

Potential human health effects associated with exposure to the chemicals of potential concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The Site is an active industrial area. Fencing and signs discourage access to the Site by non**n**workers. However, it is possible for trespassers to enter the Site. Land use in the area surrounding the Site is primarily residential. Future use of the Site is expected to remain industrial. However, because of nearby residential areas, future residential use of groundwater impacted by the Site was considered. The following is a brief summary of just the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario, can be found in Section 6.0 of the RI and in Appendix I of the FS. For lead contaminated soil, a lead model was used to evaluate potential risks to workers of child-bearing age. For contaminated groundwater, ingestion of 2 l/day, 350 days/year for 30 yrs was presumed for an adult.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1 x 10-6 for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk" - or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site related) causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site related exposure is 10-4 to 10-6. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Table G-4.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by EPA and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A HQ $\leq$1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) within or across those media to which the same individual may reasonably be exposed. A HI $\leq$1 indicates that toxic noncarcinogenic effects are unlikely. A summary of the noncarcinogenic toxicity data relevant to the chemicals of concern is presented in Table G-5.

Tables G-6 and G-7, respectively, depict the carcinogenic and non-carcinogenic risk summary for the chemicals of concern in groundwater evaluated to reflect potential future residential groundwater ingestion corresponding to the reasonable maximum exposure (RME) scenario.

Groundwater was evaluated by flow zone (i.e., shallow overburden, deep overburden, and bedrock) for on-site Areas of Concern (AOCs). Only those exposure pathways deemed relevant to the source control remedy being proposed are presented in this ROD. Readers are referred to Section 6.0 of the RI and Appendix I of the FS for a more comprehensive risk summary of all exposure pathways evaluated for all chemicals of potential concern and for estimates of the central tendency risk.

Compounds determined to be significant risk contributors for groundwater overall include benzene, 1,2-dichloroethane, 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene, bis(2-ethylhexyl) phthalate, aldrin, PCBs, arsenic, beryllium, manganese, and thallium. MCL exceedances were noted for the following compounds, listed by AOC:

- B&M Railroad Landfill: 1,2-dichloroethane, trichloroethene, and lead;
- RSI Landfill: benzene, trichloroethene, arsenic, lead, and thallium;
- B& M Locomotive Shop Disposal Areas: no exceedances noted;
- Old B&M Oil/Sludge Recycling Area: 1,2-dichloroethane, 1,1-dichloroethene, trichloroethene, bis(2-ethylhexyl) phthalate, arsenic, and lead; and
- Asbestos Lagoons: 1,2-dichloroethane, lead, and nickel.

The Adult Lead Model was used to evaluate the hazard potential posed by exposure of the developing fetus as the most sensitive receptor group. A geometric standard deviation (GSD) in blood lead concentration of 1.8 was used in the model. A GSD of 1.8 is typical of populations in which the factors that may affect blood lead concentrations are less heterogeneous than other populations in the United States. A typical blood lead concentration in the absence of site exposures was assumed to be 1.7 µg/dL, which is at the lower end of the plausible range observed in the National Health and Nutrition Examination Survey (NHANES III) conducted from 1988 to 1991. A representative intake rate of soil was assumed to be 50 mg/day based on occupational, indoor exposures to dust from outdoor soil. The absolute gastrointestinal absorption fraction for ingested lead in soil and soil-derived dust was assumed to be 0.12. The frequency of exposure was assumed to be 219 days per year. The outcome of the model revealed that greater than 5% of an exposed population was predicted to have blood lead levels greater than 10 µg/dL based on surface soil lead levels at the Contaminated Soil Area and the B&M Locomotive Shop Disposal Area, and on surface/subsurface soil lead levels combined at the Old B&M Oil-Sludge Recycling Area. It is EPA’s goal to protect 95% of the sensitive population against blood lead levels in excess of 10 µg/dL blood. A lead concentration of 1,736 mg/kg in surface soil at the Contaminated Soil Area and the B&M Locomotive Shop Disposal Area, and in surface/subsurface soil lead levels combined at the Old B&M Oil-Sludge Recycling Area is considered protective of 95% of the sensitive population.

There are uncertainties that may affect the final estimates of human health risk at this Site. One assumption in the risk assessment was that the concentrations of chemicals would remain constant over time. This assumption may overestimate risks, depending on the degree of chemical degradation or transport to other media. Conversely, biodegradation of chemicals to more toxic chemicals was also not considered. RME risks are conservative since estimated risks are based on upper-bound exposure assumptions. Actual risks for some individuals within an exposed population may vary from those predicted depending upon their actual intake rates (e.g., drinking water ingestion rates) or body weights. Therefore, exposures and estimated risks are likely to be overestimated.

As discussed in Section E, above, trespassers and workers potentially may be chronically exposed to asbestos fibers released from the Asbestos Lagoons and the Asbestos Landfill.

Asbestos fibers in the Lagoons and the Asbestos Landfill, have the potential to become airborne, posing a human health threat via the inhalation pathway. Disposal of asbestos in the lagoons as well as subsequent partial removal has been documented. Furthermore, sampling of material in the lagoons confirms the presence of asbestos.

Under the National Emissions Standards for Hazardous Air Pollutants (NESHAP), in 1973 EPA defined asbestos containing material as material containing 1% asbestos or greater based detection limits available at the time. More recent data demonstrates that materials containing less than 1% asbestos may also pose a potential health risk in some circumstances.

2. Ecological Risk Assessment

The ERA evaluated the potential for contaminants in soil, surface water, and sediment to impact ecological receptor populations within seven distinct areas of concern (AOCs): Asbestos Lagoons, Old B&M Oil/Sludge Recycling Area, Contaminated Soils Area, B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, RSI Landfill, and site-wide surface water and sediment. The risk posed by exposure contaminants in surface water and sediment, will be further addressed in IHP OU4. Two AOCs, including the Asbestos Lagoons and the site-wide surface water and sediment data group, focused on exposures to aquatic and semi-aquatic species to surface water and sediments. Consequently, this ROD focuses on the ecological risk from exposure to soils, at five AOCs: Old B&M Oil/Sludge Recycling Area, Contaminated Soils Area, B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, and RSI Landfill.

Based on the ERA, it was determined that two of the AOCs, the Old B&M Oil/Sludge Recycling Area and Contaminated Soils Area, are unlikely to provide suitable habitat for terrestrial receptors, including soil invertebrates and terrestrial mammals, due primarily to the physical alteration of the habitats from industrial activities. As a result, additional evaluation of ecological risk within these two AOCs was not necessary since risk associated with potential exposure to site-related contaminants did not represent a complete exposure pathway for any receptor group. Therefore, evaluations associated with Old B&M Oil/Sludge Recycling Area and Contaminated Soils Area, are not included in the ERA and are not included in the ROD.

Identification of Chemicals of Concern
Contaminants of concern (COCs) were identified using an effects-based screening involving the comparison of maximum contaminant concentrations to ecological benchmarks for soils within each of the three AOCs. Data used to identify COCs are summarized below in Table G-8 (B&M Railroad Landfill), Table G-9 (RSI Landfill), and Table G-10 (B&M Locomotive Shop Disposal Areas).

Exposure Assessment
The upland habitats of the B&M Railroad Landfill, B&M Locomotive Shop Disposal Areas, and RSI Landfill provide habitat for a variety of terrestrial receptors, including soil invertebrates and small mammals. Terrestrial receptors may accumulate COCs through consumption of contaminated prey and incidental soil ingestion. Earthworms have significant exposure to soil contaminants both through direct dermal contact and through ingestion of large quantities of soil and detritus. Soil invertebrates such as earthworms serve as a prey base for other predators. Birds, as well as small terrestrial mammals like the northern short-tail shrew (*Blarina brevicauda*) may consume earthworms as a large portion of their diets. Small mammals such as shrews may serve as a significant food base for carnivorous wildlife. Exposure pathways, assessment endpoints, and measurement endpoints are summarized below in Table ECO-1.

Risk to soil invertebrates was evaluated by comparing soil concentrations to soil ecological benchmarks. Exposure point concentrations consisted of the mean and maximum soil concentration (0-1 ft depth interval) for each COC. Earthworm toxicity reference values (TRVs) consisted of toxicological benchmarks developed for earthworms, as well as ecological screening values for soils, and maximum allowable contaminant levels derived for the protection of the environment.

Short-tailed shrew, representing small terrestrial mammals, were selected as the assessment population to evaluate risks associated with exposure to COCs in each AOC. Potential risk from soil COCs to assessment populations was estimated using dietary exposure models. Because site-specific tissue data were not available, dietary doses were modeled from soil

concentrations. To assist in exposure estimation for small terrestrial mammals, COC concentrations in prey (earthworms) were modeled directly from COC concentrations in soil. Exposure point concentrations consisted of the mean and maximum soil concentration (0-1 ft depth interval) for each COC, and modeled earthworm tissue concentrations based on these values.

Table ECO-1
Ecological Exposure Pathways of Concern – Surface Soil

Exposure Medium	Sensitive Environment Flag Y or N	Receptor	Endangered/ Threatened Species Flag Y or N	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Soil	N	Soil Invertebrates	N	Ingestion and direct contact with chemicals in soil.	Sustainability (survival, growth, reproduction) of local populations of soil invertebrates	Compare chemical concentrations in soil to toxicity benchmarks which are indicative of potential impairment
Soil	N	Small terrestrial mammals	N	Ingestion and direct contact with chemicals in soil.	Sustainability (survival, growth, reproduction) of local populations of soil invertebrates	Compare modeled exposures to published values which are indicative of potential impairment.

Ecological Effects Assessment
Risk to soil invertebrates was evaluated by comparing COC concentrations in soil to soil ecological benchmarks. Whether COCs exceeded lower risk thresholds or upper risk thresholds for soil invertebrates was based on the magnitude of the exceedences of benchmark values.

Modeled dietary doses for shrew were compared to toxicity reference values (TRVs) obtained from the literature. TRVs were predominantly selected from studies which reported no-observed-adverse-effects-levels (NOAELs). When a suitable NOAEL was unavailable, studies which reported lowest-observed-adverse-effects-levels (LOAELs) were used and adjusted downward with an uncertainty factor of 10. Hazard quotients (HQs) were then calculated for each COC using the modeled doses and NOAEL TRVs.

Based on further data evaluation following the remedial investigation, the models/endpoints were revised. Background information on the updated calculations is presented in the FS.

Risk Characterization
The RI ecological risk assessment indicated soil COCs potentially posed a risk to populations of both earthworms (representative of soil invertebrates) and shrews (representative of the small mammal community) at B&M Railroad Landfill and the B&M Locomotive Shop Disposal Areas. Risks to terrestrial receptors from exposure to soils at RSI Landfill were minimal.

Although potential risks were identified in the ERA for soil invertebrates, the confidence in the conclusions were low, as these were based on conservative screening benchmarks. Development of the preliminary remediation goals (PRGs) was based on shrew endpoints to emphasize the importance of contamination in the food chain and risk to the small mammal community. Risks were identified for exposures of shrew to high concentrations of cadmium in soil at the B&M Railroad Landfill and to copper and lead in soils at the B&M Locomotive Shop

Disposal Areas.

PRGs were developed to identify a soil concentration at which ecological effects are likely to occur. The PRGs are based on a daily dose resulting in a hazard quotient (HQ) of 1.0, and using a protective NOAEL TRV. Since food COC concentrations were estimated from soil concentrations, the food chain models were used to back-calculate a soil concentration that corresponds to a daily dose resulting in an HQ of 1.0. This approach assumes that concentrations are evenly distributed throughout the site or foraging area. PRGs are summarized below (Table ECO-2) for those COCs identified as posing risk to small terrestrial mammals.

Table ECO-2
COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis 1	Assessment Endpoint
B&M Railroad Landfill	Soil	Cadmium	15.4	mg/kg	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals
B&M Locomotive Shop Disposal Area	Soil	Copper	2,213	mg/kg	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals
	Soil	Lead	868	mg/kg	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals

1 Exposure factors and toxicity reference values for the development of Preliminary Remediation Goals for soils are provided in Appendix B.2 of the Feasibility Study for Iron Horse Park Superfund Site, 3rd Operable Unit (M&E, 2004)

3. Basis for Response Action

Because the baseline human health and ecological risk assessments revealed that adult workers and small mammals potentially exposed to compounds of concern in soil via ingestion and contact may present an unacceptable human health risk as evaluated by the Adult Lead Model or unacceptable ecological risk (exceedance of NOEL TRVs), actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Workers and trespassers may also potentially be exposed to released asbestos fibers via inhalation. A response action will be selected and implemented to address risks associated with soil.

H. REMEDIATION OBJECTIVES

As stated previously, the reasonable, expected, future use for the site is industrial. The risk assessment evaluated exposure pathways associated with site workers as well as potential trespassers. Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives (RAOs) were developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to

human health and the environment. The RAOs for the selected remedy for OU3 are:

Human Health

- Soil - Prevent ingestion of lead from soil-derived dust at the B&M Locomotive Shop Disposal Areas, Old B&M Oil/Sludge Recycling Area, and Contaminated Soils Area that results in estimated maternal blood levels of greater than 4.2 µg/dL, a site-specific level protective of a 95th percentile fetal blood lead level of 10 µg/dL. This results in preventing exposure to lead soil concentrations greater than 1,736 mg/kg

- Soil - Prevent exposure to asbestos at the Asbestos Landfill.

- Soil - Prevent exposure to asbestos at the Asbestos Lagoons.

- Groundwater - Limit migration of contaminants in the B&M Landfill, RSI Landfill, B&M Locomotive Shop Disposal Areas, Old B&M Oil/Sludge Recycling Area, Contaminated Soils Area and Asbestos Lagoons into groundwater.

Ecological

- Protect short-tailed shrews and other smalls mammals from exposure to levels of metals associated with a HQ greater than 1 (cadmium) in soils at the B&M Railroad Landfill.

- Protect short-tailed shrews and other smalls mammals from exposure to levels of metals associated with a HQ greater than 1 (copper and lead) in soils at the B&M Locomotive Shop Disposal Areas.

(Other RAOs were developed and presented in the FS. However, those related to surface water and sediment, and management of migration of groundwater (i.e. potential ingestion) will be addressed as part of OU4.)

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/ Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

B. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP), 40 CFR Part 300, set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the site.

With respect to source control, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management. This range also included alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be

managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a no action alternative at each Area of Concern.

As discussed in Section 2 of the FS, soil and groundwater treatment technology options were identified, assessed and screened based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MM) alternatives for each Area of Concern. Section 4 of the FS presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP, as well as by combining the technologies for each Area of Concern in to Site Wide remedial alternatives. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. By this process, EPA initially developed 72 Site Wide remedial alternatives which contained source control and management of migration measures. Of these 72 alternatives EPA retained 15 alternatives for detailed analysis. Each alternative was then evaluated in detail in Section(s) 5 of the FS.

As discussed above in Section D. of this ROD, during the alternatives analysis development process of the FS, groundwater modeling demonstrated that groundwater cleanup alternatives being considered would not be effective in achieving RAOs in a reasonable time period. Because of this, the selection of a remedy for groundwater was deferred to OU4. A new section, Section 7, was developed to conduct the comparative analysis process for source control alternatives by Area of Concern. As discussed earlier, each Area of Concern tends to be distinct with regard to source control issues (i.e. contamination and risk). Section 7 evaluates the source control alternatives for each Area of Concern separately.

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each source control and management of migration alternative evaluated.

Source Control Alternatives Analyzed

The source control alternatives analyzed for the Site discussed by Area of Concern are summarized below. A more complete, detailed presentation of each alternative is found in Section 7 of the FS.

B&M RAILROAD LANDFILL

Table 7-1 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #1 , B&M Railroad Landfill which encompasses 12.4 acres. Table L-8 presents a summary of the ARARs associated with this AOC. The media of concern was soil and source control of contaminants in the landfill to protect groundwater. These technologies/process options for remediation of soil include:

- **No Action**
  - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action n**
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of soil and groundwater;

- **InSitu-1 - Monitored Natural Attenuation**
  - In-situ remedy of monitored natural attenuation
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - monitoring of soil and groundwater;

- **Source Control-1 - Capping**
    - Excavation of landfill material from the edge of the wetland, to minimize impacts on the wetland
    - Construction of double-barrier (EPA Region 1, Alternative CERCLA) landfill cap
    - Maintenance of cap
    - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
    - Restoring wetlands impacted by the cleanup
    - Monitoring of groundwater to assess the protectiveness of the cap;

Table 7-3 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #2, RSI Landfill which encompasses 2.5 acres. Table L-9 presents a summary of the ARARs associated with this AOC. Human health and ecological risk limits were not exceeded at this AOC for soil, but contaminants in the soil have the potential to migrate into groundwater. Therefore, single-barrier capping (SC-1) as part of source control for groundwater has been established as a technology/ process option for remediation in this area.

- **No Action**
    - Reevaluate taking no action at a minimum once every 5 years as part of the 5- year review process for the entire Site

- **Source Control-1 - Capping**
    - Construction of single-barrier (Subtitle D - Solid Waste) landfill cap
    - Maintenance of cap
    - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
    - Monitoring of groundwater to assess the protectiveness of the cap;

B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Table 7-5 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/ process options evaluated for AOC # , B&M Locomotive Shop Disposal Areas which together encompass 4.7 acres. Table L-10 presents a summary of the ARARs associated with this AOC. The media of concern was soil and source control of contaminants in the disposal area to protect groundwater. These technologies/process options for remediation of soil include:

- **No Action**
    - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action** -
    - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
    - Monitoring;

- **InSitu-1 - Monitored Natural Attenuation**
    - In-situ remedy of monitored natural attenuation
    - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
    - Monitoring of groundwater

- **Source Control-1 - Capping**
    - Construction of single- barrier (Subtitle D - Solid Waste) landfill cap
    - Maintenance of cap
    - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
    - Monitoring of groundwater to assess the protectiveness of the cap

- **Source Control-2 On-Site Disposal**
  - Excavation of soil/waste and placement under caps at other on-site AOCs;

- **OnSite-1 - Solidification/Stabilization**
  - Excavation of soil/ waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Mix excavated material with stabilizing additives
  - Place stabilized material as backfill (depending on what additives are used, pending predesign treatability studies, it is possible that mixing/treatment with asphalt emulsion may be feasible. In that event, treated material may be suitable for a paving sub-grade layer
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

- **OnSite-2 - Soil Washing/Chemical Extraction**
  - Excavation of soil/waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Soils are rinsed of fine material(<2mm) and returned for placement as backfill
  - Fines are mixed with additives (pending pre-design treatability studies) to remove site contaminants
  - Clean fines are returned as backfill
  - Sludge is dewatered prior to disposal
  - Treated water is discharged to groundwater via injection wells
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

OLD B&M OIL/SLUDGE RECYCLING AREA

Table 7-7 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC # , Old B&M Oil/Sludge Recycling Area which encompasses 7 acres. Table L-11 presents a summary of the ARARs associated with this AOC. The media of concern was soil and source control of contaminants in the soil to prevent migration into groundwater. These technologies/ process options for remediation of soil include:

- **No Action**
  - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action** -
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring;

- **InSitu-1 - Monitored Natural Attenuation**
  - In-situ remedy of monitored natural attenuation
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater

- **Source Control-1- Capping**
  - Construction of single-barrier asphalt cap (Subtitle D - Solid Waste standards to prevent direct contact with contaminated soil and prevent migration of contaminants to groundwater)
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)

- Monitoring of groundwater to assess the protectiveness of the cap

- **Source Control-2 - On-Site Disposal**
  - Excavation of soil/waste and placement under caps at other on-site AOCs;
  - Backfilling of excavated area

- **OnSite-1 - Solidification/Stabilization**
  - Excavation of soil/ waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Mix excavated material with stabilizing additives
  - Place stabilized material as backfill (depending on what additives are used, pending predesign treatability studies, it is possible that mixing/treatment with asphalt emulsion may be feasible. In that event, treated material may be suitable for a paving sub-grade layer
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

- **OnSite-2 - Soil Washing/Chemical Extraction**
  - Excavation of soil/ waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Soils are rinsed of fine material(<2mm) and returned for placement as backfill
  - Fines are mixed with additives(pending pre-design treatability studies) to remove site contaminants
  - Clean fines are returned as backfill
  - Sludge is dewatered prior to disposal
  - Treated water is discharged to groundwater via injection wells
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

CONTAMINATED SOILS AREA

Table 7-9 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #5, Contaminated Soils Area which encompasses approximately 6.7 acres. Table L-12 presents a summary of the ARARs associated with this AOC. The media of concern was soil and source control of contaminants to prevent migration into groundwater. These technologies/process options for remediation of soil include:

- **No Action**
  - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action** -
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring;

- **InSitu-1 - Monitored Natural Attenuation**
  - In-situ remedy of monitored natural attenuation
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater

- InSitu-2 - In- Situ Solidification/Stabilization
  - application of solidification/stabilization agents (agent requirements to be determined through pre- design analysis)
  - rototill/mixing of agents with contaminated soil
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

- **InSitu-3 - In-Situ Soil Flushing**
  - Application of flushing solvents (following pre-design studies) to leach contaminants into groundwater
  - Collection of contaminated groundwater for treatment via extraction wells
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

- **Source Control-1- Capping**
  - Construction of single-barrier asphalt cap (Subtitle D - Solid Waste standards to prevent direct contact with contaminated soil and to prevent migration of contaminants to groundwater
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the cap

- **Off Site - Soil Excavation and Off Site Treatment/Disposal**
  - Removal and disposal of existing asphalt
  - Excavation of contaminated soil
  - Transport contaminated soil to treatment facility for treatment by asphalt batching (pending pre-design treatability studies)
  - Backfill excavated area with clean soil

- **OnSite-1 - Solidification/Stabilization**
  - Excavation of soil/ waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Mix excavated material with stabilizing additives(pending pre-design treatability studies)
  - Place stabilized material as backfill (depending on what additives are used, it is possible that mixing/treatment with asphalt emulsion may be feasible. In that event, treated material may be suitable for a paving sub-grade layer
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

- **OnSite-2 - Soil Washing/Chemical Extraction**
  - Excavation of soil/ waste to local staging area
  - Remove debris and large(>3/4 inch) stones for disposal under landfill cap at B&M or RSI Landfill
  - Soils are rinsed of fine material(<2mm) and returned for placement as backfill
  - Fines are mixed with additives to remove site contaminants(pending pre-design treatability studies)
  - Clean fines are returned as backfill
  - Sludge is dewatered prior to disposal
  - Treated water is discharged to groundwater via injection wells
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring of groundwater to assess the protectiveness of the treatment

ASBESTOS LANDFILL

Table 7-11 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/ process options evaluated for AOC #6, Asbestos Landfill which encompasses 13.3 acres. Table L-13 presents a summary of the ARARs associated with this AOC. The only media of concern was soil. Previous sections of this report provided the option of capping this AOC under the assumption that the existing cap may not be adequately protective. However, recent Site visits have determined that the existing cap is protective if maintained properly. Therefore, the technologies/ process options for remediation of soil include:

- **No Action**
  - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action** -
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Construction of perimeter fence
  - Maintenance of cap
  - Monitoring to assess the protectiveness of the cap;

ASBESTOS LAGOONS

Table 7-13 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #7, Asbestos Lagoons which encompass 1.9 acres. Table L-14 presents a summary of the ARARs associated with this AOC. The media of concern was soil and source control of contaminants in the lagoon sediment to protect groundwater. These technologies/ process options for remediation of soil include:

- **No Action**
  - Reevaluate taking no action at a minimum once every 5 years as part of the 5-year review process for the entire Site

- **Institutional Action** -
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Monitoring;

- **Source Control-1- Capping**
  - Construction of single-barrier (Subtitle D - Solid Waste) landfill cap
  - Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures)
  - Maintenance of cap
  - Monitoring of groundwater to assess the protectiveness of the cap

- **Source Control-2 - On-Site Disposal**
  - Excavation of soil/waste and placement under caps at other on-site AOC
  - Backfilling of excavated area

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section l2l(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria. These

criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long- term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

COMPARISON OF SOURCE CONTROL CLEANUP OPTIONS BY AREA OF CONCERN (AOC)

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Tables 7-1 through 7-13 of the FS, which are also attached to this ROD.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

Discussed briefly below are the relative strengths and weaknesses of the cleanup alternatives considered for the different areas of concern. In addition, a graphic comparison is presented in the tables that follow the discussion. The cleanup alternatives are compared against the list of nine evaluation criteria that were described earlier. Of these, the criteria for State Acceptance and Community Acceptance are evaluated after the public comment period. For these criteria, see the state concurrence letter (Appendix A) and the Responsiveness Summary (Part 3).

I. B&M Railroad Landfill. The media of concern soil and source control of contaminants in the landfill to protect groundwater. There is a risk from soil contamination to ecological receptors (from metals). Table 7-1 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #1, B&M Railroad Landfill which encompasses 12.4 acres. The technologies/ process options to control these risks include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;
- **Inst. Action**: Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- InSitu-1: In-situ remedy of monitored natural attenuation and institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- SC-1: Source control remedy consisting of horizontal containment (i.e., cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

The **Source Control (SC-1)** alternative is the only alternative which provides overall protection, through capping. Capping prevents exposure to the environment from unacceptable contaminant levels in soils. Migration of contaminants into groundwater is also prevented. Institutional actions and monitoring will ensure that the cap is maintained and remains protective. The other alternatives do not reduce or eliminate the potential for exposure to unacceptable contaminant levels in soils for ecological receptors. The other alternatives also don’t prevent the migration of contaminants into groundwater.

Compliance with ARARs:

This AOC is adjacent to a wetland/surface water body. As such there are numerous federal and state stream, wetland and floodplain regulations, which any chosen alternative must meet. In addition, this AOC is an uncapped landfill. Because of this, there are numerous regulations related to landfill closure and post- closure requirements. Only the **Source Control (SC-1)** alternative meets the requirements of the closure and post- closure regulations, in particular landfill capping requirements. The other alternatives do not provide for any activities that could constitute closure or post-closure under the regulations.

Long-Term Effectiveness and Permanence:

Only the **Source Control (SC-1)** alternative will provide continued long- term protection.

Installation, maintenance, and monitoring of a cap will virtually eliminate exposure and risk to ecological receptors and will prevent migration of contaminants into groundwater. The other alternatives do not require actions that prevent ecological receptors from coming onto contact with contaminated media, and therefore do not provide long- term protection. The other alternatives also will not prevent contaminants from migrating into groundwater.

Reduction of Toxicity, Mobility and Volume through Treatment:

None of the alternatives involve treatment. Although the FS reviewed treatment alternatives no treatment alternative was found suitable for this area.

Short-Term Effectiveness:

While this criterion encompasses a number of issues, the most significant issue is **time until Remedial Action Objectives are achieved**. For the Source Control (SC-1) alternative, this time period is 2 years. For the other alternatives, the time period is estimated at greater than 30 years.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. First, all of the alternatives are implementable from a construction standpoint. The **Source Control (SC-1)** alternative is the most reliable in meeting Remedial Action Objectives, while the **No Action** and **Institutional Action** alternatives are the least reliable. Second, to varying degrees, all of the alternatives are administratively feasible, with all but the **No Action** alternative containing provisions for institutional controls such as deed restrictions. Therefore, these alternatives will require a higher degree of administrative effort than the **No Action** alternative. Third, services and materials are available for all alternatives.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action	$0.90 million
In-Situ	$0.97 million
Source Control	$9.66 million

II. RSI Landfill. The only media of concern is source control of contaminants in the landfill to protect groundwater. Risk limits for human health or ecological receptors from contact with soil were not exceeded at this AOC. Two technology/process options were considered: capping (SC1); and No Action. Table 7-3 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #2, RSI Landfill which encompasses 2.5 acres. Capping was considered as part of source control for groundwater cleanup. The technologies/process options to control these risks include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;

- SC-1: Source control remedy consisting of horizontal containment (i.e., cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring.

Compliance with ARARs:

This AOC is an uncapped landfill. Therefore, there are numerous regulations related to landfill closure and post-closure requirements, particularly regarding landfill capping. Although OU3 does not address groundwater directly, the source control remedies to be

implemented as part of the OU3 ROD will have a positive impact on groundwater quality. Capping the landfill will help prevent further migration of contaminants (arsenic and manganese) from soil to groundwater, where a potential risk has been demonstrated. The **Source Control (SC-1)** alternative meets the requirements of the closure and post-closure regulations. The **No Action** alternative does not satisfy this criteria since it does not provide for any activities that could constitute closure or post-closure under the regulations.

Long-Term Effectiveness and Permanence:

Only the **Source Control (SC-1)** alternative will provide continued long-term protection. Installation, maintenance, and monitoring of a cap will virtually eliminate migration of contaminants from the landfill into groundwater. The **No Action** alternative does not require actions that prevent migration of contaminants from contaminated media, and therefore do not provide long-term protection.

Reduction of Toxicity, Mobility and Volume through Treatment:

None of the alternatives involve treatment. Although the FS reviewed treatment alternatives no treatment alternative was found suitable for this area.

Short-Term Effectiveness:

While this criterion encompasses a number of issues, the most significant issue is **time until Remedial Action Objectives are achieved**. For the Source Control (SC-1) alternative, this time period is 2 years for construction and implementation of institutional controls. For the **No Action** alternative, the time period is estimated at greater than 30 years.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. First, both alternatives are implementable from a construction standpoint. The **Source Control (SC-1)** alternative is the most reliable in meeting Remedial Action Objectives, while the **No Action** alternative is the least reliable. Second, to varying degrees, both alternatives are administratively feasible, but the **No Action** alternative does not contain provisions for institutional controls such as deed restrictions. Therefore, the **Source Control** alternative will require a higher degree of administrative effort than the **No Action** alternative. Third, services and materials are available for both alternatives.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Source Control	$2.49 million

III. B&M Locomotive Shop Disposal Areas. The media of concern are soil and source control of contaminants in the disposal area to protect groundwater. There is potential risk in soil to both human health (from lead) and ecological (from metals) receptors. Table 7-5 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/ process options evaluated for AOC #3, B&M Locomotive Shop Disposal Areas which together encompass 4.7 acres. The technologies/process options to control these risks include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;
- **Inst. Action**: Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;

- **InSitu-1:** In-situ remedy of monitored natural attenuation and institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **SC-1**: Source control remedy consisting of horizontal containment (i.e. cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **SC-2:** Source control remedy consisting of soil/waste excavation and placement under caps at other on-site AOCs;
- **OnSite-1:** Remedy consisting of soil/waste excavation and on-site treatment via solidification/stabilization;
- **OnSite-2:** Remedy consisting of soil/waste excavation and on- site treatment via soil washing/chemical extraction.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

The **No Action** alternative will not be protective of human health or the environment as it does not significantly reduce or eliminate potential exposures to human or ecological receptors, nor will migration of contaminants into groundwater be addressed. The **Institutional Action** and **InSitu-1** alternatives will be somewhat more protective of human health, but not the environment, in that access (and exposure) to contaminated material will be controlled. Furthermore, migration of contaminants into groundwater will not be addressed. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives will provide overall protection of human health and the environment by effectively reducing or eliminating potential exposure to contaminated soil and dust and eliminating migration of contaminants from soil to groundwater.

Compliance with ARARs:

Of the seven alternatives considered, four (**SC-1, SC-2, OnSite-1** and **OnSite-2)** will have activities that impact wetland areas. These impacts would need to be limited or mitigated in order to meet ARARs. The nature of this AOC requires that landfill closure and post-closure requirements be met. These four alternatives would meet the landfill closure and post-closure requirements. The **No Action, Institutional Action** and **InSitu-1** alternatives would not meet the landfill closure and post-closure requirements.

Long-Term Effectiveness and Permanence:

Under the **No Action** alternative residual risks from soil contaminants will remain. Therefore, it would not provide overall protection from exposures to both human and ecological receptors nor prevent migration of contaminants into groundwater and therefore will not provide long-term effectiveness. Under the **Institutional Action** and **InSitu-1** alternatives, while access to contaminated material will be controlled, over time migration of contaminants may occur. The **Institutional Action** and **InSitu-1**, while exhibiting greater effectiveness than the **No Action** alternative, still only achieve a moderate level of effectiveness.

The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives will provide long- term effectiveness in protecting from exposures to both human health and ecological receptors and preventing migration of contaminants into groundwater. The **SC-1** and **SC-2** caps must be constructed, maintained, and monitored to ensure continued protection; the **OnSite-1** and **OnSite-2** treatment alternatives are effectively permanent.

Reduction of Toxicity, Mobility and Volume through Treatment:

The **No Action, Institutional Action, InSitu-1, SC-1** and **SC-2** alternatives do not utilize treatment and therefore provide no reduction of toxicity, mobility and volume through treatment. The **OnSite-1** and **OnSite-2** alternatives do utilize treatment and would result in

permanent reduction of toxicity, mobility and volume through treatment.

Short-Term Effectiveness:

The **No Action** alternative takes no actions and therefore does not cause any increase in short-term risk. With standard control measures (dust control, air monitoring), none of the alternatives will cause increases of short-term risk to the community or workers. The environmental impacts to natural habitats from the implementation of these alternatives, range from: no impact (**No Action**); temporary and relatively minor impacts (**Institutional Action** and **InSitu-1**); and greater impacts (**SC-1, SC-2, OnSite-1** and **OnSite-2**). The potential impacts to adjacent wetlands from disturbance during implementation of these alternatives is expected to be moderate and would be mitigated.

The time until Remedial Action Objectives are achieved varies considerably. The **No Action, Institutional Action** and **InSitu-1** alternatives are expected to take greater than 30 years. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives are expected to take 2 to 3 years.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. First, all of the alternatives are feasible to implement. The **No Action, Institutional Action** and **InSitu-1** alternatives would each take little effort to construct; the **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives would require a greater effort to construct. The **No Action** and **Institutional Action** alternatives are not considered reliable in achieving Remedial Action Objectives. The **InSitu-1** alternative is considered slightly reliable in achieving Remedial Action Objectives. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives are considered reliable in achieving Remedial Action Objectives. Second, all of the alternatives are considered administratively feasible. Third, services and materials are available for implementation of all alternatives. Services for the OnSite-1 and OnSite-2 alternatives are somewhat less commonly available when compared with the other alternatives.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action	$0.77 million
InSitu	$0.83 million
Source Control-1	$2.61 million
Source Control-2	$8.68 million
OnSite-1	$34.16 million
OnSite-2	$42.59 million

IV. Old B&M Oil/Sludge Recycling Area. The media of concern being addressed is soil with potential human health risk (from lead) and source control of contaminants in the soil to prevent migration into groundwater. Table 7-7 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #4, Old B&M Oil/Sludge Recycling Area which encompasses 7 acres. The technologies/process options for soil cleanup include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;
- **Inst. Action**: Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **InSitu-1:** In-situ remedy of monitored natural attenuation and institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;

- **SC-1:** Source control remedy consisting of horizontal containment (i.e. cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **SC-2**: Source control remedy consisting of soil excavation and placement under caps at other on-site AOCs;
- **OnSite-1**: Remedy consisting of soil excavation and on-site treatment via solidification/stabilization;
- **OnSite-2:** Remedy consisting of soil excavation and on-site treatment via soil washing/chemical extraction.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

The No Action alternative will not be protective of human health or the environment as it does not significantly reduce or eliminate potential exposures to human receptors, nor does it prevent contaminant migration to groundwater. The **Institutional Action** and *InSitu-1* alternatives will be somewhat more protective in that human access (and exposure) to contaminated material will be controlled, but migration of contaminants into groundwater would not be addressed. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives will provide overall protection of human health by effectively reducing or eliminating potential exposure to soil and dust and preventing the migration of contaminants into groundwater. There are no ecological risks due to soil at this area.

Compliance with ARARs:

The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives will meet the closure and post- closure requirements. The **No Action, Institutional Action** and **InSitu-1** alternatives do not provide for any activities that could constitute closure or post- closure under the regulations.

Long-Term Effectiveness and Permanence:

Under the No Action alternative, residual risks from soil contaminants will remain. Therefore, they would not provide overall protection from exposures to human receptors and therefore will not provide long-term effectiveness. Under the **Institutional Action** and **InSitu-1** alternatives, while access to contaminated material will be controlled, over time migration of contaminants may occur. The **Institutional Action** and **InSitu-1**, while exhibiting greater effectiveness than the **No Action** alternative, still only achieve a moderate level of effectiveness.

The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives soil will provide long- term effectiveness in protecting from exposure to human receptors. The **SC-1** and **SC-2** caps must be maintained and monitored to ensure continued protection; the **OnSite-1** and **OnSite-2** treatment alternatives are effectively permanent.

Reduction of Toxicity, Mobility and Volume through Treatment:

The **No Action, Institutional Action, InSitu-1, SC-1** and **SC-2** alternatives do not utilize treatment and therefore provide no reduction of toxicity, mobility and volume through treatment. The **OnSite-1** and **OnSite-2** alternatives do utilize treatment and would result in permanent reduction of toxicity, mobility and volume through treatment.

Short-Term Effectiveness:

For all of the alternatives except **No Action,** with standard control measures (dust control, air monitoring) none of the alternatives will cause increases of short-term risk to the community or workers. The environmental impacts to natural habitats from the implementation of these alternatives range from: no impact (**No Action**); temporary and relatively minor

impacts (**Institutional Action** and **InSitu-1)**; and greater impacts (**SC-1, SC-2, OnSite-1** and **OnSite-2**) due to ground disturbance and excavation.

The time until Remedial Action Objectives are achieved varies considerably. The **No Action, Institutional Action** and **InSitu-1** alternatives are expected to take greater than 30 years. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives are expected to take 2 years.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. First, all of the alternatives are feasible to implement. The **No Action, Institutional Action** and **InSitu-1** alternatives would each take little effort to implement; the **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives would require greater effort to implement. The No Action and Institutional Action alternatives are not considered reliable in achieving Remedial Action Objectives. The **SC-1, SC-2, OnSite-1** and **OnSite-2** alternatives are considered reliable in achieving Remedial Action Objectives, and the **InSitu-1** alternative is considered slightly reliably in achieving Remedial Action Objectives. Second, all of the alternatives are considered administratively feasible. Third, services and materials are available for implementation of all alternatives; services for the **OnSite-1** and **OnSite-2** alternatives are somewhat less commonly available.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action	$0.85 million
InSitu-1	$0.90 million
SC-1	$2.11 million
SC-2	$5.61 million
OnSite-1	$16.22 million
OnSite-2	$21.18 million

V. Contaminated Soils Area. The only media of concern being addressed is soil with potential human health risk (from lead) and source control of contaminants to prevent migration into groundwater. Table 7-9 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #5, Contaminated Soils Area which encompasses approximately 6.7 acres (the area in need of remediation). The technologies/ process options for cleanup of soil include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;
- **Inst. Action:** Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **InSitu-1:** In-situ remedy of monitored natural attenuation and institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures);
- **InSitu-2:** In-situ remedy consisting of solidification/stabilization and access restrictions (i.e., land use restrictions) as well as monitoring;
- **InSitu-3:** In-situ remedy consisting of soil flushing, enhanced biodegradation, and access restrictions (i.e., land use restrictions) as well as monitoring;
- **SC-1:** Source control remedy consisting of horizontal containment (i.e., cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring.
- **Off Site**: Remedy consisting of soil excavation and off site treatment/disposal;

- **OnSite-1**: Remedy consisting of soil excavation and on-site treatment via solidification/stabilization;
- **OnSite-2**: Remedy consisting of soil excavation and on-site treatment via soil washing/chemical extraction.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

The No Action alternative will not be protective of human health or the environment as it does not significantly reduce or eliminate potential exposures to human receptors, nor does it prevent contaminant migration to groundwater. The **Institutional Action** and **InSitu-1** alternatives will be somewhat more protective in that access (and exposure) to contaminated material will be controlled, but migration of contaminants into groundwater would not be addressed. The **InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2** alternatives will provide overall protection of human health by effectively reducing or eliminating potential exposure to soil and dust and will prevent migration of contaminants into groundwater. There are no ecological risks due to soil at this area.

Compliance with ARARs:

The **InSitu-2, InSitu-3**, will meet treatment standards by treating contaminated material to eliminate risks from contact and migration to groundwater. The **Off Site, OnSite-1** and **OnSite-2** alternatives will excavate contaminated soil for treatment or off-site disposal eliminating the risks. The **SC-1** alternative will meet closure requirements by providing a barrier to prevent contact and ingestion of contaminated soil thereby eliminating the risk. Post- closure requirements will be met through monitoring and inspections. The **No Action, Institutional Action** and **InSitu-1** alternatives would not meet closure and post-closure requirements, because they do not provide for any activities that could constitute closure or post-closure under the regulations.

Long-Term Effectiveness and Permanence:

Under the **No Action** alternative residual risks from soil contaminants will remain. Therefore, they would not provide overall protection from exposures to human receptors nor prevent migration of contaminants into groundwater and therefore will not provide long-term effectiveness. Under the Institutional Action and **InSitu-1** alternatives, while access to contaminated material will be controlled, over time migration of contaminants may occur. Therefore, they would not provide overall protection from exposure to human receptors and will not provide long-term effectiveness.

The **InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2** alternatives will provide long-term effectiveness in protecting human receptors from exposure to contaminated soil and will prevent migration of contaminants into groundwater. The **SC-1** cap must be maintained and monitored to ensure continued protection; the **OnSite-1** and **OnSite-2** treatment alternatives are effectively permanent.

Reduction of Toxicity, Mobility and Volume through Treatment:

The **No Action, Institutional Action, InSitu-1**, and **SC-1** alternatives do not utilize treatment and therefore provide no reduction of toxicity, mobility and volume through treatment. The **InSitu-2, InSitu-3, Off Site, OnSite-1** and **OnSite-2** alternatives do utilize treatment; the **InSitu-2, InSitu-3, Off Site, OnSite-1** and **OnSite-2** alternatives provide the greatest degree of expected reduction of toxicity, mobility and with the exception of the **InSitu-2** alternative, volume through treatment. While the **InSitu-2** alternative provides treatment, the solidification/stabilization treatment process is accompanied by a potentially significant increase in volume.

Short-Term Effectiveness:

For all of the alternatives except **No Action**, with standard control measures (dust control, air monitoring) none of the alternatives will cause increases of short-term risk to the community or workers. The environmental impacts to natural habitats from the implementation of these alternatives, range from: no impact (**No Action**); temporary and relatively minor impacts (Institutional Action and InSitu-1); and greater impacts (**InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2**) due to ground disturbance and excavation.

The time until Remedial Action Objectives are achieved varies considerably. The **No Action, Institutional Action** and **InSitu-1** alternatives are expected to take greater than 30 years. The **InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2** alternatives are expected to take 2 years.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. First, all of the alternatives are feasible to implement. The **No Action, Institutional Action** and **InSitu-1** alternatives would each take little effort to implement; the **InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2** alternatives would require a greater effort to implement, since the AOC is within an active rail yard. The No Action and Institutional Action alternatives are not considered reliable in achieving Remedial Action Objectives. The **InSitu-2, InSitu-3, SC-1, Off Site, OnSite-1** and **OnSite-2** alternatives are considered reliable in achieving Remedial Action Objectives, with the **InSitu-2** alternative potentially less reliable. The **InSitu-1** alternative is considered moderately slightly reliable in achieving Remedial Action Objectives. Second, all of the alternatives are considered administratively feasible. Third, services and materials are available for implementation of all alternatives; services for the **InSitu-2, InSitu-3, OnSite-1** and **OnSite-2** alternatives are somewhat less commonly available.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action	$1.54 million
InSitu-1	$1.58 million
InSitu-2	$2.25 million
InSitu-3	$10.23 million
SC-1	$2.40 million
Off Site	$7.83 million
OnSite-1	$8.20 million
OnSite-2	$11.59 million

VI. Asbestos Landfill. The media of concern was soil with the potential for human health risk (from asbestos). As the Asbestos Landfill had previously been capped, only maintenance activities were considered. Table 7-11 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #6, Asbestos Landfill which encompasses 13.3 acres. The options for cleanup of soil include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;
- **Inst. Action**: Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring and maintenance of the existing cap.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

As long as the existing cap is maintained, it will remain protective of human health. Therefore, both the **No Action** and **Institutional Action** alternatives would be protective. However, the lack of maintenance would eventually cause the **No Action** alternative to be unprotective.

Compliance with ARARs:

Requirements related to the disturbance and handling of asbestos containing materials are the most significant for this area. Under the **Institutional Action**, activities(i.e., fence installation) that may impact wetlands must be conducted in such a way as to minimize wetland impacts in order to meet associated requirements. The cap will be maintained to satisfy asbestos capping requirements under the **Institutional Action**, but not under the **No Action** alternative.

Long-Term Effectiveness and Permanence:

Under the **Institutional Action**, but not under the **No Action** alternative, with continued maintenance of the existing cap, there will be no risk to human receptors due to potential exposure to asbestos.

Reduction of Toxicity, Mobility and Volume through Treatment:

Neither alternative utilizes treatment processes and therefore provide no reduction of toxicity, mobility and volume through treatment.

Short-Term Effectiveness:

The **Institutional Action** alternative will be accompanied by a nominal increase of potential short-term risk of exposure, due primarily to soil disturbance for fence installation. Air monitoring and engineering controls to control dust will be required to manage potential risk from inhalation.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. Both alternatives are technically and administratively feasible to implement. Services and materials for the alternatives are available.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action (including monitoring and maintaining the cap)	$1.31 million

VII. Asbestos Lagoons. The media of concern being addressed is soil with the potential for human health risk (from asbestos) and source control of contaminants in the lagoon sediment to protect groundwater. Table 7-13 presents a summary of the primary evaluation factors and a comparative assessment of the technologies/process options evaluated for AOC #7, Asbestos Lagoons which encompass 1.9 acres. The technologies/process options for soil cleanup include:

- **No Action** Subject to a review at least every five years as required by CERCLA since wastes would be left in place;

- **Inst. Action**: Institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **SC-1**: Source control remedy consisting of horizontal containment (i.e., cap), institutional actions consisting of access restrictions (i.e., land use restrictions, fencing and security measures) as well as monitoring;
- **SC-2**: Source control remedy consisting of soil excavation and placement under caps at other on-site AOCs.

Analysis of Nine Criteria

Overall Protection of Human Health and the Environment:

The **No Action** alternative will not be protective of human health or the environment as it does not significantly reduce or eliminate potential exposure of human receptors to soil nor does it prevent migration of contaminants into groundwater. The Institutional Action alternative will be somewhat more protective in that access (and exposure) to contaminated material will be controlled, but migration of contaminants into groundwater would not be addressed. The **SC-1** and **SC-2** alternatives will provide overall protection of human health by effectively reducing or eliminating potential exposure of human receptors to soil and preventing the migration of contaminants into groundwater.

Compliance with ARARs:

Requirements related to the disturbance and handling of asbestos containing materials and the closure/post closure of waste facilities are the most significant for this area. The **SC-1** and **SC-2** alternatives would achieve these requirements. **No Action** and **Institutional Action** do not provide for any activities that would meet these requirements, nor would they meet closure/post closure standards.

Long-Term Effectiveness and Permanence:

The **No Action** and **Institutional Action** alternatives will allow residual risks to remain at unacceptable levels. The **SC-1** and **SC-2** alternatives will provide long-term effectiveness in protecting from exposure of human receptors to asbestos containing material and prevent the migration of contaminants into groundwater. Cap maintenance and monitoring will be necessary to ensure continued effectiveness.

Reduction of Toxicity, Mobility and Volume through Treatment:

None of the considered alternatives utilize treatment processes and therefore provide no reduction of toxicity, mobility and volume through treatment.

Short-Term Effectiveness:

The **Institutional Action** alternative will be accompanied by a nominal increase of potential short-term risk of exposure, due primarily to soil disturbance for fence installation. Air monitoring and engineering controls to control dust will be required to manage potential risk from inhalation. The **SC-1** and **SC-2** alternatives will be accompanied by a somewhat greater potential short-term risk of exposure, due to capping and the handling of asbestos containing material which is necessary in these alternatives. As alternative **SC-2** involves transport of material to another AOC, short term risks (from asbestos material becoming airborne) are potentially greater than for **SC-1**. Air monitoring, dust control/suppression measures will be employed, and workers will wear necessary protective equipment.

Implementability:

Implementability is primarily related to three factors: technical feasibility (i.e., can it

be constructed, is it reliable); administrative feasibility; and the availability of services and materials to implement the remedy. These alternatives are all technically and administratively feasible to implement. Services and materials for the alternatives are available.

Cost:

No-Action	$0 (there will be a slight incremental cost associated with site wide Five-Year Review)
Institutional Action	$0.85 million
SC-1	$2.90 million
SC-2	$1.97 million

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a combination of individual source control remedies which addresses risks associated with the seven Areas of Concern (AOCs) at Operable Unit 3 (OU3) of Iron Horse Park.

The capping components of the remedy will prevent direct contact with contaminants by human and ecological receptors. In addition these components will help prevent migration of contaminants to groundwater and surface water.

A source control remedy was chosen for implementation at each area of concern.

2. Description of Remedial Components

The selected remedy for the **B&M Railroad Landfill** involves:

- *excavating landfill material from the edge of the wetland to minimize impacts of the cleanup action;*

Install sheet piling along the edge of the wetland. Excavate waste material 5 feet deep and 50 feet wide along edge of wetland. Place excavated material on landfill

- *capping landfill material*;

Cap landfill: grade slopes, install: Double barrier cap (Region 1 Alternative Cap Design). An example of a cap utilizing the Region 1 Alternative Cap Design, would include installation of: soil sub-grade layer; suitable gas vent layer; low-permeability soil layer (<10-4 cm/sec) ≥12 inches; 60 mil low-density polyethylene membrane liner; drainage layer; 24 inch cover soil layer; 6 inch topsoil layer and hydro-seed(Figure L-1). In addition, storm-water drainage structures (swales, rip-rap, perimeter drains), detention basins and gas vents, as necessary.

- *erecting a fence around the landfill;*

Install fence to prevent unauthorized access in order to safeguard the public, and prevent damage to landfill structures.

- *instituting land use restrictions;*

Restrict activities (like excavation and construction) which may damage the landfill cap and cause exposure to and migration of landfill contaminants. To be implemented by responsible parties.

- *restoring wetlands impacted by the cleanup*;

Install wetland soils and replant with appropriate species as necessary. The limits of the wetland restoration will be determined during remedial design.

- *inspecting & maintaining the landfill cap & fence on a periodic basis to ensure that it*

remains effective;
Maintenance program to inspect landfill structures and maintain/ repair as necessary.

- *sampling groundwater periodically to assess the effects of the source control action (capping)& any ongoing impacts from the landfill. Installing, if necessary, new monitoring wells.*

Monitor groundwater quality downgradient of landfill

The selected remedy for the **RSI Landfill** involves:

- *capping landfill material*;

Cap landfill: grade slopes, install: Single barrier - Subtitle D - Solid Waste cap. An example of a Subtitle D - Solid Waste cap would include installation of: soil sub-grade layer; suitable gas vent layer; 60 mil low- density polyethylene membrane liner; drainage layer; 24 inch cover soil layer; 6 inch topsoil layer and hydro-seed(Figure L-2). In addition, storm-water drainage structures (swales, rip-rap, perimeter drains), detention basins and gas vents, as necessary.

- *erecting a fence around the landfill*;

Install fence to prevent unauthorized access in order to safeguard the public, and prevent damage to landfill structures.

- *instituting land use restrictions*;

Restrict activities (like excavation and construction) which may damage the landfill cap and cause exposure to and migration of landfill contaminants. To be implemented by responsible parties.

- *inspecting & maintaining the landfill cap & fence on a periodic basis to ensure that it remains effective;*

Maintenance program to inspect landfill structures and maintain/ repair as necessary.

- *sampling groundwater periodically to assess the effects of the source control action (capping)& any ongoing impacts from the landfill. Installing, if necessary, new monitoring wells.*

Monitor groundwater quality downgradient of landfill

The selected remedy for the **B&M Locomotive Shop Disposal Areas** involves:

- *capping disposal area;*

Cap disposal area: Grade slopes, install: Single barrier - Subtitle D - Solid Waste cap. An example of a Subtitle D - Solid Waste cap would include installation of: soil sub-grade layer; suitable gas vent layer; 60 mil low-density polyethylene membrane liner; drainage layer; 24 inch cover soil layer; 6 inch topsoil layer and hydro-seed(Figure L-2). In addition, storm-water drainage structures (swales, rip-rap, perimeter drains), detention basins and gas vents, as necessary.

- *erecting a fence around the landfill*;

Install fence to prevent unauthorized access in order to safeguard the public, and prevent damage to landfill structures.

- *instituting land use restrictions*;

Restrict activities (like excavation and construction) which may damage the landfill cap and cause exposure to and migration of landfill contaminants. To be implemented by responsible parties.

- *restoring wetlands impacted by the cleanup;*

Install wetland soils and replant with appropriate species as necessary.

- *inspecting & maintaining the landfill cap & fencing on a periodic basis to ensure that it remains effective;*

Maintenance program to inspect landfill structures and maintain/ repair as necessary.

- *sampling groundwater periodically to assess the effects of the source control action (capping)& any ongoing impacts from the landfill. Installing, if necessary, new monitoring wells.*

Monitor groundwater quality downgradient of landfill

The selected remedy for the **Old B&M Oil/Sludge Recycling Area** involves:

- *capping contaminated soils with a gravel/asphalt barrier (final area to be capped will be determined via a pre-design study);*

Cap area with a gravel/asphalt barrier based on relevant and appropriate Subtitle D Solid Waste capping standards (final area to be capped will be determined via a pre-design study - assumed to be 7 acres). An example of relevant and appropriate Subtitle D Solid Waste capping standards would include installing gravel sub-grade layer as necessary, bituminous concrete intermediate course and bituminous concrete top course (Figure L-3)

- *instituting land use restrictions;*

Restrict activities (excavation and construction) which may damage the cap and permit exposure to contaminated material. To be implemented by responsible parties.

- *sampling groundwater periodically to assess the effects of the source control action (capping). Installing, if necessary, new monitoring wells.*

Monitor downgradient groundwater quality

The selected remedy for the **Contaminated Soils Area** involves:

- *capping contaminated soils;*

Cap area with a gravel/asphalt barrier based on relevant and appropriate Subtitle D Solid Waste capping standards. An example of relevant and appropriate Subtitle D Solid Waste capping standards would include installing a gravel sub-grade layer, bituminous concrete intermediate course and bituminous concrete top course(Figure L-3). Special care will be required to conduct capping activities in rail yard areas;

- *instituting land use restrictions;*

Restrict activities (excavation and construction) which may damage the cap and permit exposure to contaminated material. To be implemented by responsible parties.

- *sampling groundwater periodically to assess the effects of the source control action (capping). Installing, if necessary, new monitoring wells.*

Monitor downgradient groundwater quality

The selected remedy for the **Asbestos Landfill** involves:

- *inspecting & maintaining the existing gravel & vegetated soil cap to ensure asbestos material does not become airborne;*

Maintenance program to inspect existing landfill structures and maintain/repair as necessary.

- *erecting & maintaining a fence around the landfill*;

Install fence to prevent unauthorized access in order to safeguard the public, and prevent damage to landfill structures.

- *instituting land use restrictions;*

Restrict activities (like excavation and construction, residential use) which may damage the landfill cap and cause exposure to and migration of landfill contaminants(asbestos). To be implemented by responsible parties.

- *sampling groundwater periodically to assess the effects of the source control action (capping)& any ongoing impacts from the landfill Installing, if necessary, new monitoring wells.*

Monitor downgradient groundwater quality

The selected remedy for the **Asbestos Lagoons** involves:

- *capping lagoon material;*

Cap lagoons: define limits of contamination, including potential satellite deposits, grade slopes/berms, install: soil/fill if necessary for subgrade; Single barrier - Subtitle D - Solid Waste cap. An example of a Subtitle D - Solid Waste cap would include installation of: soil sub-grade layer; suitable gas vent layer; 60 mil low-density polyethylene membrane liner; drainage layer; 24 inch cover soil layer; 6 inch topsoil layer and hydro-seed(Figure L-2). In addition, storm- water drainage structures (swales, rip-rap, perimeter drains), detention basins, as necessary.

- *erecting a fence around the capped material*;

Install fence to prevent unauthorized access in order to safeguard the public, and prevent damage to cap structures.

- *instituting land use restrictions;*

Restrict activities (like excavation and construction, residential use) which may damage the cap and cause exposure to and migration of capped contaminants. To be implemented by responsible parties.

- *inspecting & maintaining the cap & fence on a periodic basis to ensure that it remains effective;*

Maintenance program to inspect cap structures and maintain/ repair as necessary.

- *sampling groundwater periodically to assess the effects of the source control action (capping)& any ongoing impacts from the landfill. Installing, if necessary, new monitoring wells.*

Monitor groundwater quality downgradient of lagoons.

The ground water monitoring system will be utilized to collect information semi-annually regarding groundwater quality down gradient of individual source areas to help assess the effectiveness of the source control remedies.

Hazardous substances, pollutants or contaminants already remain at the Site due to previous actions (OU2 Shaffer Landfill closure). Because of this, EPA has and will continue to review the Iron Horse Park Site at least once every five years to assure that the implemented remedial actions continue to protect human health and the environment. The most recent Five-Year Review was completed by EPA in September 2003. The next review will be required by September 2008.

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences (“ESD”) or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

See Tables L-1 thru L-7 for a summary of Estimated Remedy Costs by AOC.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an

order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

The total estimated cost of the selected remedy for all AOCs is $23.53 million.

4. Expected Outcomes of the Selected Remedy

An expected outcome of the selected remedy is that the **B&M Locomotive Shop Disposal Areas**, the **Old B&M Oil/Sludge Recycling Area** and the **Contaminated Soils Area** will no longer present an unacceptable risk to human health via ingestion. Another expected outcome of the selected remedy is that the **Asbestos Landfill** and the **Asbestos Lagoons** will no longer present a potential human health risk via inhalation of asbestos. Another expected outcome is that the **B&M Landfill** and the **B&M Locomotive Shop Disposal Area** will no longer present an unacceptable environmental risk via ingestion and direct contact. An additional expected outcome is the source control actions, specifically capping, removing the **B&M Landfill,** the **RSI Landfill**, the **B&M Locomotive Shop Disposal Areas**, the **Old B&M Oil/Sludge Recycling Area**, the **Contaminated Soils Area,** and the **Asbestos Lagoons** as source areas and ongoing contributors of contamination to local groundwater.

The selected remedy will also provide environmental and ecological benefits such as preventing further negative impacts from the **B&M Landfill** and the **B&M Locomotive Shop Disposal Area** on adjacent wetlands.

a. Soil Cleanup Levels

The current and anticipated future use of the Site is industrial. The Site is zoned industrial with the industrial zoning extending somewhat beyond the site limits. The Middlesex Canal,, which flows through the Site, is essentially impassible for recreational or economic purposes. The Middlesex Canal is listed on the National Register of Historic Places. Current landowners and operating companies at the Iron Horse Industrial Park include: B&M Corporation, MBTA, General Latex, Penn Culvert (most recently Cooperative Reserve Supply), Spincraft, Wood Fabricators, BNZ Materials, and Eastern Terminals, Inc. The Purity Supreme warehouse abuts the Site to the south. The area within one mile of the Site is primarily forested and residential, with “rural residential” being the predominant zoning category.

A soil cleanup level for lead was developed to protect a current female site worker of child-bearing age. The cleanup level is based on the methodology described in *Interim Approach to Assessing Risk Associated with Adult Exposures to Lead in Soil* (U.S. EPA, 1996). The cleanup level is based on the site- specific maternal blood level of 4.2 µg/dL, developed in the RI risk assessment as a level protective of a 95th percentile fetal blood lead level of 10 µg/dL. The lead cleanup level applies to the B&M Locomotive Shop Disposal Areas, Old B&M Oil/Sludge Recycling Area, and Contaminated Soils Area.

Table CL-1 summarizes the cleanup level for lead in soils.

Table CL-1: Soil Cleanup Levels for the Protection of Human Receptors

Non-Carcinogenic Compounds of Quotient Concern	Target Endpoint	Soil Cleanup Level (mg/kg)	Basis	RME Hazard Quotient
Lead	Central Nervous System	1,736	Adult Lead Model	N/A

Development of soil cleanup levels for ecological receptors was based on shrew endpoints to emphasize the importance of contamination in the food chain and risk to the small mammal community. Risks were identified for exposures of shrew to high concentrations of cadmium in soil at the B&M Railroad Landfill and to copper and lead in soils at the B&M Locomotive Shop Disposal Areas.

Cleanup levels were developed to identify a soil concentration at which ecological effects are likely to occur. The cleanup levels are based on a daily dose resulting in a hazard quotient (HQ) of 1.0, and using a protective NOAEL TRV. Since food COC concentrations were estimated from soil concentrations, the food chain models were used to back-calculate a soil concentration that corresponds to a daily dose resulting in an HQ of 1.0. This approach assumes that concentrations are evenly distributed throughout the site or foraging area. Cleanup levels are summarized below (Table CL-2) for those COCs identified as posing risk to small terrestrial mammals. The cleanup levels are based on modeling of receptor dietary doses from soil concentrations.

Table CL-2: Soil Cleanup Levels for the Protection of Ecological Receptors

AOC	Compounds of Concern	Soil Cleanup Level (mg/kg)	Basis	Assessment Endpoint
B&M Railroad Landfill	Cadmium	15.4	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals
B&M Locomotive Shop Disposal Areas	Copper	2,213	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals
	Lead	868	Food chain models, NOAEL	Sustainability (survival, growth, reproduction) of local populations of small terrestrial mammals

These soil cleanup levels must be met at the completion of the remedial action at the points of compliance. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

b. Soil - Source Control

A significant component of the Iron Horse Park OU3 Remedy involves source control actions. The source control actions at the **B&M Landfill**, the RSI Landfill, the **B&M Locomotive Shop Disposal Areas**, the Old B&M Oil/Sludge Recycling Area, the **Contaminated Soils Area** and the **Asbestos Lagoons** have two purposes. One purpose is to prevent exposure to contaminated material (metals or asbestos). Another purpose is to prevent the migration of contaminants from soil to groundwater. At these AOCs there are many instances of a particular contaminant being present in both soil(surface or sub-surface) and in downgradient groundwater. At the **B&M Landfill**, toluene, xylenes, arsenic, manganese, lead, barium, chromium, vanadium and zinc are present in both media. At the RSI Landfill, chlorobenzene, 1,2 dichloroethene, arsenic, manganese, barium and lead are present in both media. At the **B&M Locomotive Shop Disposal Areas**, arsenic, manganese, barium, copper, lead and zinc are present in both media. At the **Old B&M Oil/Sludge Recycling Area**, arsenic, manganese, lead, barium, cobalt, chromium and vanadium are present in both media. At the **Contaminated Soils Area**, arsenic, manganese, copper and zinc are present in both media. At the **Asbestos Lagoons**, xylenes, arsenic, manganese, barium, lead, chromium and zinc are present in both sediment (i.e. the solid material within the lagoons which was sampled) and downgradient groundwater. The occurrence of contaminants will be evaluated for inclusion in post-closure monitoring, in order to evaluate the effectiveness of the source control actions at these AOCs in preventing migration of contaminants to groundwater.

c. Soil - Asbestos

Trespassers and workers potentially may be chronically exposed to asbestos fibers released from the Asbestos Lagoons as well as at the Asbestos Landfill, if the landfill cap is not maintained.

Effects on the lung resulting from inhalation of asbestos fibers is the major asbestos health concern. Chronic inhalation exposure to asbestos can result in a lung disease termed asbestosis which is characterized by shortness of breath and cough. Asbestosis may lead to severe impairment of respiratory function and ultimately death. Other effects include scarring of tissue surrounding the lungs. pulmonary hypertension and immunological effects. Inhalation of asbestos fibers can cause lung cancer and mesothelioma (a rare cancer of the thin membranes lining the abdominal cavity and surrounding internal organs).

Asbestos fibers in the Lagoons, have the potential to become airborne, posing a human health threat via the inhalation pathway. Disposal of asbestos in these lagoons as well as subsequent partial removal has been documented. Furthermore, sampling of material in the lagoons confirms the presence of asbestos.

Under the National Emissions Standards for Hazardous Air Pollutants (NESHAP), in 1973 EPA defined asbestos containing material as material containing 1% asbestos or greater based detection limits available at the time. More recent data demonstrates that materials containing less than 1% asbestos may also pose a potential health risk in some circumstances.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Iron Horse Park OU3 Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will adequately protect human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through engineering controls and institutional controls. More specifically capping of contaminated material, maintenance of an existing cap, fencing and land use restrictions will control and eliminate potential risks posed by Operable Unit 3 of Iron Horse Park. Capping will prevent direct contact with contaminated material. Capping and maintenance of an existing cap will prevent asbestos from becoming airborne. Capping will prevent migration of contaminants into groundwater. Fencing and land use restrictions, will ensure that remedial measures are preserved and continue to prevent exposure and further releases.

The selected remedy will reduce potential human health risk levels such that the non**n**carcinogenic hazard is below a level of concern. It will reduce potential human health risk levels to protective ARARs levels, i.e., the remedy will comply with ARARs and To Be Considered criteria. The selected remedy will control ecological risk by eliminating direct contact with and ingestion of contaminants above acceptable ecological risk levels in soil and preventing migration of contaminants into surface waters. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

The selected response action addresses low-level threat wastes at the site by: eliminating exposure to human and ecological receptors from contaminated soil and airborne asbestos. This is accomplished through source control actions at the affected AOCs (capping of landfills and contaminated soil areas). In addition, the source control actions will help eliminate the ongoing migration of contaminants from the source areas to groundwater or surface water. Long

term monitoring/maintenance and institutional controls will ensure that the remedy remains protective in the future. There are no principal threat wastes at OU3.

2. The Selected Remedy Complies With ARARs

The selected remedy, consisting of capping six of the AOCs and maintaining a cap previously constructed at the seventh AOC, will comply with all federal and any more stringent state ARARs that pertain to the Site (see Tables L-8 thru L-14). Federal ARARs, and the AOC's they apply to, are:

1. **Resource Conservation and Recovery Act** - B&M Landfill (closure/post closure and floodplain standards); All AOCs except the Asbestos Landfill (waste characterization)
2. **Toxic Substances Control Act** - Asbestos Landfill and Asbestos Lagoons
3. **Clean Water Act** - B&M Landfill, RSI Landfill, B&M Disposal Areas, Asbestos Landfill
4. **Executive Order 11988 (Floodplain Management)** - B&M Landfill
5. **Executive Order 11990 (Protection of Wetlands)** - B&M Landfill, RSI Landfill, B&M Disposal Areas, Asbestos Landfill
6. **Fish & Wildlife Coordination Act** - B&M Landfill, RSI Landfill, B&M Disposal Areas, Asbestos Landfill
7. **National Historic Preservation Act** - B&M Landfill and RSI Landfill
8. **Historic Sites Act** - B&M Landfill and RSI Landfill
9. **Clean Air Act, National Emission Standard for Asbestos, Subpart M** - Asbestos Landfill and Asbestos Lagoons

The ARARs for each AOC vary depending on the type of cap required (TSCA, hazardous waste, or solid waste); the location of the AOC relative to wetlands, floodplains, and historic structures; the contaminants present (including, but not limited to asbestos, lead); and whether the AOC is a source control remedy or not (see Tables L-8 thru L-14). RCRA Land Ban requirements (40 CFR Part 268) are not ARARs at this Site.

In addition, the selected remedies for each AOC will comply with the following more stringent state ARARs that are described in more detail in Tables L-8 thru L-14:

1. **Massachusetts Solid Waste Management Regulations** - All AOCs except B&M Landfill and Asbestos Landfill
2. **Massachusetts Hazardous Waste Management Regulations** - B&M Landfill (capping standards); All AOCs except the Asbestos Landfill (waste characterization)
3. **Massachusetts Clean Waters Act** - B&M Landfill, RSI Landfill, B&M Disposal Areas, Asbestos Landfill
4. **Massachusetts Wetlands Protection Act** - All AOCs
5. **Massachusetts Antiquities Act and Regulations** - B&M Landfill and RSI Landfill
6. **Massachusetts Air Pollution Control Regulations** - All AOCs

The specific State ARARs for each selected remedy for each of the seven AOC are listed in Tables L-8 thru L-14 and, as with the federal ARARs, they vary based on the type of cap required (hazardous waste or solid waste); the location of the AOC relative to wetlands, floodplains, and historic structures; the contaminants present (including, but not limited to asbestos, lead); and whether the AOC is a source control remedy or not.

The following policies, advisories, criteria, and guidances (TBCs) were also be considered for each selected remedy for each of the seven AOCs listed in Tables L-8 thru L-14. The TBCs pertain either to assessing risk or to providing guidance on capping standards.

a. **Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups (EPA)** - Asbestos Lagoons and Asbestos Landfill
b. **Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil (EPA)** - B&M Disposal Areas, B&M Oil/Sludge Recycling Area, Contaminated Soil Area
c. **EPA Cancer Slope Factors** - All AOCs, except the Asbestos Landfill
d. **EPA Reference Dose** - All AOCs except the Asbestos Landfill

e. **EPA Alternative Cap Guidance** - B&M Landfill
f. **Massachusetts DEP Landfill Technical Guidance Manual** - All AOCs except B&M Landfill and Asbestos Landfill

3. The Selected Remedy is Cost-Effective

In the Lead Agency's judgment, the selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short- term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost- effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

Tables 7-1, 7-3, 7-5, 7-7, 7-9, 7-11 and 7-13 help demonstrate the cost-effectiveness of the selected remedy. In general, the cost differences between different protective alternatives at each AOC are so extensive, and the increase in overall effectiveness (if any) is so modest, that the cost effectiveness of the selected remedy is self-evident. It should be noted that at the Contaminated Soils AOC, the selected remedy of capping appears to compare very closely with the in-situ solidification/ stabilization alternative. In addition, the solidification/stabilization alternative utilizes treatment. However, this AOC is in the midst of the active rail yard at Iron Horse Park. The solidification/stabilization process has the potential for a significant volumetric increase (up to 50%) in material due to additives in the solidification/stabilization process. The rail yard with active tracks, is an area where this kind of additional volume would be very problematic due to impacts on the railroad tracks.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which of the identified alternatives provide the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against offsite land disposal of untreated waste, and community and state acceptance. The selected remedies provide the best balance of trade-offs among the alternatives.

Tables 7-1, 7-3, 7-5, 7-7, 7-9, 7-11 and 7-13 demonstrate how the respective selected remedies, provide the best balance of trade-offs when compared against the evaluation criteria. As discussed previously, the cost difference between different protective alternatives at each AOC is typically so extensive, and the increase in overall effectiveness (if any) is so modest, that even with the balance emphasis on reduction of toxicity, mobility and volume through treatment, the relative merits of the selected remedies are self-evident.

5. The Selected Remedy Does Not Satisfy the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected remedy at the various AOCs is source control by containment (capping). This element addresses the primary threat at the Site, contamination of soil and migration of soil contaminants into surface and groundwater. The remedy does not satisfy the statutory preference for treatment as a principal element. Treatment alternatives evaluated in the Feasibility Study were not practicable, primarily due to cost. At one AOC (the Contaminated Soils Area) a treatment alternative (in-situ solidification/stabilization) was impracticable due to implementability (volume increase of treated material in an area where an increase in volume would be problematic due to the area's use as an active rail yard).

6. Five-Year Reviews of the Selected Remedy are Required.

Because this remedy will result in hazardous substances remaining on- site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. In addition, Five-Year Reviews are already required for the entire Iron Horse Park Superfund Site due to the prior initiation of remedial action at Shaffer Landfill (OU2). The next Five-Year Review for Iron Horse Park is due in September 2008.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

The June 2004 Proposed Plan for Operable Unit 3 presented, for the **Asbestos Lagoons** AOC a source control remedy (SC-2) consisting of excavation of asbestos containing material for placement under the cap of a different on- site AOC. After further consideration, and upon receipt of public comment, EPA has determined to select a different alternative for the **Asbestos Lagoons** AOC, the source control remedy (SC-1) which consists of capping the material in place. Both alternatives were considered and evaluated during the Feasibility Study and were discussed in the Proposed Plan. Both alternatives are considered protective. The change will provide some benefit with regard to the Short-Term Effectiveness criteria, in that special provisions for handling and transporting asbestos containing material will be limited significantly. Comments made on behalf of the BNZ Materials, Inc, the owner of the property where the lagoons are located, also indicated a preference for capping and managing the material within the same property.

There are no other significant changes from the alternatives presented in the Proposed Plan.

O. STATE ROLE

The Massachusetts Department of Environmental Protection (MADEP) has reviewed the various alternatives and has indicated its support for many components of the selected remedy as presented in the Proposed Plan. MADEP expressed concerns with the preferred alternatives at two AOC's. At one AOC (the Asbestos Lagoons) MADEP indicated concern over uncertainties related to the volume of material to be excavated for placement and capping at another AOC. However, EPA is selecting the alternative whereby the lagoon material will be capped in place (see Section N. Documentation of Significant Change, above). Because of this, excavation volume will no longer be a concern. The other AOC where MADEP expressed concern with the preferred alternative is the **B&M Locomotive Shop Disposal Areas**. MADEP expressed a preference for the alternative (SC-2) which calls for excavation of material and placement under the cap at another AOC, rather than capping in place (SC- 1), as proposed. In its comments MADEP suggests that the volume of material that would need to be excavated and therefore the cost of the alternative, have been overestimated. The volume estimates were based on identifying areas of fill utilizing terrain conductivity and ground penetrating radar surveys. There is a good degree of confidence in the associated data, and therefore in the estimate of fill volume that would need to be excavated. While the volume estimates are undoubtedly not exact, they provide ample information to support a ROD cost estimate. Because of this, EPA does not feel that it is necessary to re**n**assess the cost estimate. An additional issue raised concerns potential negative impacts to wetlands from the capping in place alternative. Due to the proximity of wetlands to the **B&M Locomotive Shop Disposal Areas**, some wetland impacts are

likely with either SC-1 or SC-2 alternatives. Normal construction safeguards, to minimize wetland impacts during construction, as well as provisions for wetland restoration/ replication, will ensure that necessary wetland requirements are addressed.

The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The Massachusetts Department of Environmental Protection concurs with the selected remedy for the Iron Horse Park OU3 Site. A copy of the declaration of concurrence is attached as Appendix A.

PART 3: THE RESPONSIVENESS SUMMARY

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KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

July 16, 2004

Mr. Don McElroy
US EPA, HBO
One Congress St., Suite 1100
Boston, MA 02114-2023

RE: Proposed Plan. Iron Horse Park OU #3.

Dear Mr. McElroy:

The Department has reviewed the June 2004 Proposed Plan (the Plan) for Remedial Action at the Third Operable Unit (OU #3) for the Iron Horse Park Superfund site in Billerica and is submitting the following formal comments.

1) As the Preliminary Remediation goals (cleanup goals) for soils were not included in this Plan, DEP expects an opportunity to review and comment on them before the Record of Decision (ROD) is made final.

2) As stated on page 7 of the Plan, the proposal "presents cleanup approaches for soil contamination only." The proposed remedy does not take measures to actively cleanup groundwater as models predicted it would take a very long time (greater than 200 years) to achieve cleanup goals for groundwater, even with source control measures. EPA states that groundwater monitoring will be conducted and trends in contaminant concentrations evaluated. If the groundwater is being monitored to determine whether it is technically impracticable to achieve specific cleanup goals for groundwater, EPA should be conducting this monitoring as a Remedial Investigation activity, not as part of the remedy for this Operable Unit. EPA will then, at a later time, issue a decision document for groundwater.

3) The Plan does not discuss the evaluation of the VOCs found in groundwater monitoring wells adjacent to the asbestos landfill. DEP was previously informed that the source of VOCs would be investigated during the design process for the Remedial Action. No mention has been made of this in the Plan. The Department is concerned that the VOCs be investigated either during the design process or during the investigation for OU 04.

4) All of the preferred alternatives will require Institutional Controls to maintain the effectiveness of the remedy and prevent future exposure to contaminants that will remain in place at the Site.

Proposed Plan Source Control Cleanup Options

5) Pending review of public comments, the DEP is in general agreement with the following preferred alternatives.

B&M Railroad Landfill
The DEP agrees with the preferred alternative for the landfill, which includes capping the landfill (SC-1).

RSI Landfill
The DEP agrees with the preferred alternative for the landfill, which includes capping the landfill (SC-l).

Contaminated Soils Area
The DEP agrees with the preferred alternative of capping in place (SC-1).

Asbestos Landfill
The DEP agrees with the preferred alternative of capping in place (SC-1).

Asbestos Lagoons
The DEP agrees with the preferred alternative of excavation of waste and capping elsewhere on-site (SC-2). The FS stated that the Asbestos Lagoons would be excavated to a depth of 1 foot. Since soil was not sampled within the lagoons, it is possible that greater depths may need to be excavated to remove the contamination.

Old B&M Oil/Sludge Recycling Area
The DEP agrees with the preferred alternative of capping in place (SC-1) as long as the cap constitutes an engineered barrier as described under the Massachusetts Contingency Plan. During historical investigations of this area, LNAPL has periodically been found. Although cleanup goals have not been established for this OU yet, DEP considers NAPL thickness in excess of ½ inch to constitute an exceedance of the Upper Concentration Limit (UCL). An engineered barrier would be required if the NAPL were left in place without being fixated (immobilized) and if it were less than 15 feet below the ground surface. DEP UCLs have been incorporated as cleanup goals at Superfund sites in Massachusetts and we would expect them to be incorporated into the ROD for this OU.

6) B&M Locomotive Shop Disposal Areas
The RI described samples taken up to 12 feet deep with one isolated location containing elevated levels of PCBs. The Feasibility Study discussed excavating the two areas 20 feet deep. It does not seem likely that the entire 5 acres (both areas combined) needs to be excavated to 20 feet. Perhaps just the “hot spot” where PCBs were detected needs to be excavated. The volume should be recalculated. It may be that excavation and capping elsewhere on-site wi] I be a better remedial action than capping in place.

The DEP would prefer that the two areas be excavated (SC-2) rather than capped (SC-1). From discussions held during the preparation of the Feasibility Study (FS), it appeared that excavating these areas was more appropriate due to the engineering difficulties with capping being so close to the man-made canal and/or wetlands. The preferred alternative calls for capping in place. Due to engineering issues, DEP believes that the Locomotive Shop Disposal Areas should be excavated and placed under one of the on-site caps (RSI Landfill) rather than being capped in place.

DEP appreciates the opportunity to submit formal comments on the Proposed Plan for Operable Unit #3 of the Iron Horse Park Superfund Site. We look forward to your response to our comments.

Sincerely,

Janet S. Waldron

Janet S. Waldron
DEP Project Manager

e-file: 4.09 Proposed Plans for Selected RA/Proposed Plan Formal Comments

Johns Manville

A Berkshire Hathaway Company

Site:
Break:
Other:

Bruce D. Ray
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Don McElroy
Remedial Project Manager
U.S. Environmental Protection Agency
Region I (HRO)
1 Congress Street
Suite l100
Boston, Massachusetts 02114

Re: Proposed Plan for Iron Horse Park Superfund Site; Asbestos Lagoons

Dear Mr. McElroy:

The purpose of this letter is to provide comments on the Proposed Plan for the Asbestos Lagoons area of concern at the Iron Horse Park Superfund Site.

Specifically, it would seem that the cost estimated for the on-site capping option is significantly too high. Based on Johns Manville's prior experience, effective asbestos settling basin caps cost in the range of $30,000 to $50,000 per foot of thickness per acre. If the asbestos lagoons are approximately three acres and a three-foot thick engineered cap is necessary, the total cost of on-site cap should not exceed $450,000 (3*3*$50,000). Construction and agency oversight along with safety and other costs could increase this by $100,000 for a total of $550,000 but certainly not the $2,900,000 referenced in the proposed plan.

Given that the remedial action objective here is prevention of exposure to lagoon-related asbestos and because asbestos, unlike dissolved substances, does not migrate in groundwater, the better alternative would be to install an effective cap on the lagoons.

If you have any questions concerning this matter, please do not hesitate to call me.

Sincerely,

Bruce D. Ray
Associate General Counsel

WILMER CUTLER PICKERING
HALE AND DORR LLP

Robert F. Fitzpatrick Jr.

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Via Email and First Class Mail

August 13, 2004

Donald McElroy
Remedia1 Project Manager
U.S. Environmental Protection Agency
Region I, (HBO)
1 Congress Street, Suite 1100
Boston, MA 02114

Re: Comments on EPA's Proposed Plan For Lagoons At
Operable Unit 3 of the Ironhorse Park Superfund Site

Dear Mr. McElroy:

This letter and the enclosed letter from BNZ's consultant, ESS Group, Inc., are the comments of BNZ Materials, Inc. ("BNZ") on EPA's proposed plan for the lagoons in Operable Unit 3 of the Iron Horse Park Superfund Site (so-called “Area of Concern 7”).

˚o

EPA has proposed excavating the lagoons and transporting the excavated material to the B&M landfill for disposal under an expanded cap. The lagoons are located on BNZ's property on High Street. BNZ acquired this Property from Johns Manville in 1987. BNZ has never used or manufactured products containing asbestos. Johns Manville, not BNZ, used the lagoons for the disposal of asbestos slurry.

EPA should reconsider its proposed lagoon remedy. For the reasons described in ESS' letter, managing the lagoons in place rather than excavating and transporting the excavated material to the B&M landfill will produce a faster, less expensive and more protective remedy during construction.

BNZ is a small company with limited resources. Reducing the cost and logistical complexity of the lagoon remedy consistent with ESS’s comments will yield a remedy that can be more readily implemented.

Nothing in this letter or ESS' letter is or should be construed as an acknowledgment or admission of any fact or liability. BNZ reserves all rights and defenses.

Please let me know if you would like to discuss BNZ's comments.

Very truly yours,

Robert F. Fitzpatrick Jr.

RFFjr.cmd
Enclosure

cc: Mr. Josh Hulce
Peter E. Nangeroni, P.E., LSP

ESS Group, Inc.

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Scientists
Consultants

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August 13, 2004

Mr. Don McElroy
Remedial Project Manager
U.S. Environmental Protection Agency
Region I (HBO)
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Re: Formal Comments on Proposed Plan – Operable Unit 3, Iron Horse Park Superfund Site, North Billerica, MA
ESS Project No. B348-000

Dear Don,

ESS Group, Inc., (ESS) is providing these Formal Comments on the Proposed Plan for Operable Unit 3 at the Iron Horse Park Superfund Site on behalf of our client, BNZ Materials, Inc. Our comments are focused on the lagoons (Area of Concern 7) since our client has had no involvement in any other portion of the Iron Horse Park Superfund Site.

With respect to the lagoons, the proposed remedy (SC-2) calls for the excavation of approximately 15,200 cubic yards of what EPA presumes to be asbestos containing soil, with an assumed average depth of asbestos containing soil in the lagoons of 5 feet. The excavated soil would then be trucked to the B & M Landfill (Area of Concern 1) and placed under the cap of the B & M Landfill. The lagoon excavations would then be backfilled with 1 foot of clean soil followed by 6 inches of topsoil and seeding. The cost estimate includes provisions for dust control, dewatering and a modest allowance (approximately $2.13 per cubic yard of soil) for "Cap Expansion" to address incremental costs of capping the B & M Landfill.

An alternative remedy considered by EPA for the lagoons (that provides the same level of protection as remedy SC-2) is capping the lagoons in place (SC-1) combined with land use restrictions and monitoring. EPA apparently eliminated this option since its cost of $2.90 million was approximately $1 million higher than remedy SC-2. The cost estimate for the lagoon capping remedy was based on the use of single barrier cap with an overall thickness of 30 inches and included a 60 mil Low Density Polyethylene Geomembrane and the requisite Drainage Composite layer. The estimate also assumed that the cap would extend over the current footprint of the 3 lagoons and that approximately 21,000 cubic yards of granular fill would be required to provide an adequate slope (5%) on the lagoon cap.

GENERAL COMMENTS:

The selection of remedy SC-2 for the lagoons requires that the lagoon work be coordinated with and integrated into the B & M Landfill capping, which in turn will likely be coordinated with the work at the remaining Areas of Concern (AOCs). This approach will be much slower than in-place closure of the lagoons, which can be accomplished independent of the planning or implementation of work at the other AOCs. EPA's proposed approach also significantly hinders BNZ's ability to plan for and implement a program geared towards the beneficial re-use of the lagoon area since BNZ will have no control over the project.

The Plan should provide for an in-place capping approach for the lagoons that is planned and implemented separately from the work at the other AOCs in OU-3. The in-place capping approach would protect human health and the environment and would be consistent with ARARs, including MADEP's Draft Asbestos in Soil Streamlining Regulations and Management, Policy and Technical Support Document (February 2, 2004)(Draft MADEP Policy). This approach will allow BNZ to plan for and implement a cost-effective beneficial reuse plan for the lagoon area that is consistent with the goals of EPA and MADEP. BNZ is currently evaluating redeveloping the lagoon area for recreational vehicle and boat storage. Of the viable options identified by the EPA (SC-1 and SC-2), in place capping approach (SC-1) would be most protective to site workers and local residents during construction due to the more limited asbestos handling.

Capping the lagoons in place would be less expensive than excavating and transporting material from the lagoons to the B & M Landfill. The primary reason for the high cost of the lagoon capping option under the EPA's analysis is the cost associated with providing 21,385 cubic yards of clean fill required for slope/grading purposes. This material represents about $400,000 of EPA's $1.1 million base estimate. A more cost effective approach would be to consolidate the lagoons prior to capping, thereby reducing the cost for imported fill material. The components of the low permeability barrier represent another $236,000 of EPA's base estimate. ESS does not agree that a low permeability barrier is required for the lagoons.

In addition, the types of property reuse currently being evaluated would further reduce capping costs by $85,000 or more. This would be accomplished by incorporating pavement into the cap thereby eliminating the need for the hydroseed, topsoil, and a part, if not the entire proposed 24-inch thick cover soil layer. This would lead to additional costs savings of $85,000 to $230,000. This estimate is based upon a planning price provided by a local contractor to place 3-inches of asphalt over 8 to 12 inches of bedding at the site. In summary, the cost estimate for SC-1 is believed to over state the costs required to cap the lagoons in a manner that is protective of human health and the environment and by incorporating reuse options into the in place closure option, additional costs savings can be achieved.

SPECIFIC COMMENTS:

1. Operable Unit 3 attempts to simultaneously address seven unique AOCs that are quite distinct and clearly represent separate potential source areas. In fact, EPA in its September 24, 2003 Five Year Review Report states in section II that "...each potential source area in OU3 is unique...". Property owners should be allowed to address AOCs that are self contained on their property on an individual basis. This approach would lead to more efficient and timely implementation of the remedies, while providing property owners more opportunity to consider and implement beneficial re-use of their property. For a property owner to develop and implement a re-use plan, they need the highest level of certainty and control over remediation costs and schedule. Under the remedy proposed by the EPA, BNZ would have to coordinate their re-use efforts with remediation of the B & M Landfill. The B & M Landfill has a number of technical and regulatory challenges (e.g. removing waste from wetlands) that add significant uncertainty to costs and schedule. These uncertainties would be eliminated if the lagoons were managed on the BNZ property, thereby enhancing the ability to effectively re-use the BNZ property.

2. The selection of remedy SC-2 over SC-1 was apparently made based primarily on cost since both approaches provide similar levels of protection to human health and the environment. Given the uncertainty in the cost estimates and the desire of BNZ to more

directly control work on their property, the Plan should provide for implementation of an approach similar to option SC-1, because it is as protective to human health and the environment, as compliant with ARARs as predicted by the EPA's Feasibility Study and otherwise more beneficial than option SC-2 based upon cost-effectiveness and ability to support property reuse.

3. The Proposed Plan states on page 4 that there are "risks from asbestos at two of the areas". The data and analysis presented in the Remedial Investigation (RI) do not support this statement with respect to asbestos containing soils that may be present in the lagoons. There has been no quantitative risk assessment performed to confirm that the asbestos containing soils present in the lagoons present a current or future risk to human health or the environment.

4. The Proposed Plan recommends excavating the contents of the lagoons and trucking the contents to the B & M Landfill for disposal under the cap of the B & M Landfill (option SC-2). The Feasibility Study (FS) and Proposed Plan do not take into consideration the potential short term risk associated with the excavation, handling, trucking and re-deposition of asbestos containing soils. In many instances leaving unconsolidated asbestos fiber containing soils or materials in place and minimizing the handling of the materials presents less risk than the potential risk posed by generating airborne asbestos during excavation, trucking and re-deposition of asbestos containing soils. The Draft MADEP Policy acknowledges that leaving asbestos containing materials in place will avoid asbestos releases and potential exposures, if re-use plans for the property allow the material to remain in place.

5. The Proposed Plan includes a low permeability cap in the alternative that was considered for the in-place capping of the lagoons (option SC-1). The data presented by EPA in the RI does not indicate that a low permeability cap is required for the lagoons since a) asbestos is known to be insoluble and therefore would not require a low permeability cap as exemplified by the cap design used for the Asbestos Landfill, b) there is no current risk posed by the groundwater in the vicinity of the lagoons, and c) even if there is a potential future risk associated with the groundwater, there is no identified correlation between the contents of the lagoon and the metals detected in groundwater in the vicinity of the lagoons which drive the risk assessment.

6. The evaluation of the on-site capping option should have considered consolidation of the lagoons to reduce overall capping requirements and costs. For example, if the 5% slope assumed by EPA for option SC-1 is required for the cap, the contents of one lagoon could be used as fill material on the adjacent lagoon rather than importing fill for use in grading. This approach would reduce costs by reducing the amount of imported fill required and by creating a smaller cap footprint, thereby reducing capping and long term maintenance costs. Lagoon consolidation and in-place capping should be included as a viable option for the lagoons in the Plan.

7. Consideration should be given to an in-place capping approach for the lagoons that includes the beneficial re-use of the lagoon area such that the capping could be incorporated into the future site use, thereby potentially reducing capping costs and generating revenue for the long term maintenance of the cap. The use of an asphalt cap or construction of a building over the lagoons, for example, which are both included as presumptive remedies in the Draft MADEP Policy, would provide a multi-purpose benefit for the lagoon closure and re-use of the lagoon area.

8. In consideration of comment number 4 above, it is not apparent in the cost estimate backup in the FS for the recommended option SC-2 that sufficient allowances are provided for dust control and monitoring during the excavation, loading, transport, and placement of the lagoon materials.

9. The "cap expansion" allowance of $32,500 in the recommended remedy (SC-2) for the lagoons does not accurately reflect the true cost of incorporating the excavated solids into the B & M Landfill based upon our experience. There is also uncertainty associated with the vertical extent of materials that would be removed from the lagoons and the type of post-excavation surface restoration and land use controls that will be required. The fact that remediation goals for unconsolidated asbestos fibers are not established in the Feasibility Study further increases the uncertainty associated with excavating this material. This may lead to significantly higher restoration costs than included in the cost estimate. Therefore, it is likely that the actual costs would be greater to manage the lagoons materials at the B&M Landfill than to manage the material in place.

10. The placement of the excavated lagoon material under the B&M Landfill cap in the recommended remedy (SC-2) will increase the impacts to wetlands and the floodplain in the vicinity of the B&M Landfill by increasing the volume of material to be placed in the landfill. The in-place capping of the lagoons (remedy SC-1) will have no impact on wetlands or floodplains.

11. A number of action specific asbestos management related ARARs are identified for the work associated with implementing the recommended remedy (SC-2) at the lagoons. By transporting the asbestos containing soil to the B&M Landfill many of these ARARs would also apply at the B&M Landfill AOC. The FS does not identify asbestos related ARARs for the B&M Landfill AOC and the asbestos is not identified as a contaminant of concern. It appears this has caused an under-estimation of the level of effort and costs for disposing the excavated lagoon material at the B&M Landfill.

Thank you for your consideration of these comments. If you should have any questions please contact Peter Nangeroni at 781-489-1106.

Sincerely,

ESS GROUP, INC.

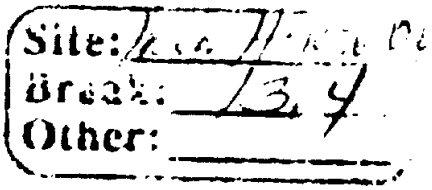
Peter E. Nangeroni, P.E., LSP
Senior Vice President

Michael S. Gitten, P.E., LSP
Vice President

C: Robert F. Fitzpatrick, Jr., Esq.

UNITED STATES OF AMERICA
ENVIRONMENTAL PROTECTION AGENCY

BOSTON REGION



In the Matter of:

PUBLIC HEARING:

RE: PROPOSED CLEAN-UP PLAN FOR OPERABLE UNIT 3 AT THE
IRON HORSE PARK SUPERFUND SITE

Billerica Town Hall
Room 210
365 Boston Road,
Billerica, Massachusetts

Wednesday
June 16, 2004

The above entitled matter came on for hearing,

pursuant to Notice at 8:15 p.m.

BEFORE:

ROBERT CIANCIARULO, Chief
Massachusetts Superfund Section
DON MCELROY, Remedial Project Manager
STACEY GREENDLINGER
EPA, Region 1
1 Congress St., Suite 1100
Boston, MA 02114-2023

I N D E X

P R 0 C E E D I N G S

MR. CIANCIARULO: Good evening. I'm Bob Cianciarulo. I am Chief of the Massachusetts Superfund Section at EPA, and I'll be the Hearing Officer for tonight's hearing on the proposed clean-up plan for what's called Operable Unit 3 at the Iron Horse Park Superfund site.

As Stacey and Don mentioned, the purpose of this hearing is really to get your comments formally on the record so your voice can be heard on this clean-up proposal. As Don outlined earlier in the meeting, community acceptance is one of the nine criteria we use set forth by the Superfund law. We use those to select a clean-up plan. It's a critical part of our decision-making process.

Again, as noted earlier, and in the proposed plan at the back of the room, the public comment period officially begins today, and it's scheduled to run 30 days, to July 16th. You've heard this, and this will be the fifth time you've heard this, as far as how you can make a comment. There's no obligation to sort of make an oral comment here. This is really, hopefully, a matter of convenience to the extent that you don't want to otherwise submit written comments either by mail, by fax or by email all to Don's attention. And those addresses and phone numbers are in the proposed plan. So you can comment orally

today and in writing, or in writing, your choice.

We'll be transcribing the meeting, as we discussed, and we'll produce a printed transcript which will make part of the record. That will go in the library with the other materials we discussed earlier. And we'll also then be responding to comments that we receive on the proposed plan in what's called a responsiveness summary that we'll publish in conjunction with our Record of Decision.

The hearing process is rigid, and I hope it's not too frustrating. We will be accepting your comments. It won’t be a dialogue. We won't be responding to them verbally. So don't take it out on me if you ask a bunch of questions and I say thank you. Because really, again, this process is get your comments formally on the record.

I'd ask when you do come up and make a comment, you state your name, address, and affiliation, if any, also for the record. I'm going to try to limit people to five minutes each, just to make sure that everybody who wants to make a formal statement does so.

And again, we'll make ourselves available at the close of the meeting to the extent there is additional questions and answers, more informal dialogue you'd like to have.

So to the extent that people have signed up at the back or, you know, we can sort of, in an orderly fashion,

figure out who wants to make -- who wants to be first. And it may not be necessarily again if you're just stating your name and address. It's a small enough crowd. Just as long as someone's willing to break the ice.

MS. GREENDLINGER: Do you want to go first? You can feel free to go first.

MR. CIANCIARULO: Okay, I need you to just stand up there.

MR. JOHNSON: Okay. Do I hit you?

MR. CIANCIARULO: Not yet.

MR. JOHNSON: Not yet, okay. I talked to you earlier, Don, about the proposed clean-up and how to determine the effectiveness of the clean-up, and also, to assess what is going to be done of the plan. To do that, would like to have on-line access to all of the ground water, surface water, sediment and air monitoring results that are taken at this site. And I'd also like to have it for -- instituted for all of the other sites that are included in this overall Iron Horse Superfund Park. That's my comment, and I feel that the plan needs to include making that information available on line, both now, and as part of the ongoing maintenance.

Oh, my name is David Johnson, and it's 113 Gray Street, Billerica. And soon to be, I’m affiliated with the Earth Watch Coalition. Thank you.

MR. CIANCIARULO: Okay, thank you. All yours. You can stand on either side.

MS. GIOVINO: Dangerous to give me a mike -- No, I'm kidding.

MR. CIANCIARULO: Again, if you could, name and address.

MS. GIOVINO: Yes.

MR. CEANCIARULO: And maybe you want to stand facing everyone else.

MS. GIOVINO: All right, Joanne Giovino, 10 Eastview Ave., Billerica; President of the Earth Watch Coalition, which is the organization that has been the liaison with the EPA over these last 22 years. We were formerly known as the Superfund Action Committee, which we will soon be going back to the Superfund Action Committee. And we have received technical assistance grant money. And Dave Johnson is a member. Barbara Morrissey and Helen Knight are the core members. And these are the people that, for the rest of you who are here, we are the people for 22 years that have bean working to see that this is taken care of properly.

My comment is, in looking at the matrix for the proposed options, I would like to see, on the mobility and toxicity and volume -- but primarily on the mobility – I would like all the areas that are to be capped to have the

EPA determine the depth to the high seasonal water elevations, and develop a matrix indicating the contaminants and the mobility rate, and then the cost so that EPA could make a determination whether, in some instances, if there's a high mobility rate of particularly onerous contaminants, that it may be very well worth it to then examine options or methods of installing a non-porous liner in the bottom and the sides.

MR. CIANCIARULO: Okay, thank you. Others?

MS. MORRISSEY: My name is Barbara Morrissey. I live at 10 Sumac Street. I'm also a member of Earth Watch Coalition. And I just want to basically say ditto to what Joanne said. Many of the problems with the Superfund site that we have in town is that it is in a wetland area. And because of that, even if something may not be mobile during a dry or a drought-type season, whenever there is any heavy rain, those areas flood dramatically. I live near there. I see the flooding.

So there is going to be a sponge effect. There will be mobility. There is no way, when the water does go up into the mounds of these landfills that are going to be created, that it will not be giving the contaminants the ability to move, and possibly to go to another area in town. And I do want to see every effort made to contain this by putting some type of a liner in there. Thank you very much.

MR. CIANCIARULO: Okay, others? You can be next. No? Has everyone made a comment for the -- Oh, would you like to? Sure.

MR. RAMOS: My name is Al Ramos. I live at 39 Mt. Pleasant Street, and I have no affiliation. I just live in the neighborhood. And my only comment is I'd like somebody to somehow do like a definitive study on the cancer rate because I've only lived here ten years. But talking to long-term neighbors, they said there is clusters, apparently, of cancer in the area. And that's extremely important. And two neighbors within about five houses of me, both in their 40s and 50s, one has succumbed, and the other one is not doing very well at all. And the one that's not doing very well at all, he basically never smoked, never drank, and he has throat cancer. And he's lived there about 25 years. So this brings that into question. And I've got three little children. So that's one of the biggest concerns that I have.

And, yeah, just basically, if somebody could conduct a definitive study. And I know there's a lot of analysis and stuff. But maybe it'll speak for itself if the data, if it's real obvious, you know, so better decisions can be made on the priority of the fund. Thank you.

MR. CIANCIARULO: Thank you.

MS. LIEBERMAN: My name is Judy Lieberman, and I

live at 201 High Street. And I'm getting up basically because of what you just said about people coming down with cancer. I own horses. And back in 2001 -- and I take very good care of my horses. Actually, I take better care of them than I do myself. And I experienced some very strange happenings in my stable with my animals.

I went out one evening. It was in December of 2000. And my horses were bleeding around the coronary bands. It’s where the hoof and the ankle meet. My horses, you know, they didn't have thrush, or they didn’t have any other, you know, ailments, any, you know, horse-related diseases or anything like that. They were gust bleeding around the coronary bands. And also their argots. It's another little piece of skin up above their knee. And all of my horses had the same symptoms. I've never seen anything like it. I've had horses for over 30 years.

I called my veterinarian. And he said, you know, obviously, they either ingested some kind of a toxin -- whether it was from the soil, the feed or, you know, something aerial. I did call the EPA, and eventually, I had them come out. At first, they were a little reluctant to come out. And then I said that I would call Christine Todd Whitman, and they came out within two weeks, and we started to do a study.

I also consulted with some veterinarians that are

hired by the United States government because I'm a member of the United States Equestrian Team. And I got some very good advice from them. And they said it was definitely some form of a poisoning or something.

When the EPA came out, they did some testing. They did everything but water samples in my yard, which I did request them to do. The only thing that they did was inside the barn, they tested my shavings. We did some feed testing. Everything, you know, came back within, you know, a normal range. I do have the results here. Some of the results did come back inconclusive. And I haven‘t been able to complete my study with the EPA yet on all of the findings. I'm still working on it.

But something happened in 2001. It is on the Internet. If you, you know, just type in Judy Lieberman, North Billerica, the Republican Committee, which I‘m on, you‘ll find that I did do this study. And again, the results are inconclusive. I'm still working on it.

I also have a suspicion about the biological pellets that they've been dropping for the West Nile Virus. I've been working with some agents from the EPA. Dan Granz is one of them, and Amy Jane Lussier, who is with Region 1 in Boston, and a couple of other United States federal agents from Washington, D.C.

I don't have all of the results back from the

study. But I just wanted to let the residents know that I am working on this. I don't know what happened. I don't know if there's any connection to Iron Horse Park, or if there is actually something else that's going on in the environment in North Billerica. But obviously, there is something going on. And just for the record, I wanted to let you know. If you have any -- I'm a little bit nervous right now. I apologize. I'm not really a good public speaker. But I have a lot of information, and I have a got of good resources. And I'm in contact with chemists and biologists and veterinarians from all over the country. And I can guarantee you that I will get to the bottom of this, and I'll find out what happened.

As a matter of fact, I wanted to mention for the record, my problems escalated right before the terrorist attack in September. My horses were bleeding extensively around the coronary bands, and I just went into a frenzy, a complete panic. And I thought, even before I heard about, you know, the terrorist and, you know, what they were -- I had no idea what was going on, but I knew something was going on. And the EPA was made aware of this well in advance. And that has been documented, and I have everything on record. So residents, you're more than welcome to contact me and look at anything that I have. And that's all I have to say for right now. Thank you.

MR. CIANCIARULO: Anyone else who would like to make a comment for the record tonight? Hearing none – Again, if there's no one else who wishes to make a statement, I'm going to close the hearing. Again, the public comment period begins today, a 30-day comment period. Please make sure you have a copy of that proposed plan, and you can respond in writing, U.S. Mail, fax or email to Don McElroy, and Don's phone number is there, as well. So thank you. Thank you for attending. Again, thank you for your participation here today, and your interest in this site, and your assistance in helping us make a final decision on this clean-up plan. Thank you.

(Whereupon, the proceedings were concluded.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings in the Matter of:

RE: PROPOSED CLEAN-UP PLAN FOR OPERABLE UNIT 3 AT THE IRON HORSE PARK SUPERFUND SITE

Place: Billerica, Massachusetts

Date: June 16, 2004

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

Suzanne French	June 16, 2004
Reporter	Date
Patricia Nelligan	July 8, 2004
Transcriber	Date

Robert Stanton
<rbtstanton@msn.com>
08/05/2004 12:04 PM

To: Don Mcelroy/R1/USEPA/US@EPA
cc:
Subject: Iron Horse Park Clean up Plan

Dear Mr. McElroy,

I received a copy of the proposed clean up plan for Iron Horse Park. Unfortunately I was unable to attend your meeting back in June. I think it's great that there is a concerted effort to "clean" this site up. However, I do have some comments I would like to share...

First, I am concerned about the recent expansions of existing companies currently in the Iron Horse Park site such as McQuesten Lumber Co. They recently expanded in the former Penn Culvert property. This expansion includes a large storage shed/building and paved parking throughout this site which appears to be located on top of the Old B&M Oil/Sludge Recycling Area. Associated with this expansion is an increase of tractor trailor activity. How does this coincide with clean up efforts or is paving over certain areas and letting companies expand the answer?

A recent trip through the "Park", I noticed many abandoned MBTA buses stored next to the large B&M building. Why are they now parking such vehicles there and what impact (oil, antifreeze, transmission fluid) will this have on clean up efforts?

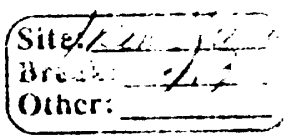
Second, as a resident of the area, how can I be assured that the current companies are not contributing to the problem at hand. A lot of vehicles both active and inactive, exposed wood products, general waste and by products of other companies currently operating there. Is the EPA monitoring these companies? Seems to me that a superfund site should reduce such activities not increase.

Sincerely,

Robert J. Stanton
7 Whitegate Rd.
Billerica, Ma. 01862
Email: rbtstanton@msn.com
Phone: (978)663-5160

7 Oxford Road
North Billerica, MA 01862

June 17, 2004



Mr. Don McElroy
Remedial Project Manager
U.S. Environmental Protection Agency
Region 1, (HBO)
1 Congress Street, Suite 1100
Boston, MA 02114

RE: Iron Horse Park
Superfund Site

Dear Mr. McElroy:

I read your brochure about the proposed cleanup of Iron Horse Park, Superfund Site, in North Billerica, with great interest. My home is within a close proximity to Iron Horse Park. The Middlesex Canal is right behind my house. The water in the Canal does not flow as it should due to a dam in Iron Horse Park. My questions are as follows:

1. After the cleanup, will the Canal water be allowed to flow through Iron Horse Park as it should?

2. Will the "Superfund Site" name be removed?

3. Will the neighbors still have to disclose that the homes are located near the "Superfund Site" when selling their homes?

4. Should people in the area be concerned about planting vegetable gardens? Is the ground water in the area contaminated?

Thank you for your attention to the problems at Iron Horse Park. I do hope to hear from you on the above issues.

Thank you.

Jeanne LeGallo

Responsiveness Summary - Comments

PRP Comments

1) The preferred alternative for the Asbestos Lagoons (excavation and placement of material under the cap at another AOC) is more complicated and will take longer to implement than capping in-place. The preferred alternative hinders the owners ability to plan for and implement beneficial re-use of the lagoon area. The property owner should be allowed to address this self-contained AOC. This would be more efficient and would allow the owner more opportunity to consider and implement plans for beneficial re-use of their property. Of the alternatives proposed, EPA should choose SC-1. It would provide more short-term protectiveness to workers and residents due to less handling and transport of asbestos containing material.

EPA agrees that excavation of material for placement at another AOC may add additional complication and potentially higher short-term risk to workers and residents. In part because of comments received during the public comment period, EPA is selecting SC-1, capping in place. Additional explanation is provided in Section N. of the ROD. EPA is of the opinion that beneficial reuse of the lagoon area would be easier if asbestos containing material was no longer present in the lagoon area. However, the lagoons are all on one property, the two alternatives in question (SC-1 - capping in-place and SC-2 - excavation for placement at another AOC) are both considered protective of human health and the environment and the cost estimates for the alternatives do not differ greatly. Therefore it is reasonable to attempt to accommodate the preference of the property owner and allow the material to be capped in place.

2) For the Asbestos Lagoons AOC, EPA has overestimated the cost of capping in-place, and underestimated the cost of excavation for placement at another AOC. There are more cost-effective means for capping in-place. Capping in-place would be less expensive than the excavation option.

While EPA does not agree with the commentor’s assessment with regard to cost, we have chosen Alternative SC-1, capping in place. Specific issues related to design, construction and cost, can be resolved during the remedial design process.

3) A low permeability layer is not warranted at the Asbestos Lagoons, because; there is no risk associated with groundwater, and there is no correlation between contaminants in the lagoons and associated impacted groundwater.

EPA does not agree with the comment. While this ROD does not address groundwater remedies, it does address source control issues. As documented in the RI, a risk assessment was conducted for groundwater. There is groundwater risk associated with the Asbestos Lagoons area. In addition, there are a number of contaminants, including: xylenes, arsenic, manganese, barium lead, chromium and zinc, which are present in both the lagoon sediment as well as in groundwater associated with the Asbestos Lagoons AOC. These contaminant results are also documented in the RI.

4) No quantitative risk assessment was performed to support the statement that asbestos in the lagoons presents a current or future risk to human health or the environment.

Risk from exposure to asbestos can be quantified when the concentration of asbestos fiber in air is known. The amount of asbestos in soil that may become airborne can vary depending on activities occurring at a site under current or future land use. Methods for quantifying these amounts are under development. Because of the difficulties in quantifying the amount of asbestos fiber that may become airborne, EPA has relied on its definition of asbestos-containing material in determining whether potential risk exists in past decisions. EPA's National Emissions Standards for Hazardous Air Pollutants defined material with 1% or greater asbestos as asbestos- containing material. Recent information indicates that the 1% threshold

definition may not be conservative enough in assessing human health risks.

Since methods for quantifying risks associated with asbestos fibers in soil that may become airborne are still under development, EPA has conservatively assumed that asbestos material that has been identified as still present in the lagoons may potentially pose a risk.

5) The preferred alternative (for the Asbestos Lagoons) will increase impacts on wetlands and the floodplain by increasing the volume within the B&M Landfill.

EPA has selected the alternative SC-1, capping in-place, for the Asbestos Lagoons, therefore there will be no increase in volume of the B&M Landfill from Asbestos Lagoon material.

Comments from the public

1) Concern was expressed regarding the perceived expansion of companies and activities within Iron Horse Park. (the Cooperative Reserve property - formerly Penn Culvert was specifically referenced). How does this expansion coincide with cleanup efforts.

A historic Superfund problem has been that properties associated with superfund sites, have often been left unused or under-used even when this was not warranted due to contamination on the property. One of the goals of the Superfund program is land/ property re-use. In other words, taking cleanup actions necessary to allow for some desired future use, whether restricted or unrestricted. An unrestricted use is typically a property which has achieved a level of cleanup such that it would be appropriate for residential use. Under commercial or industrial uses (where perhaps a worker is present on site for a limited number of days a year and no children or other sensitive populations are present) some levels of residual contamination may still be considered protective, while those same levels of contamination would not be considered protective in a residential setting (where children, for example may play on the ground and use the site for a much longer period of time during the year).

At Iron Horse Park, Cooperative Reserve, Inc. has purchased property from Penn Culvert and has been improving the property for its lumber business. While this property was not unused previously, it is certainly being used more now. This activity and these improvements are not in opposition to the cleanup efforts at Iron Horse Park. Companies may utilize superfund sites as long as they don’t interfere with the remedy, contribute additional contamination, or create a situation where site contamination is released into the environment. If a company were to carry out any of these actions on a site they would risk incurring liability under CERCLA and being named a responsible party for the cost of the entire Superfund remedy.

2) How can it be assured that the activities of current companies (vehicle storage, exposed wood products, general waste) are not contributing to the problem? Is EPA monitoring these companies? A Superfund Site should reduce activities such as these.

See previous comment concerning actions by companies that might incur Superfund liability. EPA and its contractors, along with the State, will be active on the Site during the remedial action period and may be in a position to observe any potential problems with the operations of the companies operating within the Site.

3) The Middlesex Canal does not flow as it should due to a dam within Iron Horse Park. After the cleanup will the Canal water be allowed to flow as it should?

The only dams that EPA is aware of in the Middlesex Canal have been beaver dams. At this time, based on EPA’s knowledge of the Site to date, the beaver dams and any cleanup activities are unrelated. Any future remedial action concerning surface waters at the Site will be addressed under OU4.

4) Will the “Superfund Site” name be removed?

Iron Horse Park was listed on the Superfund National Priorities List (NPL) in 1984. Sites are not eligible for deletion from the NPL until all cleanup activities are completed and Remedial Action Objectives have been achieved. Therefore, EPA cannot consider deleting this site from the Superfund list until the cleanup activities outlined in this Record of Decision (and future Records of Decision, namely for the newly created Operable Unit 4) are completed. Since a capped landfill has already been left on Site (Shaffer Landfill, OU2), and under this remedy additional areas of contamination will be capped, the Site is currently not a candidate for delisting from the NPL.

5) Will neighbors who are selling homes still need to disclose that homes are near the Superfund Site?

Disclosure of the proximity of a property to a Superfund site is not a requirement under CERCLA (the "Superfund" law). Iron Horse Park will continue to be a Superfund site until such time as EPA deletes it from the National Priorities List (NPL). (See response to previous question)

6*) Should people in the area be concerned about planting vegetable gardens?*

EPA is unaware of any Iron Horse Park Site conditions or contamination that would have affected residential gardens.

7) Is groundwater in the area contaminated?

There is groundwater contamination associated with Iron Horse Park. Various contaminants are present above either Maximum Contaminant Levels (MCLs - or drinking water standards) or health based contaminant levels. EPA is not aware of any human receptors exposed to groundwater (i.e. anyone drinking this groundwater). As discussed in the ROD, the selected remedies address source control of contaminants that may migrate into groundwater and are present in the areas to be capped. The remediaton of groundwater, surface water and sediment will be addressed in the ROD for OU4.

Comments from the Public Hearing

1) EPA should make data associated with groundwater, surface water, sediment and air monitoring accessible on-line, so that the effectiveness of the cleanup can be determined.

EPA will post new monitoring data on-line. The link where data as well as other site information can be found is www.epa.gov/ne/superfund/sites/ironhorse.

2) EPA should examine contaminant mobility rates and the proximity of waste to groundwater to determine if at any areas to be capped, installation of an impermeable liner under and around the waste, would be warranted.

EPA has examined the concentration, mobility and proximity to groundwater of contaminants in the source areas at OU3. This is discussed in Section E. of the ROD and is discussed in greater detail in the Remedial Investigation, primarily in the sections addressing Nature and Extent of Contamination, and Contaminant Fate and Transport. The additional cost that would be associated with excavation of all of these source areas for placement of liners (which would be in the 10's of millions of dollars) would be prohibitively expensive, with limited environmental benefit. As discussed previously, groundwater cleanup will be addressed in the ROD for OU4.

3) A study should be conducted regarding cancer rates and potential cancer clusters in the area.

The Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) is the Federal agency responsible for evaluating such requests, typically in conjunction with the state Department of Public Health. This comment has been forwarded to

ATSDR for their consideration and follow-up.

Comments from MADEP

1) MADEP expects the opportunity to review and comment on cleanup goals for soils prior to finalization of the ROD.

MADEP has had the opportunity to review and comment on cleanup goals for soils as well as the rest of the ROD.

2) This proposed plan addresses soil contamination. Groundwater monitoring should be conducted as a remedial investigation activity, not as a part of the remedy for OU3.

Capping is being conducted at all of the AOCs in accordance with toxics, solid waste or hazardous waste regulations. These regulations require monitoring (including groundwater monitoring) as a part of post-closure activities. Therefore, groundwater monitoring will be conducted in the vicinity of the capped areas to assess the effectiveness of the caps.

3) The proposed plan does not discuss VOC's in a monitoring well adjacent to the Asbestos Landfill. The VOC's should be investigated either during the design process or during the OU4 investigation.

The VOC issue noted will be addressed as part of the OU4 investigation.

4) The preferred alternatives will require Institutional Controls to maintain the effectiveness of the remedy and prevent future exposure to contaminants that will remain on site.

EPA agrees that Institutional Controls will be necessary as part of the remedy for OU3. Institutional Controls, primarily in the form of land use restrictions, are discussed in Section L. of the ROD which describes the selected remedy.

5) MADEP questions whether the FS assumption with regard to excavating the Asbestos Lagoons to a depth of 1 foot is valid, or whether more extensive excavation may be necessary.

As discussed earlier, EPA has selected SC-1, capping in-place, as the remedy at the Asbestos Lagoons.

6) DEP notes that at the Old B&M Oil/Sludge Recycling Area, the cap needs to constitute an "Engineered Barrier" as defined in the MCP. MADEP also notes an issue regarding non aqueous phase liquid (NAPL) associated with groundwater.

The selected remedy for the Old B&M Oil/Sludge Recycling Area states that this area must be capped in accordance with the relevant and appropriate portions of the State Solid Waste regulations. In addition, EPA has designated the MADEP "Landfill Technical Guidance Manual" as a document "To Be Considered" in association with the implementation of the remedy at the Old B&M Oil/Sludge Recycling Area.

7) At the B&M Locomotive Shop Disposal Areas, MADEP indicates a preference for excavation and consolidation of material (SC-2), rather than capping in-place (SC-1). In support of this preference, MADEP cites, in part, the potential difficulty of performing the construction in close proximity to the wetlands.

In EPA's judgement, the increased cost (approximately $6 million) associated with the implementation of the SC-2 alternative is not warranted, given the limited additional benefit that would be realized. While there will be issues associated with construction in close proximity to wetlands, this would also be an issue if SC-2 were implemented. Protection and potential restoration of wetlands would be necessary with either alternative and does not

pose a problem in implementing the remedy.

8) MADEP questions whether the volume of material to be excavated at the B&M Locomotive Shop Disposal Areas, is overestimated.

During the RI, EPA conducted subsurface profiling using ground penetrating radar and electro-magnetic surveying, in addition to soil borings and test pits in order to help define the nature and extent of waste. EPA is confident that this combined information, provides a reasonably accurate assessment of the volume of the B&M Locomotive Shop Disposal Areas. However, EPA has determined not to excavate the B&M Locomotive Shop, but instead to cap the Site.

APPENDICES

APPENDIX A: Commonwealth Letter of Concurrence

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

September 24, 2004

Susan Studlien, Director
Office of Site Remediation and Restoration
U.S. EPA
One Congress Street, Suite 1100 (HIO)
Boston, MA 02114

Re: ROD Concurrence Letter
Operable Unit #3
Iron Horse Park Superfund Site

Dear Ms. Studlien:

The Department of Environmental Protection (DEP) has reviewed the Selected Remedial Action alternative for the cleanup of the Third Operable Unit at the Iron Horse Park Superfund Site. The selected alternative addresses several source areas within the Iron Horse Park Site. The DEP concurs with the selection of this alternative for this operable unit.

This Operable Unit's remedial action has three components:

- Control the sources of contamination and limit or prevent future contaminant migration by capping;
- Monitor groundwater, including conducting an evaluation of the trend in groundwater contaminant concentrations;
- Conduct an evaluation to determine if the source control measures alone can be protective of human health and the environment, whether active groundwater cleanup is viable, and whether the cleanup approach needs to be reevaluated.

Based on the information presented to date, DEP believes that the selected remedial actions of capping and monitoring of groundwater will be protective of human health and the environment.

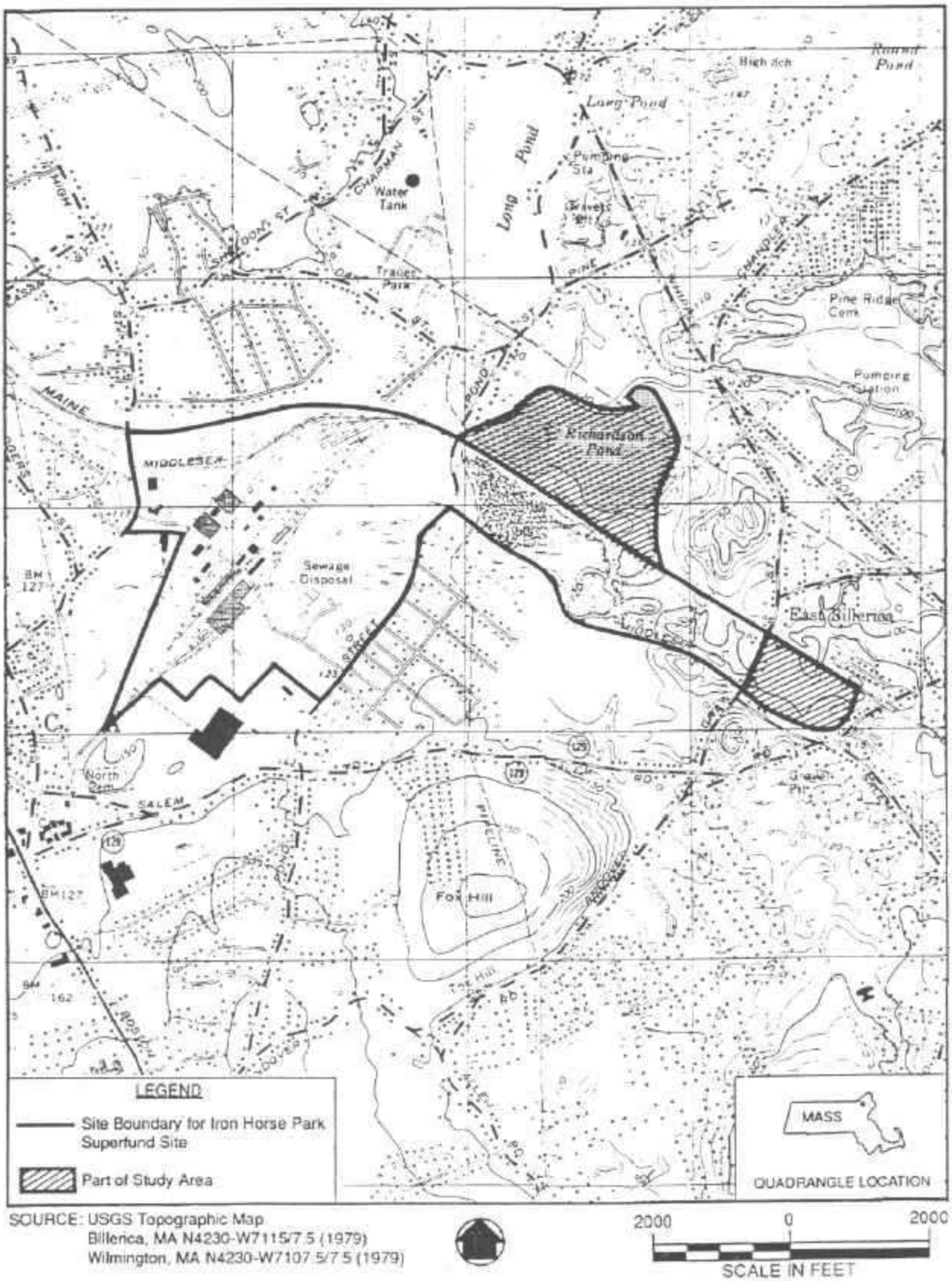
The Department looks forward to working with you in implementing the selected alternative. If you have any questions, please contact Janet Waldron at 617-556-1156.

Very truly yours,

Richard C. Chalpin
Acting Assistant Commissioner

DC/jsw
Efile: 5.01 Correspondence/DEP OU 3 Concurrence Letter 092004

APPENDIX B: Figures



SOURCE: USGS Topographic Map
Billerica, MA N4230-W7115/7.5 (1979)
Wilmington, MA N4230-W7107.5/7.5 (1979)

FIGURE 1-1. GEOGRAPHICAL LOCATION OF THE IRON HORSE PARK SUPERFUND SITE

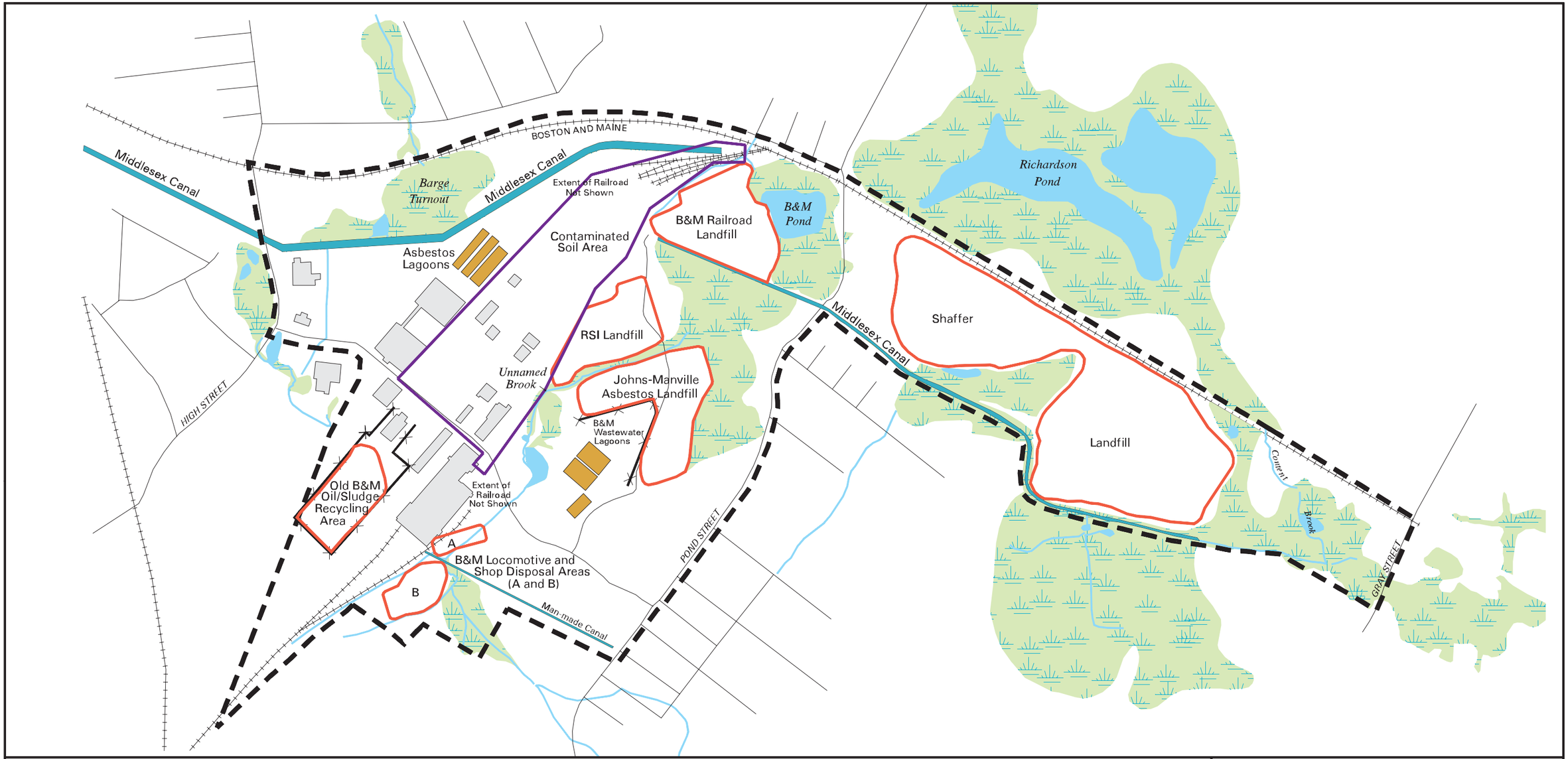
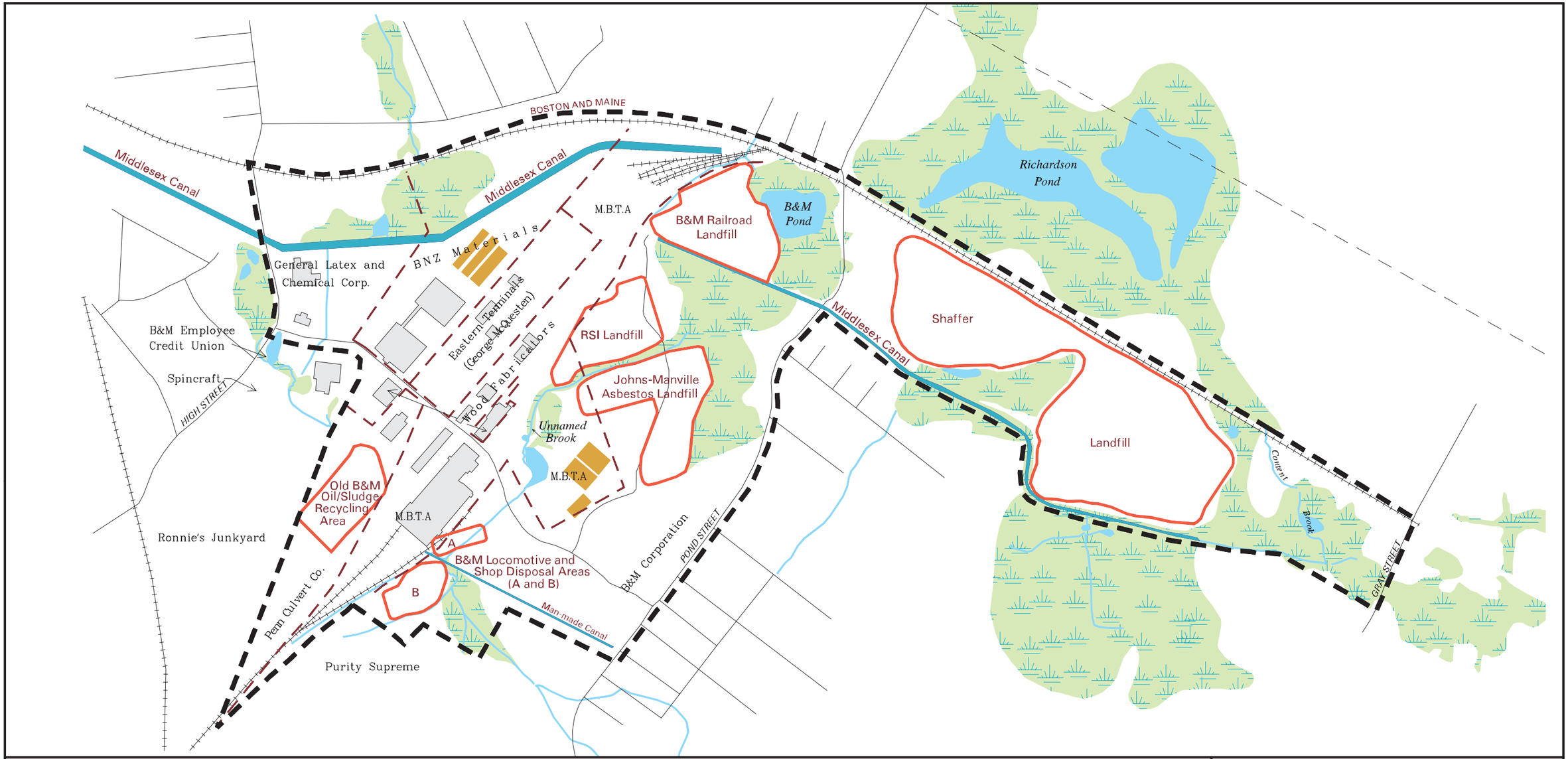


FIGURE 1-2. SITE BASE MAP

Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

fig1-a.aml October 1999

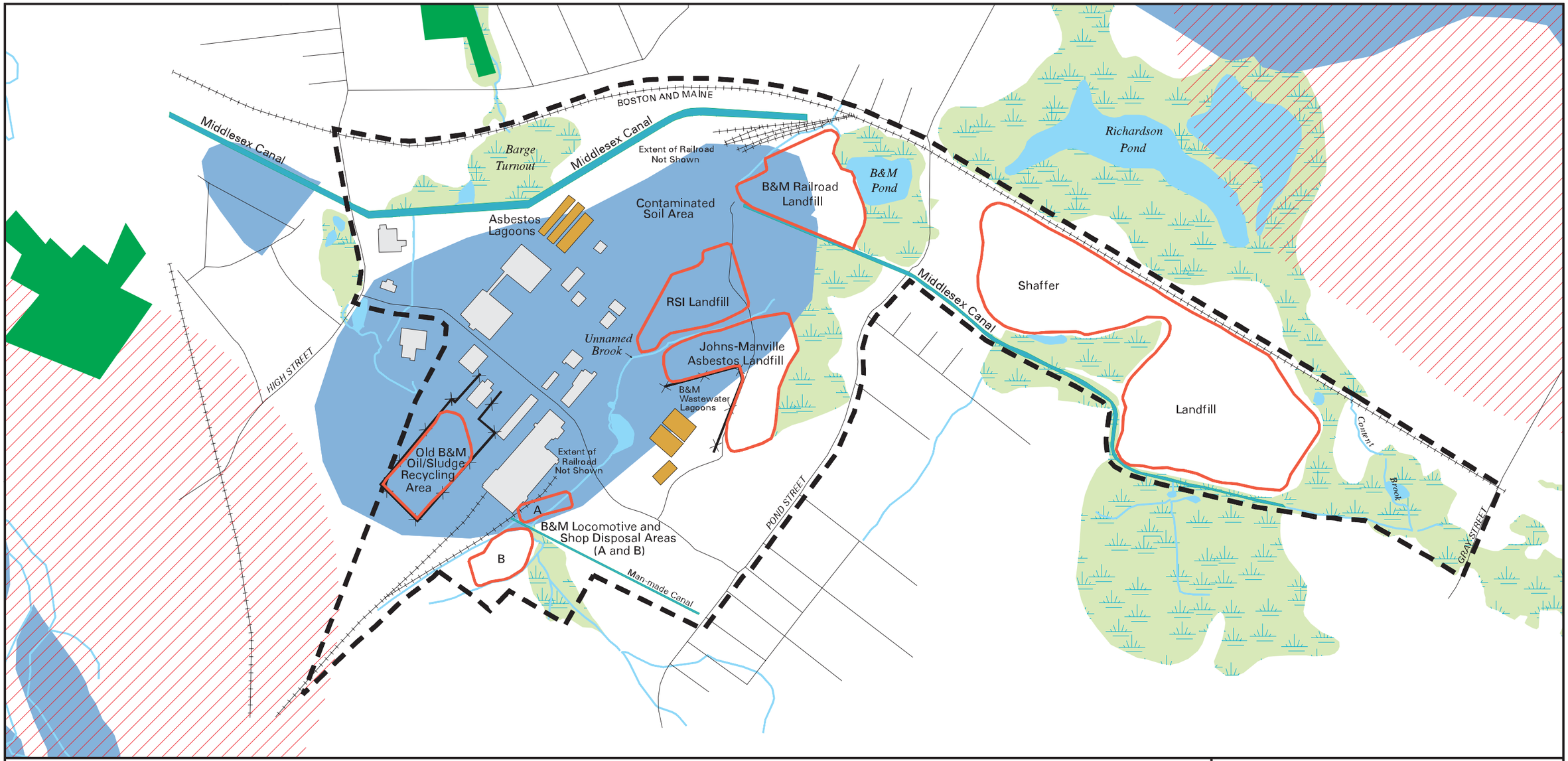


Locations for All Features Shown are Approximate.
Extent of Wetland and Surface Waters are Limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993 and November 8, 1994.

FIGURE 1-3. PROPERTY BOUNDARIES

Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

prop.aml October 1999



LEGEND

- Road
- Railroad
- Stream
- Fence
- Disposal Area Boundary
- Iron Horse Site Boundary
- Surface Water
- Wetland
- Lagoon
- Building
- Canal
- Medium Yield Aquifer
- Open Space
- Interim Wellhead Protection Area

N
W E
S

800 0 800
SCALE IN FEET

Locations for All Features Shown are Approximate. Extent of Wetland and Surface Waters are Limited to Areas Confirmed During Wetlands Reconnaissance on July 15, 1993, and November 8, 1994. MASSGIS DATA SOURCES: AQUIFERS: USGS Water Resources Div. hydrologic atlas series manuscript, 1:48,000, 1977 to 1988. INTERIM WELLHEAD PROTECTION AREAS: MASSDEP/DWS, 1:25,000. OPEN SPACE: MA DFWELE/MASSGIS, 1:25,000, 1993.

FIGURE 1-4. AQUIFERS, INTERIM WELLHEAD PROTECTION AREAS AND OPEN SPACES

Iron Horse Park Superfund Site
3rd Operable Unit
North Billerica, MA

massgis.aml October 1999

Figure E-1 CONCEPTUAL SITE MODEL FOR CONTAMINATED GROUNDWATER, SURFACE WATER, AND SEDIMENT

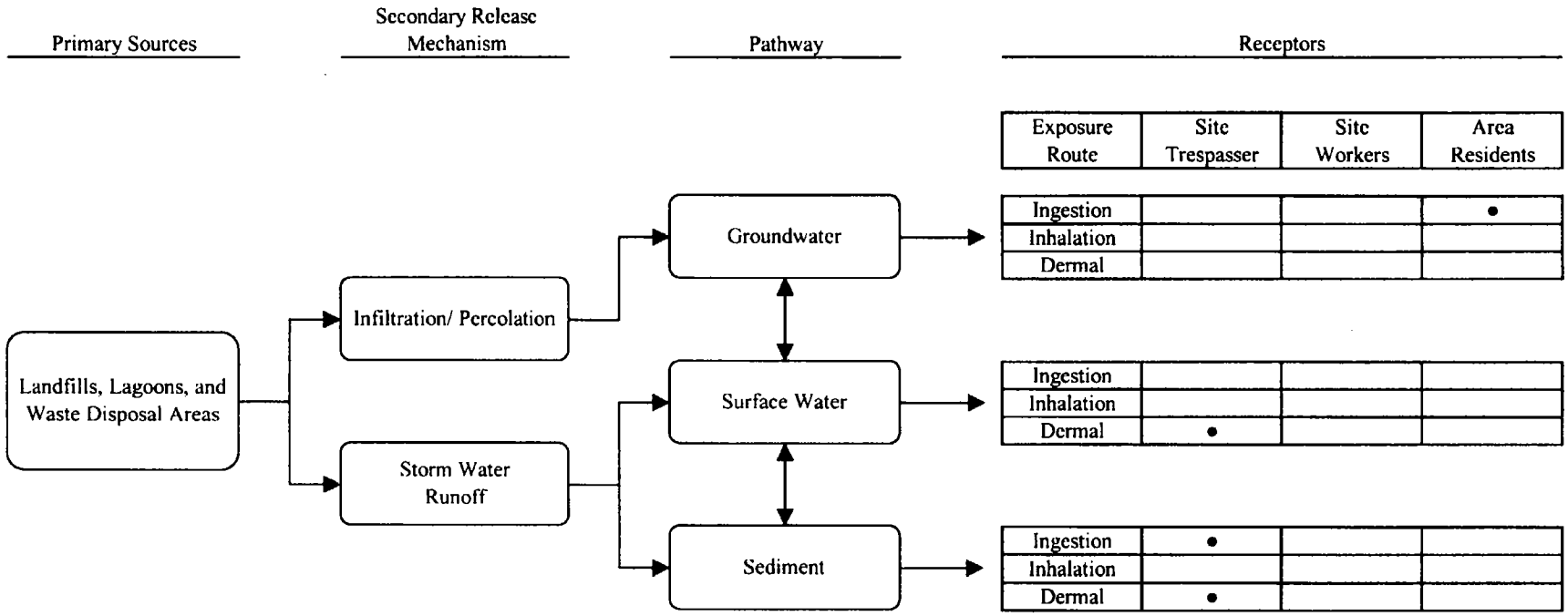
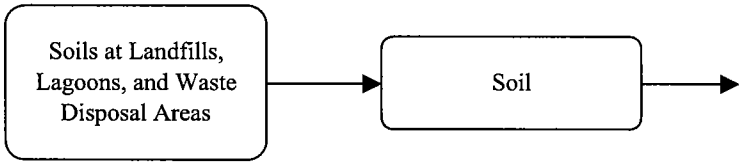


Figure E-2 CONCEPTUAL SITE MODEL FOR CONTAMINATED SOIL



Receptors

	Human Health			Ecological	
Exposure Route	Site Trespasser	Site Workers	Area Residents	Soil Invertebrates	Short-tailed Shrew
Ingestion	•	•		•	•
Inhalation					
Dermal	•	•		•	

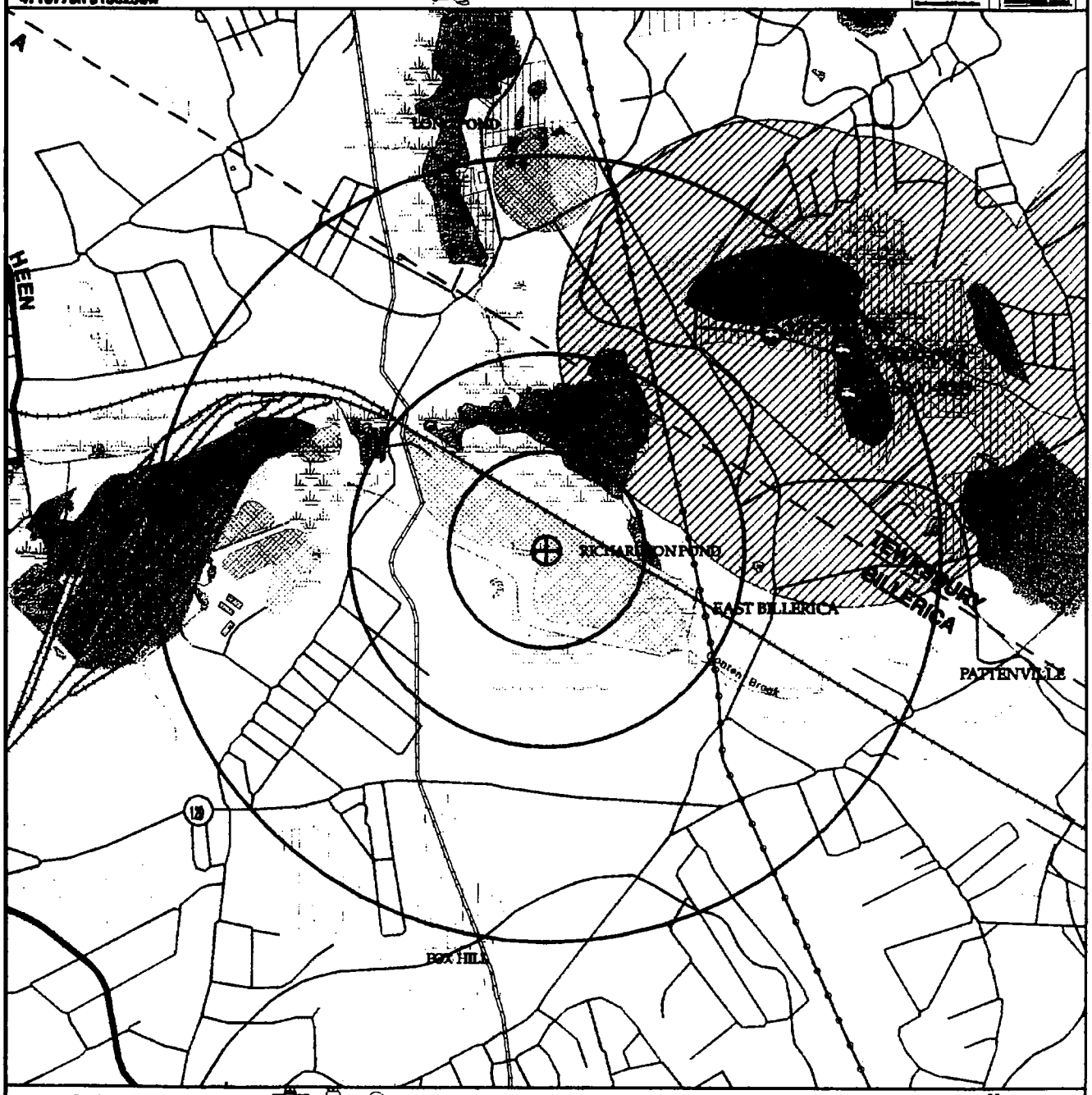
MA DEP - Bureau of Waste Site Cleanup

Preliminary Assessment Map: 1, 1/2, & 1/4 Mile Radii

SITE NAME:
Iron Horse Park OU#2
3-0240-02
Shaffer Landfill
Billerica
4716775n 315525ew

Site Location

The information shown on this map is the best available at the date of printing. Please refer to the data source descriptions document.



Roads: Interstate,US,State,Street,Trail
Boundaries: Municipal,County,DEP Region
Elec: Powerline; Pipeline
Drainage Basins: Major,Sub
Streams: Perennial,Intermittent,Aqueduct
Potentially Productive Aquifers: Medium Yield,High Yield
Non-Potential Drinking Water Source Area: Medium,High Yield
EPA Designated Sole Source Aquifer
Public Water Supplies: Ground,Surface,Non Community
Approved Zone2; IWPA;
Hydrography: Water Features,Public Surface Water Supply
Wetlands: Fresh,Salt,NHESP Wetlands Habitat
Protected Open Space; ACEC
DEP Permitted Solid Waste Facilities; Certified Vernal Pools

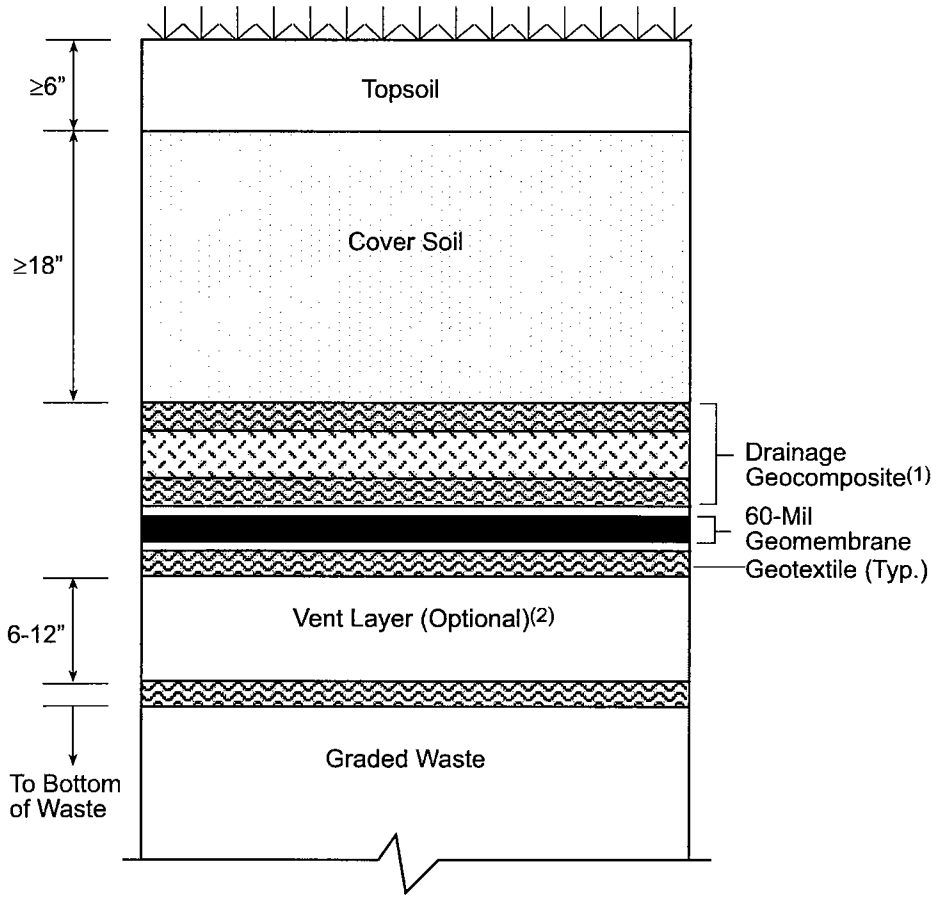
N W E S

SCALE 1:20000

0 1/2 1 KILOMETERS
0 1/2 1 MILES

April 23, 1998

F-1

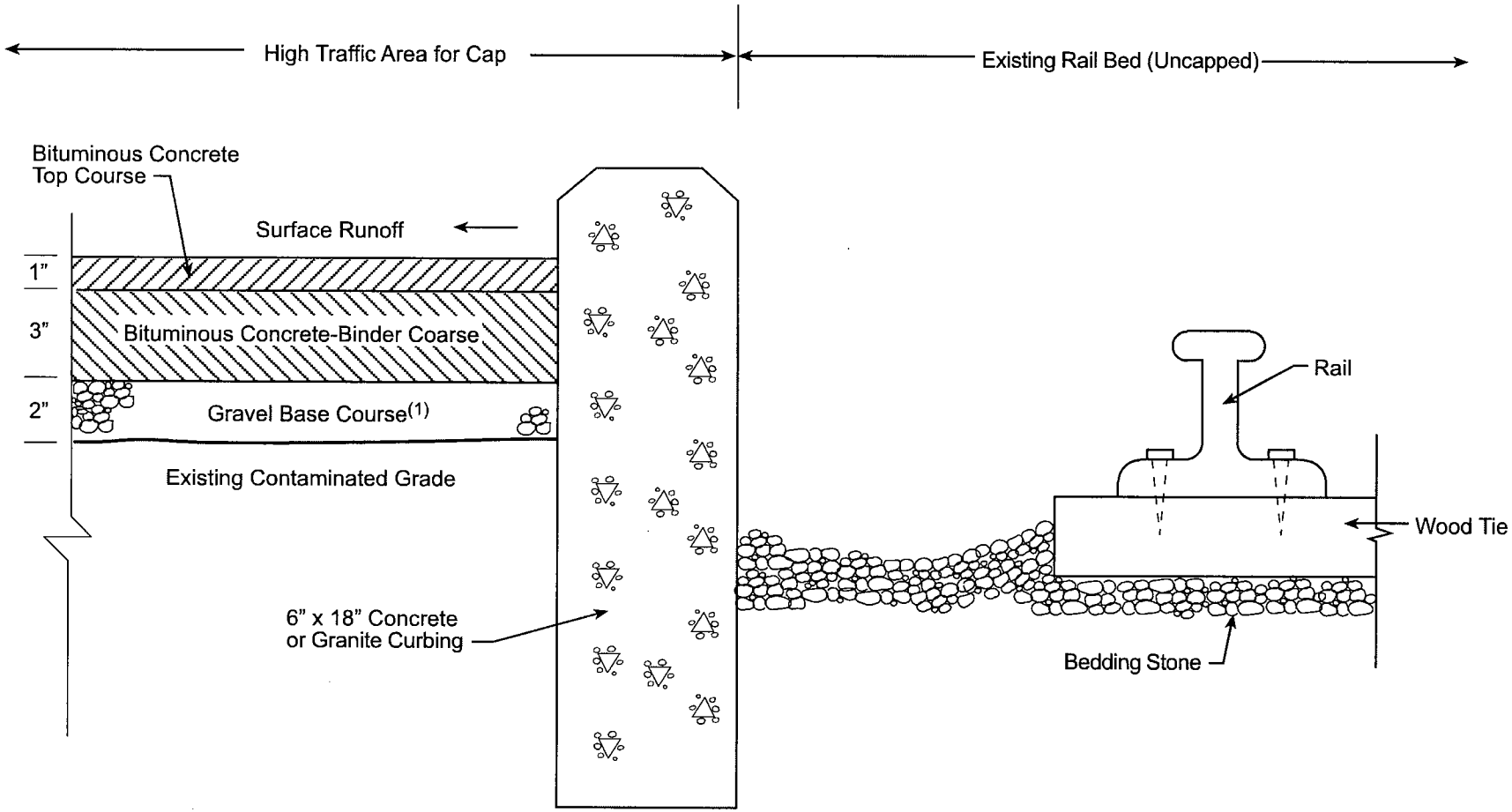


SECTION VIEW: SUBTITLE D
SOLID WASTE CAP

NOTES:

1. Drainage Geocomposite to be two non-woven geotextiles heat bonded to a drain core. Minimum hydraulic transmissivity of 3×10^{-4} m^2/sec.
2. Used if gas generation from waste is possible.

FIGURE L-2. HORIZONTAL CONTAINMENT SINGLE BARRIER LANDFILL CAP

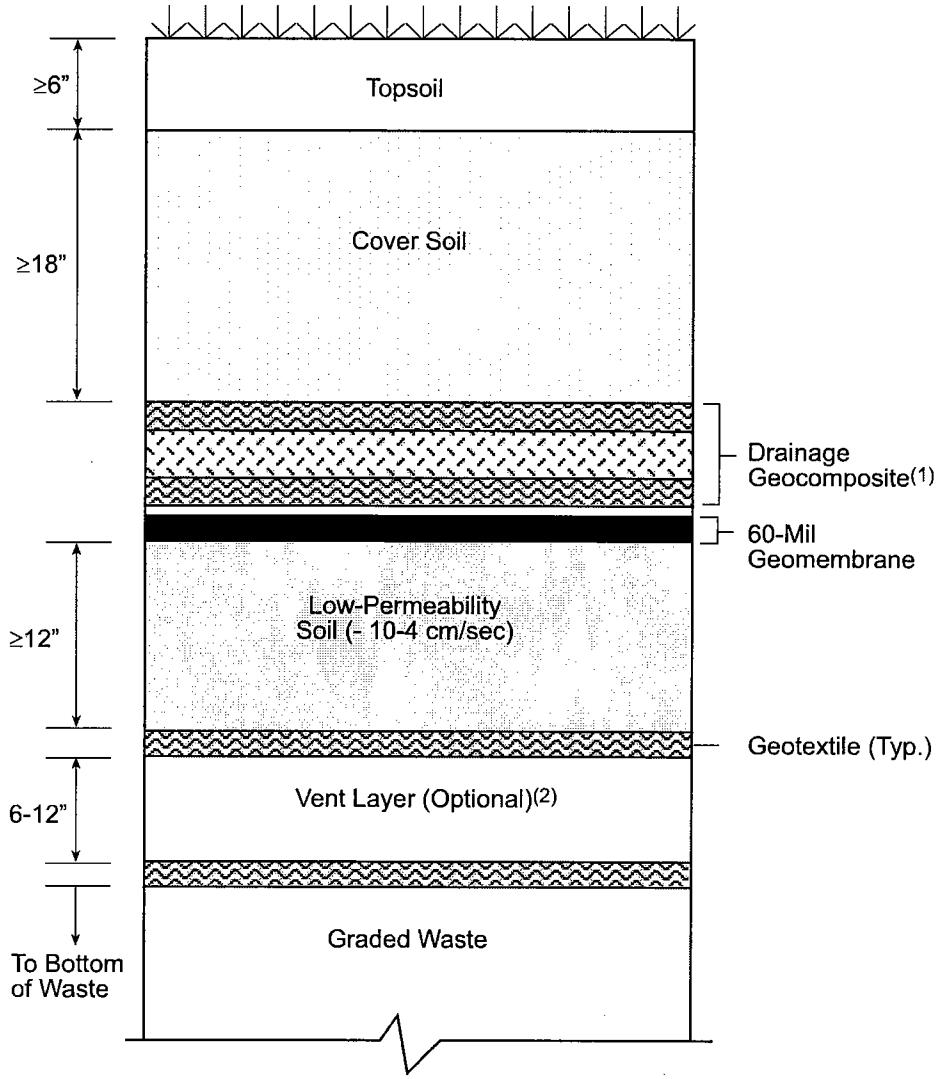


NOTES:

1. No gravel base course in areas of existing pavement.

FIGURE L-3. HORIZONTAL CONTAINMENT - SINGLE BARRIER CAP

02/6413jp



SECTION VIEW: EPA REGION I
ALTERNATIVE CERCLA CAP

NOTES:

1. Drainage Geocomposite to be two non-woven geotextiles heat bonded to a drain core. Minimum hydraulic transmissivity of 3 x 10^{-4} m^2/sec.
2. Used if gas generation from waste is possible.

FIGURE L-1. HORIZONTAL CONTAINMENT COMPOSITE/DOUBLE BARRIER

APPENDIX C: Tables

ROD RISK WORKSHEET

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
B&M Locomotive Shop Disposal Area								
	Lead	13.2	2,370	mg/kg	4 / 5	2,370	mg/kg	Max
Contaminated Soils Area								
	Lead	69.1	10,800	mg/kg	46 / 46	1,830	mg/kg	95% UCL

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

The table represents the chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs detected in surface soil (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that lead was detected more frequently at the Contaminated Soil Area than at the B&M Locomotive Shop Disposal Area. The 95% UCL on the arithmetic mean was used as the EPC for lead at the Contaminated Soil Area. However, due to the limited amount of sample data available for lead at the B&M Locomotive Shop Disposal Area, the maximum detected concentration was used as the default EPC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
Old B&M Oil/Sludge Recycling Area								
	Lead	8.9	4,120	mg/kg	24 / 27	4,120	mg/kg	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL);
Arithmetic Mean (Mean)

The table represents the chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in surface soil/subsurface soil (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface soil/subsurface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. Due to the variability of the data available for lead at the Old B&M Oil/Sludge Recycling Area, the maximum detected concentration was used as the default EPC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
B&M Railroad Landfill - Shallow Overburden								
	Aldrin	0.010	0.010	ug/l	1 / 10	0.010	ug/l	Max
	PCBs	0.060	0.15	ug/l	3 / 10	0.15	ug/l	Max
	Arsenic	3.1	55.6	ug/l	3 / 10	55.6	ug/l	Max
	Manganese	12.5	5,420	ug/l	7 / 10	5,420	ug/l	Max
B&M Railroad Landfill - Bedrock								
	1,2-Dichloroethane	6.0	9.0	ug/l	4 / 10	9.0	ug/l	Max
	1,1-Dichloroethene	3.0	9.0	ug/l	4 / 10	9.0	ug/l	Max
	Trichloroethene	22	50	ug/l	4 / 10	50	ug/l	Max
	Arsenic	3.8	19.6	ug/l	4 / 10	19.6	ug/l	Max
RSI Landfill - Shallow Overburden								
	Benzene	345	350	ug/l	2 / 14	350	ug/l	Max
	Arsenic	5.5	186	ug/l	12 / 14	186	ug/l	Max
	Manganese	11.7	2,440	ug/l	14 / 14	2,440	ug/l	Max
RSI Landfill - Deep Overburden								
	1,1,2,2-Tetrachloroethane	5.0	5.0	ug/l	1 / 10	5.0	ug/l	Max
	Trichloroethene	21	23	ug/l	2 / 10	23	ug/l	Max
	PCBs	0.0060	0.080	ug/l	4 / 10	0.080	ug/l	Max
	Arsenic	3.1	345	ug/l	7 / 10	345	ug/l	Max
	Manganese	1,100	6,400	ug/l	10 / 10	6,400	ug/l	Max
	Thallium	8.9	9.0	ug/l	2 / 10	9.0	ug/l	Max
RSI Landfill - Bedrock								
	1,2-Dichloroethane	2.0	6.0	ug/l	5 / 10	6.0	ug/l	Max
	1,1-Dichloroethene	2.0	2.0	ug/l	1 / 10	2.0	ug/l	Max
	Tetrachloroethene	3.0	3.0	ug/l	2 / 10	3.0	ug/l	Max
	PCBs	0.080	0.080	ug/l	1 / 10	0.080	ug/l	Max
	Arsenic	2.125	11.9	ug/l	4 / 10	11.9	ug/l	Max
	Manganese	10.35	2,690	ug/l	8 / 10	2,690	ug/l	Max

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
B&M Locomotive Shop Disposal Area - Shallow Overburden								
	Manganese	10.5	11,000	ug/l	7 / 8	11,000	ug/l	Max
B&M Locomotive Shop Disposal Area - Deep Overburden								
	Arsenic	11.8	16.6	ug/l	2 / 8	16.6	ug/l	Max
Old B&M Oil/Sludge Recycling Area - Shallow Overburden								
	Arsenic	9.9	27.1	ug/l	4 / 12	27.1	ug/l	Max
	Manganese	56.4	1,480	ug/l	12 / 12	1,480	ug/l	Max
Old B&M Oil/Sludge Recycling Area - Deep Overburden								
	Manganese	10.2	1,370	ug/l	12 / 12	1,370	ug/l	Max
Old B&M Oil/Sludge Recycling Area - Bedrock								
	Arsenic	3.0	9.6	ug/l	4 / 10	9.6	ug/l	Max
	Manganese	10.2	1,370	ug/l	10 / 10	1,370	ug/l	Max
Asbestos Lagoons - Shallow Overburden								
	1,1,2,2-Tetrachloroethane	3.0	3.0	ug/l	1 / 10	3.0	ug/l	Max
	Arsenic	12.1	58.1	ug/l	6 / 10	58.1	ug/l	Max
Asbestos Lagoons - Deep Overburden								
	1,2-Dichloroethane	3.0	3.0	ug/l	2 / 8	3.0	ug/l	Max
	Bis(2-ethylhexyl)phthalate	3.0	13	ug/l	2 / 8	13	ug/l	Max
	Arsenic	12	17.3	ug/l	2 / 8	17.3	ug/l	Max
	Beryllium	2.4	2.4	ug/l	1 / 8	2.4	ug/l	Max
	Manganese	853	4,160	ug/l	8 / 8	4,160	ug/l	Max
Asbestos Lagoons - Bedrock								
	1,2-Dichloroethane	3.0	39	ug/l	6 / 6	39	ug/l	Max
	Bis(2-ethylhexyl)phthalate	17	17	ug/l	1 / 6	17	ug/l	Max
	PCBs	0.10	0.10	ug/l	1 / 6	0.10	ug/l	Max
	Beryllium	2.1	2.1	ug/l	1 / 6	2.1	ug/l	Max
	Manganese	453	8,745	ug/l	6 / 6	8,745	ug/l	Max

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL);
Arithmetic Mean (Mean)

The table represents the chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that inorganic chemicals are the most frequently detected COCs in groundwater at the site. As prescribed by EPA guidance, the maximum detected concentration was used as the EPC for all COCs detected in groundwater within each flow zone for each Area of Concern (AOC).

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-4

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
Benzene	2.9E-02	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/01/96
1,2-Dichloroethane	9.1E-02	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
1,1-Dichloroethene	6.0E-01	N/A	$(mg/kg\text{-}day)^{-1}$	C	IRIS	01/01/96
1,1,2,2-Tetrachloroethane	2.0E-01	N/A	$(mg/kg\text{-}day)^{-1}$	C	IRIS	01/01/96
Tetrachloroethene	5.2E-02	N/A	$(mg/kg\text{-}day)^{-1}$	B2/C	IRIS	01/01/96
Trichloroethene*	1.1E-02	N/A	$(mg/kg\text{-}day)^{-1}$	B2/C	IRIS	01/01/96
bis(2-Ethylhexyl)phthalate	1.4E-02	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
Aldrin	1.7E+01	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
PCBs (carcinogenic)	7.7E+00	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
PCBs (noncarcinogenic)						
Aroclor 1016	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	N/A	N/A
Aroclor 1254	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	N/A	N/A
Arsenic	1.5E+00	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/01/96
Beryllium	4.3E+00	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
Lead	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/01/96
Manganese	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	01/01/96
Thallium	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	01/01/96

Key

N/A: Not applicable

IRIS: Integrated Risk Information System, U.S. EPA

NCEA: National Center for Environmental Assessment, U.S. EPA

HEAST: Health Effects Assessment Summary Tables, U.S. EPA

USEPA 1994: U.S. EPA Region 1 Risk Update

EPA Group

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

ROD RISK WORKSHEET

Table G-4

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)

***There is a new draft slope factor for TCE which will increase risk by approximately 60-fold, but the cleanup level will still be the MCL.**

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. Because the dermal route was not assessed for groundwater exposures and lead was evaluated through use of a lead model, dermal slope factors are not applicable to this assessment.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-5

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of Rfd: Target Organ (MM/DD/YYYY)
Benzene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethene	Chronic	9.0E-03	mg/kg-day	N/A	mg/kg-day	liver	1000	IRIS	01/01/96
1,1,2,2-Tetrachloroethane	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	N/A	mg/kg-day	liver	1000	IRIS	01/01/96
Trichloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg-day	N/A	mg/kg-day	liver	1000	IRIS	01/01/96
Aldrin	Chronic	3.0E-05	mg/kg-day	N/A	mg/kg-day	liver	1000	HEAST	01/01/96
PCBs (carcinogenic)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCBs (noncarcinogenic)									
Aroclor 1016	Chronic	7.0E-05	mg/kg-day	N/A	mg/kg-day	low birth weight	100	IRIS	01/01/96
Aroclor 1254	Chronic	2.0E-05	mg/kg-day	N/A	mg/kg-day	immune system	300	IRIS	01/01/96
Arsenic	Chronic	3.0E-04	mg/kg-day	N/A	mg/kg-day	skin	[3]	IRIS	01/01/96
Beryllium	Chronic	5.0E-03	mg/kg-day	N/A	mg/kg-day	none observed	[100]	IRIS	01/01/96
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	Chronic	2.4E-02	mg/kg-day	N/A	mg/kg-day	CNS	[3]	IRIS	01/01/96
Thallium	Chronic	8.0E-05	mg/kg-day	N/A	mg/kg-day	liver	[3000]	IRIS	01/01/96

Key

N/A - No Information available

IRIS - Integrated Risk Information System, U.S. EPA

NCEA - National Center for Environmental Assessment, U.S. EPA

HEAST - Health Effects Assessment Summary Tables, U.S. EPA

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil and groundwater. Nine of the COCs have toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the nine COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table. The available chronic toxicty data indicate that 1,1-dichloroethene, tetrachloroethene, bis(2-ethylhexyl)phthalate, aldrin, and thallium affect the liver, Aroclor-1254 (a PCB) affects the immune system, arsenic affects the skin, manganese affects the nervous system, and Aroclor 1016 (a PCB) causes low birth weight. Reference doses were not available for the benzene, 1,2-dichloroethane, 1,1,2,2-tetrachloroethane, trichloroethene, and lead. Dermal RfDs are not applicable for this assessment because the dermal route was not evaluated for groundwater exposures and lead was evaluated through the use of a lead model.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-6

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	B&M Railroad Landfill - Shallow Overburden						
			Aldrin	2E-06	--	--	--	2E-06
			PCBs	4E-06	--	--	--	4E-06
			Arsenic	1E-03	--	--	--	1E-03
							Exposure Point Groundwater Risk Total =	1E-03
Groundwater	Groundwater	B&M Railroad Landfill - Bedrock						
			1,2-Dichloroethane	1E-05	--	--	--	1E-05
			1,1-Dichloroethene	6E-05	--	--	--	6E-05
			Trichloroethene	6E-06	--	--	--	6E-06
			Arsenic	3E-04	--	--	--	3E-04
							Exposure Point Groundwater Risk Total =	4E-04
Groundwater	Groundwater	RSI Landfill - Shallow Overburden						
			Benzene	1E-04	--	--	--	1E-04
			Arsenic	3E-03	--	--	--	3E-03
							Exposure Point Groundwater Risk Total =	3E-03
Groundwater	Groundwater	RSI Landfill - Deep Overburden						
			1,1,2,2-Tetrachloroethane	1E-05	--	--	--	1E-05
			Trichloroethene	3E-06	--	--	--	3E-06
			PCBs	2E-06	--	--	--	2E-06
			Arsenic	6E-03	--	--	--	6E-03
							Exposure Point Groundwater Risk Total =	6E-03

Table G-6

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	RSI Landfill - Bedrock	1,2-Dichloroethane	6E-06	--	--	--	6E-06
			1,1-Dichloroethene	1E-05	--	--	--	1E-05
			Tetrachloroethene	2E-06	--	--	--	2E-06
			PCBs	2E-06	--	--	--	2E-06
			Arsenic	2E-04	--	--	--	2E-04
							Exposure Point Groundwater Risk Total =	2E-04
Groundwater	Groundwater	B&M Locomotive Shop Disposal Area - Deep Overburden	Arsenic	3E-04	--	--	--	3E-04
							Exposure Point Groundwater Risk Total =	3E-04
Groundwater	Groundwater	Old B&M Oil/Sludge Recycling Area - Shallow Overburden	Arsenic	5E-04	--	--	--	5E-04
							Exposure Point Groundwater Risk Total =	5E-04
Groundwater	Groundwater	Old B&M Oil/Sludge Recycling Area - Bedrock	Arsenic	2E-04	--	--	--	2E-04
							Exposure Point Groundwater Risk Total =	2E-04
Groundwater	Groundwater	Asbestos Lagoons - Shallow Overburden	1,1,2,2-Tetrachloroethane	7E-06	--	--	--	7E-06
			Arsenic	1E-03	--	--	--	1E-03
							Exposure Point Groundwater Risk Total =	1E-03

Table G-6

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	Asbestos Lagoons - Deep Overburden						
			1,2-Dichloroethane	3E-06	--	--	--	3E-06
			Bis(2-ethylhexyl)phthalate	2E-06	--	--	--	2E-06
			Arsenic	3E-04	--	--	--	3E-04
			Beryllium	1E-04	--	--	--	1E-04
							Exposure Point Groundwater Risk Total =	4E-04
Groundwater	Groundwater	Asbestos Lagoons - Bedrock						
			1,2-Dichloroethane	4E-05	--	--	--	4E-05
			Bis(2-ethylhexyl)phthalate	3E-06	--	--	--	3E-06
			PCBs	2E-06	--	--	--	2E-06
			Beryllium	1E-04	--	--	--	1E-04
							Exposure Point Groundwater Risk Total =	2E-04
							Total Risk =	

ROD RISK WORKSHEET

Table G-6

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total

Key

-- Route of exposure is not applicable to this medium.

This table provides risk estimates by flow zone and Area of Concern for the drinking water ingestion route of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an adult's exposure to groundwater, as well as the toxicity of the COCs (benzene, 1,2-dichloroethane, 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene, bis(2-ethylhexyl)phthalate, aldrin, PCBs, arsenic, beryllium, manganese, and thallium). The total risk from direct exposure to contaminated groundwater at this site to a future adult resident is estimated to be between 2×10^{-4} and 6×10^{-3}. The COC contributing the most to these risk levels is arsenic in groundwater. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of between 2 in 10,000 and 6 in 1,000 of developing cancer as a result of site-related exposure to the COCs.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-7

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	B&M Railroad Landfill - Shallow Overburden						
			Arsenic	Skin	5E+00	--	--	5E+00
			Manganese	Nervous System	6E+00	--	--	6E+00
							Groundwater Hazard Index Total =	1E+01
							Receptor Hazard Index =	1E+01
							Nervous System Hazard Index =	6E+00
							Skin Hazard Index =	5E+00
Groundwater	Groundwater	B&M Railroad Landfill - Bedrock						
			Arsenic	Skin	2E+00	--	--	2E+00
							Groundwater Hazard Index Total =	2E+00
							Receptor Hazard Index =	2E+00
							Skin Hazard Index =	2E+00
Groundwater	Groundwater	RSI Landfill - Shallow Overburden						
			Arsenic	Skin	2E+01	--	--	2E+01
			Manganese	Nervous System	3E+00	--	--	3E+00
							Groundwater Hazard Index Total =	2E+01
							Receptor Hazard Index =	2E+01
							Nervous System Hazard Index =	3E+00
							Skin Hazard Index =	2E+01

Table G-7

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	RSI Landfill - Deep Overburden	Arsenic	Skin	3E+01	--	--	3E+01
			Manganese	Nervous System	7E+00	--	--	7E+00
			Thallium	Liver	3E+00	--	--	3E+00
							Groundwater Hazard Index Total =	4E+01
							Receptor Hazard Index =	4E+01
							Liver Hazard Index =	3E+00
							Nervous System Hazard Index =	7E+00
							Skin Hazard Index =	3E+01
Groundwater	Groundwater	RSI Landfill - Bedrock	Manganese	Nervous System	3E+00	--	--	3E+00
							Groundwater Hazard Index Total =	3E+00
							Receptor Hazard Index =	3E+00
							Nervous System Hazard Index =	3E+00
Groundwater	Groundwater	B&M Locomotive Shop Disposal Area - Shallow Overburden	Manganese	Nervous System	1E+01	--	--	1E+01
							Groundwater Hazard Index Total =	1E+01
							Receptor Hazard Index =	1E+01
							Nervous System Hazard Index =	1E+01
Groundwater	Groundwater	B&M Locomotive Shop Disposal Area - Deep Overburden	Arsenic	Skin	2E+00	--	--	2E+00
							Groundwater Hazard Index Total =	2E+00
							Receptor Hazard Index =	2E+00
							Skin Hazard Index =	2E+00

Table G-7

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Old B&M Oil/Sludge Recycling Area - Shallow Overburden						
			Arsenic	Skin	2E+00	--	--	2E+00
			Manganese	Nervous System	2E+00	--	--	2E+00
							Groundwater Hazard Index Total =	4E+00
							Receptor Hazard Index =	4E+00
							Nervous System Hazard Index =	2E+00
							Skin Hazard Index =	2E+00
Groundwater	Groundwater	Old B&M Oil/Sludge Recycling Area - Deep Overburden						
			Manganese	Nervous System	2E+00	--	--	2E+00
							Groundwater Hazard Index Total =	2E+00
							Receptor Hazard Index =	2E+00
							Nervous System Hazard Index =	2E+00
Groundwater	Groundwater	Old B&M Oil/Sludge Recycling Area - Bedrock						
			Manganese	Nervous System	2E+00	--	--	2E+00
							Groundwater Hazard Index Total =	2E+00
							Receptor Hazard Index =	2E+00
							Nervous System Hazard Index =	2E+00
Groundwater	Groundwater	Asbestos Lagoons - Shallow Overburden						
			Arsenic	Skin	5E+00	--	--	5E+00
							Groundwater Hazard Index Total =	5E+00
							Receptor Hazard Index =	5E+00
							Skin Hazard Index =	5E+00

Table G-7

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Asbestos Lagoons - Deep Overburden						
			Arsenic	Skin	2E+00	--	--	2E+00
			Manganese	Nervous System	5E+00	--	--	5E+00
							Groundwater Hazard Index Total =	6E+00
							Receptor Hazard Index =	6E+00
							Nervous System Hazard Index =	5E+00
							Skin Hazard Index =	2E+00
Groundwater	Groundwater	Asbestos Lagoons - Bedrock						
			Manganese	Nervous System	1E+01	--	--	1E+01
							Groundwater Hazard Index Total =	1E+01
							Receptor Hazard Index =	1E+01
							Nervous System Hazard Index =	1E+01

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides, by flow zone for each Area of Concern, hazard quotients (HQs) for each COC in groundwater and the hazard index (sum of the hazard quotients) for the drinking water ingestion route of exposure. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indictes the potential for adverse noncancer effects. The estimated range of HIs of between 2 and 40 indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater containing arsenic, manganese, and thallium.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

TABLE G-8
SOIL COPC SCREENING
B&M RAILROAD LANDFILL
Iron Horse Park Superfund Site, OU3
North Billerica, MA

Analyte	Frequency of Detection	Maximum Soil Conc.	Maximum Background Soil Conc.	Ecological Soil Screening Level	Source of Ecological Screening Level	COC?	Reason	Hazard Quotient (a)
VOCs (ug/kg)								
Acetone	5 / 14	42	N/A	10,000	(1)	N	BSV	0.0042
2-Butanone	1 / 14	7.0	N/A	10,000	(1)	N	FD	0.00070
Methylene Chloride	8 / 14	280	36	N/A		Y		N/A
SVOCs (ug/kg)								
Acenaphthene	5 / 14	340	N/A	N/A		Y		N/A
Acenaphthylene	11 / 14	3,200	N/A	N/A		Y		N/A
Anthracene	12 / 14	5,800	N/A	10,000	(11)	N	BSV	0.58
Benzo(a)anthracene	14 / 14	16,000	N/A	1,000	(4)	Y		16
Benzo(a)pyrene	14 / 14	18,000	N/A	5	(5)	Y		3600
Benzo(b)fluoranthene	14 / 14	33,000	N/A	19,000	(6)	Y		1.7
Benzo(g,h,i)perylene	12 / 14	10,000	N/A	1,000	(1)	Y		10
Bis(2-chloroethyl) ether	1 / 14	280	N/A	N/A		Y		N/A
Bis(2-ethylhexyl)phthalate	7 / 14	25,000	N/A	70,000	(5)	N	BSV	0.36
Butylbenzylphthalate	5 / 14	10,000	N/A	N/A		Y		N/A
Carbazole	8 / 14	3,400	N/A	N/A		Y		N/A
Chrysene	14 / 14	20,000	N/A	5,000	(4)	Y		4.0
Di-n-butylphthalate	1 / 14	390	N/A	60	(1)	Y		6.5
Dibenzo(a,h)anthracene	7 / 14	4,200	N/A	1,000	(4)	Y		4.2
Dibenzofuran	5 / 14	290	N/A	N/A		Y		N/A
Fluoranthene	14 / 14	28,000	N/A	10,000	(11)	Y		2.8
Fluorene	5 / 14	340	N/A	30,000	(12)	N	BSV	0.011
Indeno(1,2,3-cd)pyrene	13 / 14	10,000	N/A	1,000	(1)	Y		10
Isophorone	1 / 14	430	N/A	N/A		N	DF	N/A
2-Methylnaphthalene	7 / 14	260	N/A	N/A		Y		N/A
4-Methylphenol	2 / 14	96	N/A	N/A		N	DF	N/A
Naphthalene	6 / 14	280	N/A	5,000	(11)	N	BSV	0.056
Phenanthrene	14 / 14	17,000	N/A	5,000	(11)	Y		3.4
Phenol	3 / 14	200	N/A	30,000	(12)	N	BSV	0.0067
Pyrene	14 / 14	24,000	N/A	10,000	(11)	Y		2.4
PCBs/Pesticides (ug/kg)								
Aldrin	7 / 14	3.9	N/A	N/A		Y		N/A
alpha-BHC	5 / 13	2.5	N/A	100	(2, 3)	N	BSV	0.025
beta-BHC	1 / 14	1.1	N/A	100	(2, 3)	N	BSV	0.011
delta-BHC	2 / 13	1.4	N/A	100	(2, 3)	N	DF	0.014
gamma-BHC(Lindane)	8 / 14	1.8	N/A	100	(2)	N	BSV	0.018
alpha-Chlordane	6 / 13	13	0.27	500	(1)	N	BSV	0.026
gamma-Chlordane	5 / 13	7.5	N/A	500	(1)	N	BSV	0.015
4,4'-DDD	14 / 14	97	2.6	100	(2, 7)	N	BSV	0.97
4,4'-DDE	10 / 14	50	4.9	100	(2, 7)	N	BSV	0.50
4,4'-DDT	13 / 14	230	7.7	100	(2)	Y		2.3
Dieldrin	1 / 13	5.2	2.1	10	(8)	N	BSV	0.52
Endosulfan I	2 / 13	1.9	N/A	100	(9)	N	BSV	0.019
Endosulfan II	5 / 13	23	1.0	100	(9)	N	BSV	0.23
Endosulfan Sulfate	7 / 13	79	N/A	100	(9)	N	BSV	0.79
Endrin	11 / 13	140	N/A	N/A		Y		N/A
Endrin Aldehyde	7 / 13	110	N/A	N/A		Y		N/A
Endrin Ketone	9 / 13	170	N/A	N/A		Y		N/A
Heptachlor	3 / 13	0.59	N/A	50	(2)	N	BSV	0.012
Heptachlor Epoxide	14 / 14	9.7	2.0	50	(2, 10)	N	BSV	0.19
Methoxychlor	10 / 13	170	1.8	N/A		Y		N/A
Metals (mg/kg)								
Aluminum	14 / 14	7,260	9,630	N/A		N	BKGD	N/A
Antimony	1 / 14	155	N/A	4.5	(2)	Y		34
Arsenic	14 / 14	36	7.6	60	(12)	N	BSV	0.60
Barium	14 / 14	922	32	400	(13)	Y		2.3
Cadmium	8 / 14	35	N/A	20	(2)	Y		1.7
Calcium	14 / 14	14,700	949	N/A		N	EAN	N/A
Chromium	13 / 14	304	N/A	0.4	(12)	Y		760
Cobalt	13 / 14	26	N/A	50	(11)	N	BSV	0.52
Copper	14 / 14	1,030	8.9	50	(12)	Y		21
Cyanide	10 / 14	39	N/A	N/A		Y		N/A
Iron	14 / 14	76,800	8,350	N/A		Y		N/A
Lead	14 / 14	1,130	102	500	(12)	Y		2.3

TABLE G-8
SOIL COPC SCREENING
B&M RAILROAD LANDFILL
Iron Horse Park Superfund Site, OU3
North Billerica, MA

Analyte	Frequency of Detection	Maximum Soil Conc.	Maximum Background Soil Conc.	Ecological Soil Screening Level	Source of Ecological Screening Level	COC?	Reason	Hazard Quotient (a)
Magnesium	14 / 14	4,300	1480	N/A		N	EAN	N/A
Manganese	14 / 14	1,080	206	1,500	(2)	N	BSV	0.72
Mercury	12 / 14	3.4	N/A	0.1	(12)	Y		34
Nickel	9 / 14	154	N/A	200	(12)	N	BSV	0.77
Potassium	8 / 14	792	N/A	N/A		N	EAN	N/A
Selenium	4 / 14	3.1	N/A	70	(12)	N	BSV	0.044
Silver	1 / 9	1.2	N/A	10	(4)	N	DF	0.12
Vanadium	14 / 14	35	14	150	(2)	N	BSV	0.23
Zinc	14 / 14	4,400	47	200	(12)	Y		22

a. In this screening table, the hazard quotient is calculated by dividing the maximum detection by the screening value.
N/A - Not Applicable or Not Available
COC - Contminant of Concern
BSV - Below screening value
DF - Dection frequency less than 5% site-wide
EAN- Essential animal nutrient
BKGD - Background comparison

Sources:
1. Fitchko (1989).
2. Maximum allowable soil concentration in the former Soviet Union (as cited in Beyer 1990).
3. Value for gamma-BHC(Lindane) conservatively used.
4. Indicative of moderate soil contamination as designated by the soil cleanup criteria of Quebec (as cited in Beyer 1990).
5. Acceptable concentration proposed by Ontario Ministry of Environment (as cited in Beyer 1990).
6. Kappleman (1993).
7. For Screening purposes, maximum allowable DDT concentration was used for DDE and DDT.
8. Decreased cocoon production by Eisenia fetida (Reinecke and Venter 1985 as cited in Beyer 1990).
9. Tenative allowable concentration for endosulfan in the former Soviet Union (as cited in Beyer 1990).
10. Value for heptachlor.
11. Soil criteria for evaluating the severity of contamination under the Dutch Soil Cleanup (Interim) Act (as cited in Beyer 1990).
12. Will and Suter (1994).
13. Guidelines for the New Jersey Environmental Cleanup Responsibility Act (as cited in Beyer 1990).

TABLE G-9
SOIL COPC SCREENING
RSI LANDFILL
Iron Horse Park Superfund Site, OU3
North Billerica, MA

Analyte	Frequency of Detection	Maximum Soil Conc.	Maximum Background Soil Conc.	Ecological Soil Screening Level	Source of Ecological Screening Level	COC?	Reason	Hazard Quotient (a)
VOCs (ug/kg)								
Methylene Chloride	2 / 6	64	36	N/A		Y		N/A
SVOCs (ug/kg)								
Benzo(a)anthracene	1 / 6	120	N/A	1,000	(4)	N	BSV	0.12
Benzo(b)fluoranthene	3 / 6	380	N/A	19,000	(6)	N	BSV	0.020
Chrysene	2 / 6	340	N/A	5,000	(4)	N	BSV	0.068
Fluoranthene	3 / 6	390	N/A	10,000	(11)	N	BSV	0.039
Phenol	2 / 6	220	N/A	30,000	(12)	N	BSV	0.0073
Pyrene	3 / 6	330	N/A	10,000	(11)	N	BSV	0.033
PCBs/Pesticides (ug/kg)								
gamma-Chlordane	1 / 6	0.33	N/A	500	(1)	N	BSV	0.00066
4,4'-DDD	5 / 6	1.6	2.6	100	(2, 7)	N	BSV	0.016
4,4'-DDE	5 / 6	1.4	4.9	100	(2, 7)	N	BSV	0.014
4,4'-DDT	6 / 6	5.2	7.7	100	(2)	N	BSV	0.052
Endosulfan II	1 / 6	0.51	1.0	100	(9)	N	BSV	0.0051
Endrin	4 / 6	1.4	N/A	N/A		Y		N/A
Endrin Ketone	3 / 6	0.87	N/A	N/A		Y		N/A
Heptachlor Epoxide	2 / 6	0.75	2.0	50	(2, 10)	N	BSV	0.015
Methoxychlor	3 / 6	4.0	1.8	N/A		Y		N/A
Metals (mg/kg)								
Aluminum	6 / 6	9,470	9630	N/A		N	BKGD	N/A
Arsenic	6 / 6	4.8	7.6	60	(12)	N	BSV	0.080
Barium	6 / 6	46	32	400	(13)	N	BSV	0.12
Calcium	6 / 6	1,180	949	N/A		N	EAN	N/A
Chromium	4 / 6	24	N/A	0.4	(12)	Y		59
Cobalt	6 / 6	6.5	N/A	50	(11)	N	BSV	0.13
Copper	5 / 6	20	8.9	50	(12)	N	BSV	0.39
Iron	6 / 6	13,600	8,350	N/A		Y		N/A
Lead	6 / 6	248	102	500	(12)	N	BSV	0.50
Magnesium	6 / 6	3,780	1,480	N/A		N	EAN	N/A
Manganese	6 / 6	212	206	1,500	(2)	N	BSV	0.14
Potassium	5 / 6	1,990	N/A	N/A		N	EAN	N/A
Vanadium	6 / 6	20	14	150	(2)	N	BSV	0.13
Zinc	6 / 6	59	47	200	(12)	N	BSV	0.30

a. In this screening table, the hazard quotient is calculated by dividing the maximum detection by the screening value.
N/A - Not Applicable or Not Available
COC - Contminant of Concern
BSV - Below screening value
DF - Dection frequency less than 5% site-wide
EAN- Essential animal nutrient
BKGD - Background comparison

Sources:
1. Fitchko (1989).
2. Maximum allowable soil concentration in the former Soviet Union (as cited in Beyer 1990).
3. Value for gamma-BHC(Lindane) conservatively used.
4. Indicative of moderate soil contamination as designated by the soil cleanup criteria of Quebec (as cited in Beyer 1990).
5. Acceptable concentration proposed by Ontario Ministry of Environment (as cited in Beyer 1990).
6. Kappleman (1993).
7. For Screening purposes, maximum allowable DDT concentration was used for DDE and DDT.
8. Decreased cocoon production by Eisenia fetida (Reinecke and Venter 1985 as cited in Beyer 1990).
9. Tenative allowable concentration for endosulfan in the former Soviet Union (as cited in Beyer 1990).
10. Value for heptachlor.
11. Soil criteria for evaluating the severity of contamination under the Dutch Soil Cleanup (Interim) Act (as cited in Beyer 1990).
12. Will and Suter (1994).
13. Guidelines for the New Jersey Environmental Cleanup Responsibility Act (as cited in Beyer 1990).

TABLE G-10
SOIL COPC SCREENING
B&M LOCOMOTIVE SHOP DISPOSAL AREA
Iron Horse Park Superfund Site, OU3
North Billerica, MA

Analyte	Frequency of Detection	Maximum Soil Conc.	Maximum Background Soil Conc.	Ecological Soil Screening Level	Source of Ecological Screening Level	COC?	Reason	Hazard Quotient (s)
VOCs (ug/kg)								
Methylene Chloride	2 / 5	21	36	N/A		Y		N/A
SVOCs (ug/kg)								
Acenaphthene	1 / 5	790	N/A	N/A		Y		N/A
Acenaphthylene	1 / 5	20	N/A	N/A		Y		N/A
Anthracene	2 / 5	1,500	N/A	10,000	(11)	N	BSV	0.15
Benzo(a)anthracene	4 / 5	2,300	N/A	1,000	(4)	Y		2.3
Benzo(a)pyrene	4 / 5	1,700	N/A	5	(5)	Y		340
Benzo(b)fluoranthene	4 / 5	2,900	N/A	19,000	(6)	N	BSV	0.15
Benzo(g,h,i)perylene	3 / 5	960	N/A	1,000	(1)	N	BSV	0.96
Benzo(k)fluoranthene	1 / 5	110	N/A	19,000	(6)	N	BSV	0.0058
Bis(2-ethylhexyl)phthalate	1 / 5	120	N/A	70,000	(5)	N	BSV	0.0017
Carbazole	1 / 5	880	N/A	N/A		Y		N/A
Chrysene	4 / 5	2,400	N/A	5,000	(4)	N	BSV	0.48
Dibenzo(a,h)anthracene	1 / 5	400	N/A	1,000	(4)	N	BSV	0.40
Dibenzofuran	1 / 5	740	N/A	N/A		N	BSV	N/A
Fluoranthene	5 / 5	4,200	N/A	10,000	(11)	N	BSV	0.42
Fluorene	1 / 5	760	N/A	30,000	(12)	N	BSV	0.025
Indeno(1,2,3-cd)pyrene	3 / 5	920	N/A	1,000	(1)	N	BSV	0.92
2-Methylnaphthalene	2 / 5	370	N/A	N/A		Y		N/A
Naphthalene	2 / 5	290	N/A	5,000	(11)	N	BSV	0.058
Phenanthrene	5 / 5	5,900	N/A	5,000	(11)	Y		1.2
Pyrene	5 / 5	4,800	N/A	10,000	(11)	N	BSV	0.48
PCBs/Pesticides (ug/kg)								
Aldrin	3 / 5	2.8	N/A	N/A		Y		N/A
beta-BHC	1 / 5	0.96	N/A	100	(2, 3)	N	BSV	0.0096
alpha-Chlordane	3 / 5	1.0	0.27	500	(1)	N	BSV	0.0020
gamma-Chlordane	3 / 5	4.0	N/A	500	(1)	N	BSV	0.0080
4,4'-DDD	4 / 5	5.0	2.6	100	(2, 7)	N	BSV	0.050
4,4'-DDE	3 / 5	2.4	4.9	100	(2, 7)	N	BSV	0.024
4,4'-DDT	4 / 5	9.3	7.7	100	(2)	N	BSV	0.093
Dieldrin	1 / 5	1.7	2.1	10	(8)	N	BSV	0.17
Endosulfan II	3 / 5	2.0	1.0	100	(9)	N	BSV	0.020
Endrin	5 / 5	3.5	N/A	N/A		Y		N/A
Endrin Ketone	1 / 5	5.6	N/A	N/A		Y		N/A
Heptachlor Epoxide	3 / 5	1.8	2.0	50	(2, 10)	N	BSV	0.036
Methoxychlor	2 / 5	19	1.8	N/A		Y		N/A
Aroclor-1016	1 / 5	2.2	N/A	N/A		N	DF	N/A
Metals (mg/kg)								
Aluminum	5 / 5	7,660	9,630	N/A		N	BKGD	N/A
Antimony	2 / 5	53	N/A	4.5	(2)	Y		12
Arsenic	5 / 5	49	7.6	60	(12)	N	BSV	0.82
Barium	5 / 5	342	32	400	(13)	N	BSV	0.85
Beryllium	1 / 5	0.85	N/A	1	(13)	N	DF	0.85
Cadmium	1 / 5	1.0	N/A	20	(2)	N	BSV	0.050
Calcium	5 / 5	6,090	949	N/A		N	EAN	N/A
Chromium	4 / 5	87	N/A	0.4	(12)	Y		219
Cobalt	4 / 5	14	N/A	50	(11)	N	BSV	0.28
Copper	5 / 5	3,135	8.9	50	(12)	Y		63
Cyanide	2 / 5	0.94	N/A	50	(11)	N	BSV	0.019
Iron	5 / 5	101,350	8,350	N/A		Y		N/A
Lead	4 / 5	2,370	102	500	(12)	Y		4.7
Magnesium	5 / 5	4,225	1,480	N/A		N	EAN	N/A
Manganese	5 / 5	917	206	1500	(2)	N	BSV	0.61
Mercury	1 / 5	0.19	N/A	0.1	(12)	Y		1.9
Nickel	3 / 5	46	N/A	200	(12)	N	BSV	0.23
Potassium	3 / 5	1,660	N/A	N/A		N	EAN	N/A
Selenium	2 / 5	5.5	N/A	70	(12)	N	BSV	0.079
Sodium	1 / 5	13,000	N/A	N/A		N	EAN	N/A
Thallium	1 / 5	0.57	N/A	N/A		N	DF	N/A
Vanadium	5 / 5	18	14	150	(2)	N	BSV	0.12
Zinc	5 / 5	821	47	200	(12)	Y		4.1

TABLE G-10
SOIL COPC SCREENING
B&M LOCOMOTIVE SHOP DISPOSAL AREA
Iron Horse Park Superfund Site, OU3
North Billerica, MA

Analyte	Frequency of Detection	Maximum Soil Conc.	Maximum Background Soil Conc.	Ecological Soil Screening Level	Source of Ecological Screening Level	COC?	Reason	Hazard Quotient (a)

a. In this screening table, the hazard quotient is calculated by dividing the maximum detection by the screening value.
N/A - Not Applicable or Not Available
COC - Contminant of Concern
BSV - Below screening value
DF - Dection frequency less than 5% site-wide
EAN- Essential animal nutrient
BKGD - Background comparison

Sources:

1. Fitchko (1989).
2. Maximum allowable soil concentration in the former Soviet Union (as cited in Beyer 1990).
3. Value for gamma-BHC(Lindane) conservatively used.
4. Indicative of moderate soil contamination as designated by the soil cleanup criteria of Quebec (as cited in Beyer 1990).
5. Acceptable concentration proposed by Ontario Ministry of Environment (as cited in Beyer 1990).
6. Kappleman (1993).
7. For Screening purposes, maximum allowable DDT concentration was used for DDE and DDT.
8. Decreased cocoon production by Eisenia fetida (Reinecke and Venter 1985 as cited in Beyer 1990).
9. Tenative allowable concentration for endosulfan in the former Soviet Union (as cited in Beyer 1990).
10. Value for heptachlor.
11. Soil criteria for evaluating the severity of contamination under.the Dutch Soil Cleanup (Interim) Act (as cited in Beyer 1990).
12. Will and Suter (1994).
13. Guidelines for the New Jersey Environmental Cleanup Responsibility Act (as cited in Beyer 1990).

TABLE 7-1. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR B&M RAILROAD LANDFILL

	No Action	Institutional Actions	InSitu-1	SC-1 (SELECTED ALTERNATIVE)
Overall Protection of Human Health and the Environment	☐ - No Protection, ◪ - Partially Protective, ■ - Protective			
Protection of Human Health: Does not exceed risk limits	N/A	N/A	N/A	■
Ecological Protection:	☐	☐	☐	■
Compliance with ARARs	☐ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets			
	☐	☐	☐	■
Long-Term Effectiveness And Permanence	☐ - No Protection, ◪ - Partially Protective, ■ - Protective			
Magnitude of Residual Risk - Human Health: Does not exceed risk limits	N/A	N/A	N/A	■
Magnitude of Residual Risk - Ecological:	☐	☐	☐	■
Reduction of Toxicity, Mobility and Volume through Treatment				
Treatment/Recycling Processes Utilized	None	None	None	None
Amount of Hazardous Materials Treated or Recycled:	☐ - Low, ◪ - Moderate, ■ - High			
	N/A - No treatment	N/A - No treatment	N/A - No treatment	N/A - No treatment
Degree of Expected Reductions in Toxicity, Mobility or Volume:	☐ - Low, ◪ - Moderate, ■ - High			
	N/A - No treatment	N/A - No treatment	N/A - No treatment	N/A - No treatment
Irreversibility	☐ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible			
	N/A - No treatment	N/A - No treatment	N/A - No treatment	N/A - No treatment
Type and Quantity of [Process] Residuals	☐ - High, ◪ - Moderate, ■ - Low			
	N/A - No treatment	N/A - No treatment	N/A - No treatment	N/A - No treatment
Short-Term Effectiveness	☐ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts			
Protection of Community and Workers During Remedial Actions	■	■	■	■
Environmental Impacts	■	■	■	◪
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years	>30 years	2 years
Implementability	☐ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability			
Technical Feasibility:				
Construction, operation & maintenance	■	■	■	◪
Reliability in achieving RAOs	☐	☐	◪	■
Implementation of future actions	■	■	■	◪
Administrative Feasibility	☐ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort			
	■	■	■	■
Availability of Services and Materials	☐ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available			
	■	■	■	■
Cost				
Capital ($million)	$0.00	$0.16	$0.16	$8.87
O&M ($million)	$0.00	$0.12	$0.19	$0.17
Total ($million)	$0.00	$0.28	$0.35	$9.04
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.62	$0.62	$0.62

N/A - Not Applicable

TABLE 7-3. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR RSI LANDFILL

	No Action	SC-1 (as part of groundwater source control) (SELECTED ALTERNATIVE)
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Protection of Human Health: Does not exceed risk limits	N/A	■
Ecological Protection: Does not exceed risk limits	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets	
	□	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Magnitude of Residual Risk - Human Health: Does not exceed risk limits	N/A	■
Magnitude of Residual Risk - Ecological: Does not exceed risk limits	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment		
Treatment/Recycling Processes Utilized	None	None
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible	
	N/A	N/A
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low	
	N/A	N/A
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts	
Protection of Community and Workers During Remedial Actions	■	■
Environmental Impacts	■	◪
Time Until Remedial Action Objectives are Achieved	N/A	N/A(1)
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability	
Technical Feasibility: Construction, operation & maintenance	■	◪
Reliability in achieving RAOs	N/A	N/A(1)
Implementation of future actions	■	◪
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort	
	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available	
	■	■
Cost		
Capital ($million)	$0.00	$1.84
O&M ($million)	$0.00	$0.03
Total ($million)	$0.00	$1.87
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.62

N/A - Not Applicable

(1) There are no remedial action objectives (RAOs) for contaminated soils at this AOC. However, RAOs exist for groundwater, and installation of a cap is a groundwater source control remedy. RAOs for groundwater source control are expected to be achieved in 2 years and capping for groundwater source control is considered highly reliable.

TABLE 7-5. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR B&M LOCOMOTIVE SHOP DISPOSAL AREAS

	No Action	Institutional Actions	InSitu-1	SC-1 (SELECTED ALTERNATIVE)	SC-2	OnSite-1	OnSite-2
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective						
Protection of Human Health:	□	□	□	■	■	■	■
Ecological Protection:	□	□	□	■	■	■	■
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets						
	□	□	□	■	■	■	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective						
Magnitude of Residual Risk - Human Health:	□	□	□	■	■	■	■
Magnitude of Residual Risk - Ecological:	□	□	□	■	■	■	■
Reduction of Toxicity, Mobility and Volume through Treatment							
Treatment/Recycling Processes Utilized	None	None	None	None	None	Solidification/ Stabilization	Soil Washing/ Chemical Extraction
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High						
	N/A	N/A	N/A	N/A	N/A	■	■
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High						
	N/A	N/A	N/A	N/A	N/A	■	■
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible						
	N/A	N/A	N/A	N/A	N/A	◪	■
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low						
	N/A	N/A	N/A	N/A	N/A	■	◪
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts						
Protection of Community and Workers During Remedial Actions	■	■	■	■	■	■	■
Environmental Impacts	■	■	■	◪	◪	◪	◪
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years	>30 years	2 years	2 years	3 years	3 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability						
Technical Feasibility:							
Construction, operation & maintenance	■	■	■	◪	◪	◪	◪
Reliability in achieving RAOs	□	□	◪	■	■	■	■
Implementation of future actions	■	■	■	◪	◪	◪	◪
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort						
	■	■	■	■	■	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available						
	■	■	■	■	■	◪	◪
Cost							
Capital ($million)	$0.00	$0.13	$0.13	$1.96	$8.15	$33.63	$42.06
O&M ($million)	$0.00	$0.11	$0.17	$0.12	$0.00	$0.00	$0.00
Total ($million)	$0.00	$0.24	$0.30	$2.08	$8.15	$33.63	$42.06
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.53	$0.53	$0.53	$0.53	$0.53	$0.53

N/A - Not Applicable

TABLE 7-7. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR OLD B&M OIL/SLUDGE RECYCLING AREA

	No Action	Institutional Actions	InSitu-1	SC-1 (SELECTED ALTERNATIVE)	SC-2	OnSite-1	OnSite-2
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective						
Protection of Human Health:	□	□	□	■	■	■	■
Ecological Protection: Does not exceed risk limits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets						
	□	□	□	■	■	■	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective						
Magnitude of Residual Risk - Human Health:	□	□	□	■	■	■	■
Magnitude of Residual Risk - Ecological: Does not exceed risk limits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment							
Treatment/Recycling Processes Utilized	None	None	None	None	None	Solidification/ Stabilization	Soil Washing/ Chemical Extraction
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High						
	N/A	N/A	N/A	N/A	N/A	■	■
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High						
	N/A	N/A	N/A	N/A	N/A	■	■
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible						
	N/A	N/A	N/A	N/A	N/A	◪	■
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low						
	N/A	N/A	N/A	N/A	N/A	■	◪
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts						
Protection of Community and Workers During Remedial Actions	■	■	■	■	■	■	■
Environmental Impacts	■	■	■	◪	◪	◪	◪
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years	>30 years	2 years	2 years	2 years	2 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability						
Technical Feasibility:							
Construction, operation & maintenance	■	■	■	◪	◪	◪	◪
Reliability in achieving RAOs	□	□	◪	■	■	■	■
Implementation of future actions	■	■	■	◪	◪	◪	◪
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort						
	■	■	■	■	■	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available						
	■	■	■	■	■	◪	◪
Cost							
Capital ($million)	$0.00	$0.12	$0.12	$1.16	$4.99	$15.60	$20.56
O&M ($million)	$0.00	$0.11	$0.16	$0.33	$0.00	$0.00	$0.00
Total ($million)	$0.00	$0.23	$0.28	$1.49	$4.99	$15.60	$20.56
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.62	$0.62	$0.62	$0.62	$0.62	$0.62

N/A - Not Applicable

TABLE 7-9. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR CONTAMINATED SOILS AREA

	No Action	Institutional Actions	InSitu-1	InSitu-2	InSitu-3	SC-1 (SELECTED ALTERNATIVE)	Off Site	OnSite-1	OnSite-2
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective								
Protection of Human Health:	□	□	□	■	■	■	■	■	■
Ecological Protection: Does not exceed risk limits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets								
	□	□	□	■	■	■	■	■	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective								
Magnitude of Residual Risk - Human Health:	□	□	□	■	■	■	■	■	■
Magnitude of Residual Risk - Ecological: Does not exceed risk limits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment									
Treatment/Recycling Processes Utilized	None	None	None	Solidification/Stabilization	Enhanced Biodegr./ Soil Flushing	None	Assume Off Site Solidification/Stabilization	Solidification/Stabilization	Soil Washing/ Chemical Extraction
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High								
	N/A	N/A	N/A	■	■	N/A	■	■	■
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High								
	N/A	N/A	N/A	◪	◪	N/A	■	■	■
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible								
	N/A	N/A	N/A	◪	■	N/A	■	◪	■
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low								
	N/A	N/A	N/A	■	■	N/A	■	■	◪
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts								
Protection of Community and Workers During Remedial Actions	■	■	■	■	■	■	■	■	■
Environmental Impacts	■	■	■	◪	◪	◪	◪	◪	◪
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years	>30 years	2 years	2 years	2 years	2 years	2 years	2 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability								
Technical Feasibility:									
Construction, operation & maintenance	■	■	■	◪	◪	◪	◪	◪	◪
Reliability in achieving RAOs	□	□	□	◪	■	■	■	■	■
Implementation of future actions	■	■	■	◪	◪	◪	◪	◪	◪
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort								
	■	■	■	■	■	■	■	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available								
	■	■	■	◪	■	■	◪	◪	◪
Cost									
Capital ($million)	$0.00	$0.15	$0.15	$1.06	$9.04	$0.89	$6.64	$7.01	$10.40
O&M ($million)	$0.00	$0.20	$0.24	$0.00	$0.00	$0.32	$0.00	$0.00	$0.00
Total ($million)	$0.00	$0.35	$0.39	$1.06	$9.04	$1.21	$6.64	$7.01	$10.40
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19

N/A - Not Applicable

TABLE 7-11. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR ASBESTOS LANDFILL

	No Action	Institutional Actions (SELECTED ALTERNATIVE)
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Protection of Human Health:	◪	■
Ecological Protection: Does not exceed risk limits	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets	
	□	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective	
Magnitude of Residual Risk - Human Health:	◪	■
Magnitude of Residual Risk - Ecological: Does not exceed risk limits	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment		
Treatment/Recycling Processes Utilized	None	None
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High	
	N/A	N/A
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible	
	N/A	N/A
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low	
	N/A	N/A
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts	
Protection of Community and Workers During Remedial Actions	N/A	■
Environmental Impacts	■	■
Time Until Remedial Action Objectives are Achieved	0 years	0 years (existing cap is protective)
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability	
Technical Feasibility:		
Construction, operation & maintenance	□	■
Reliability in achieving RAOs	◪	■
Implementation of future actions	□	■
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort	
	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available	
	■	■
Cost		
Capital ($million)	$0.00	$0.20
O&M ($million)	$0.00	$0.20
Total ($million)	$0.00	$0.40
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.91

N/A - Not Applicable

TABLE 7-13. ABBREVIATED COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES FOR ASBESTOS LAGOONS

	No Action	Institutional Actions	SC-1 (SELECTED ALTERNATIVE)	SC-2
Overall Protection of Human Health and the Environment	□ - No Protection, ◪ - Partially Protective, ■ - Protective			
Protection of Human Health:	□	□	■	■
Ecological Protection: Does not exceed risk limits	N/A	N/A	N/A	N/A
Compliance with ARARs	□ - Does Not Meet, ◪ - May Not Meet/Partially Meets, ■ - Meets			
	□	□	■	■
Long-Term Effectiveness And Permanence	□ - No Protection, ◪ - Partially Protective, ■ - Protective			
Magnitude of Residual Risk - Human Health:	□	◪	■	■
Magnitude of Residual Risk - Ecological: Does not exceed risk limits	N/A	N/A	N/A	N/A
Reduction of Toxicity, Mobility and Volume through Treatment				
Treatment/Recycling Processes Utilized	None	None	None	None
Amount of Hazardous Materials Treated or Recycled:	□ - Low, ◪ - Moderate, ■ - High			
	N/A	N/A	N/A	N/A
Degree of Expected Reductions in Toxicity, Mobility or Volume:	□ - Low, ◪ - Moderate, ■ - High			
	N/A	N/A	N/A	N/A
Irreversibility	□ - Reversible, ◪ - Moderately Reversible, ■ - Irreversible			
	N/A	N/A	N/A	N/A
Type and Quantity of [Process] Residuals	□ - High, ◪ - Moderate, ■ - Low			
	N/A	N/A	N/A	N/A
Short-Term Effectiveness	□ - High Impacts, ◪ - Moderate Impacts, ■ - Low Impacts			
Protection of Community and Workers During Remedial Actions	■	■	■	■
Environmental Impacts	■	■	◪	◪
Time Until Remedial Action Objectives are Achieved	>30 years	>30 years	2 years	2 years
Implementability	□ - High Effort/Low Reliability, ◪ - Moderate Effort/Moderate Reliability, ■ - Low Effort/High Reliability			
Technical Feasibility:				
Construction, operation & maintenance	■	■	◪	◪
Reliability in achieving RAOs	□	□	■	■
Implementation of future actions	■	■	◪	◪
Administrative Feasibility	□ - High Effort, ◪ - Moderate to High Effort, ■ - Low to Moderate Effort			
	■	■	■	■
Availability of Services and Materials	□ - High Effort/Not Commonly Available, ◪ - Moderate Effort & Availability, ■ - Low Effort/Commonly Available			
	■	■	■	■
Cost				
Capital ($million)	$0.00	$0.08	$2.15	$1.33
O&M ($million)	$0.00	$0.13	$0.11	$0.00
Total ($million)	$0.00	$0.21	$2.26	$1.33
Additional Groundwater Monitoring - Five years - Total ($million)	$0.00	$0.64	$0.64	$0.64

N/A - Not Applicable

TABLE L-1. COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - B&M Railroad Landfill

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Composite / Double Barrier Cap												
Demolition, Removal & Disposal		11.0	AC	200.00	2,200	0.00	0	$50.00	110,000	12,000	132,000	$242,000
Site Preparation	Clearing & grubbing - very light effort (mow)	11.0	AC	48.00	528	0.00	0	$50.00	26,400	1,150.00	12,650	$39,050
Erosion Control	Haybale/silt fence perimeter	2,625	LF	0.05	131	1.75	4,594	$50.00	6,563		0	$11,156
Dust Control	Large effort during excavation and grading	1	LS	640.00	640	0.00	0	$50.00	32,000	56,000	56,000	$88,000
Waste Excavation	Excavate 50' width of waste, 5 feet deep	16,315	CY	0.10	1,632	0.00	0	$50.00	81,575	1.41	23,004	$104,579
Sheet Piling	Use for excavation along wetland perimeter	17,620	SF	0.08	1,410	12.00	211,440	$50.00	70,480	2.00	35,240	$317,160
Groundwater Collection and Treatment	Use during excavation, 50 gpm	1	LS	500.00	500	50,000	50,000	$50.00	25,000	10,000	10,000	$85,000
Backfill	Place in excavation, ordinary borrow	20,400	CY	0.10	2,040	12.00	244,800	$50.00	102,000	1.41	28,764	$375,564
Landfill Grading	Grade waste and slopes of landfill	11	AC	20.00	220	0.00	0	$50.00	11,000	600.00	6,600	$17,600
Soil Subgrade	Granular fill <1.5 inches, 12", 1 lift likely	21,800	CY	0.10	2,180	12.00	261,600	$50.00	109,000	2.00	43,600	$414,200
Gas Vent Layer	Sand layer - 12" thickness	21,800	CY	0.12	2,616	8.00	174,400	$50.00	130,800	1.65	35,970	$341,170
Geotextile	Typical, 12 oz.	52,229	SY	0.01	522	1.35	70,509	$50.00	26,115	0.05	2,611	$99,236
Low Permeability Soil ($\leq 10^{-4}$ cm/sec) - 12"	$k<10^{-4}$ cm/sec, clay/silt/soil mix	21,800	CY	0.12	2,616	15.00	327,000	$50.00	130,800	1.65	35,970	$493,770
Low Density PE Geomembrane - 60 mil	60 mil LDPE	470,063	SF	0.012	5,641	0.42	197,426	$50.00	282,038	0.05	23,503	$502,967
Drainage Geocomposite	Typical	470,063	SF	0.009	4,231	0.40	188,025	$50.00	211,528	0.05	23,503	$423,057
Cover Soil	Soil/gravel mix, 24"	43,500	CY	0.12	5,220	12.00	522,000	$50.00	261,000	1.65	71,775	$854,775
Topsoil	Loam/soil mix, 6"	10,880	CY	0.12	1,306	15.00	163,200	$50.00	65,280	1.65	17,952	$246,432
Perimeter Toe Drain	Construct along perimeter of cap	2,625	LF	0.00	0	0.00	0	$50.00	0		0	$0
Toe Drain stone	3/4-inch washed stone	148	CY	0.15	22	18.00	2,664	$50.00	1,110	2.00	296	$4,070
Drainage Pipe, 6" PVC, perforated	6" PVC perforated pipe with Toe Drain	2,625	LF	0.16	420	2.66	6,983	$50.00	21,000		0	$27,983
Hydroseed	Lawn mix, no clover	11.4	AC	14.00	160	1,100	12,540	$50.00	7,980	330.00	3,762	$24,282
Drainage Swales	Bottom width 4', total width=12'	2,625	LF	0.10	263	0.00	0	$50.00	13,125	1.60	4,200	$17,325
Rip-Rap	Line drainage swale, 1' depth	1,200	CY	0.26	310	16.00	19,200	$50.00	15,480	8.00	9,600	$44,280
Crushed stone	Line bottom of drainage swales, 6 inches, 3/4"	200	CY	0.15	30	15.00	3,000	$50.00	1,500	2.00	400	$4,900

TABLE L-1. COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Detention Basins	Use 2 basins, 100' x 75' x 4' depth	2,222	CY	0.10	222	0.00	0	$50.00	11,110	1.41	3,133	$14,243
Geotextile	Use for toe drains and swales, 12 oz.	4,083	SY	0.01	41	1.35	5,513	$50.00	2,042	0.05	204	$7,758
Gas Vents	Use 11 vents - typical vents & risers (~18 ft)	11	EA	30.00	330	400.00	4,400	$50.00	16,500	100.00	1,100	$22,000
Settling Monuments		2	EA	4.00	8	100.00	200	$50.00	400		0	$600
Piezometer Installation, 1" Sch. 80 PVC	6 @ 40ft deep	240	LF	0.30	72	6.00	1,440	$50.00	3,600	8.00	1,920	$6,960
Piezometer Wellheads - Corrugated HDPE Covers	6 piezometers	6	EA	1.00	6	100.00	600	$50.00	300		0	$900
Security Fencing - 8' Chain Link	Perimeter, top rail and bottom tension wire	3,150	LF	0.16	504	16.00	50,400	$50.00	25,200	3.00	9,450	$85,050
Gates - Double Swing Door (20')		2	EA	22.00	44	1,200	2,400	$50.00	2,200	370.00	740	$5,340
Signage -- Warning: Hazardous Waste Area		1	LS	2.00	2	100.00	100	$50.00	100		0	$200
Access Roadway - grading & compaction	10 ft wide, 1575 ft long	1,750	SY	0.05	84	0.00	0	$50.00	4,200	1.62	2,835	$7,035
Access Roadway - gravel	10 ft wide w/6" crushed stone	1,750	SY	0.03	49	7.70	13,475	$50.00	2,450	1.42	2,485	$18,410
SUBTOTAL DIRECT COSTS					36,197		2,537,909		1,809,875		599,268	$4,947,052
CONTRACTOR OVERHEAD & PROFIT		21.00%										$1,038,881
SUBTOTAL												$5,985,933
CONTRACTOR'S CONTINGENCY		20.00%										$1,197,187
SUBTOTAL (rounded)												$7,183,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$955,700
EPA/MADEP OVERSIGHT												$733,950
TOTAL CAPITAL - SOURCE CONTROL												$8,872,650

TABLE L-1. COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.30	72	6.00	1,440	$50.00	3,600	8.00	1,920	$6,960
Monitoring Well Installation, 2" PVC, bedrock	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.90	216	10.00	2,400	$50.00	10,800	24.00	5,760	$18,960
Steel Casing & Locks	12 wells	12	EA	1.00	12	100.00	1,200	$50.00	600		0	$1,800
Protective Bollards	2 per well	24	EA	1.20	29	160.00	3,840	$50.00	1,440		0	$5,280
MOB-DEMOB		1	LS	16.00	16		0	$50.00	800	1,200.00	1,200	$2,000
SUBTOTAL DIRECT COSTS					345		8,880		17,240		8,880	$35,000
CONTRACTOR OVERHEAD & PROFIT		21.00%										$7,350
SUBTOTAL												$42,350
CONTRACTOR'S CONTINGENCY		20.00%										$8,470
SUBTOTAL (rounded)												$51,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$2,550
EPA/MADEP OVERSIGHT												$7,650
TOTAL CAPITAL - MONITORING												$61,200
TOTAL CAPITAL												$8,933,850

TABLE L-1. COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - B&M Railroad Landfill

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years)	30							
i (%)	3							
d (%)	7							
Horizontal Containment								
Composite / Double Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		11.0	AC	Size of area to be capped	400	Putnam LF Closure/Post Closure Plan (Feb. 1998)	4,400	$75,000
SUBTOTAL COSTS							8,650	$147,000
CONTINGENCY	15.00%							$22,000
TOTAL O&M - SOURCE CONTROL								$169,000
Monitoring								
n (years)	5							
i (%)	3							
d (%)	7							
Groundwater Monitoring								
Laboratory Analytical Costs	13 locations	2	RD	Semi-annual monitoring	18,100	6 methods/groupings	36,200	$157,000
Field Sampling Costs	13 locations	2	RD	Semi-annual monitoring	18,500	6 methods/groupings	37,000	$160,400
Data Validation and Reporting	13 locations	2	RD	Semi-annual monitoring	18,700	6 methods/groupings	37,400	$162,200
Capital Repair / Replacement		3%		Percentage of direct capital cost	33,000		990	$4,300
SUBTOTAL COSTS							111,590	$484,000
CONTINGENCY	15.00%							$73,000
TOTAL O&M - SOURCE CONTROL								$557,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$726,000
TOTAL NET PRESENT VALUE OF REMEDY								$9,659,850

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-2 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - RSI Landfill

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Single Barrier Cap												
Site Preparation	Clearing & grubbing - very light effort (mow)	2.2	AC	48.00	106	0.00	0	$50.00	5,280	1,150.00	2,530	$7,810
Erosion Control	Haybale/silt fence perimeter	2,200	LF	0.05	110	1.75	3,850	$50.00	5,500		0	$9,350
Dust Control	During initial grading	2	MO	80.00	160	0.00	0	$50.00	8,000	7,000.00	14,000	$22,000
Soil Subgrade	Granular fill <1.5 inches, 12 lifts likely	14,335	CY	0.10	1,434	12.00	172,020	$50.00	71,675	2.00	28,670	$272,365
Gas Vent Layer	Sand layer - 12" thickness	4,450	CY	0.12	534	8.00	35,600	$50.00	26,700	1.65	7,343	$69,643
Geotextile	Typical, 12 oz.	10,640	SY	0.01	106	1.35	14,364	$50.00	5,320	0.05	532	$20,216
Low Density PE Geomembrane - 60 mil	60 mil LDPE	95,760	SF	0.012	1,149	0.42	40,219	$50.00	57,456	0.05	4,788	$102,463
Drainage Geocomposite	Typical	95,760	SF	0.009	862	0.40	38,304	$50.00	43,092	0.05	4,788	$86,184
Cover Soil	Soil/gravel mix, 24"	8,875	CY	0.12	1,065	12.00	106,500	$50.00	53,250	1.65	14,644	$174,394
Topsoil	Loam/soil mix, 6"	2,220	CY	0.12	266	15.00	33,300	$50.00	13,320	1.65	3,663	$50,283
Toe Drain stone	3/4-inch washed stone	47	CY	0.15	7	18.00	846	$50.00	353	2.00	94	$1,293
Drainage Pipe, 6" PVC, perforated	6" PVC perforated pipe with Toe Drain	1,260	LF	0.16	202	2.66	3,352	$50.00	10,080		0	$13,432
Hydroseed	Lawn mix, no clover	2.3	AC	14.00	32	1,100	2,530	$50.00	1,610	330.00	759	$4,899
Drainage Swales	Bottom width 4', total width 12'	1,440	LF	0.10	144	0.00	0	$50.00	7,200	1.60	2,304	$9,504
Rip-Rap	Line drainage swale, 1' depth	640	CY	0.26	165	16.00	10,240	$50.00	8,256	8.00	5,120	$23,616
Crushed stone	Line bottom of drainage swales, 6 inches	110	CY	0.15	17	15.00	1,650	$50.00	825	2.00	220	$2,695
Detention Basins	Use 2 basins, 75' x 75' x 4' depth	1,670	CY	0.10	167	0.00	0	$50.00	8,350	1.41	2,355	$10,705
Geotextile	Use for toe drains and swales, 12 oz.	1,840	SY	0.01	18	1.35	2,484	$50.00	920	0.05	92	$3,496
Gas Vents	Use 4 vents - typical vents & risers (~18 ft)	4	EA	30.00	120	400.00	1,600	$50.00	6,000	100.00	400	$8,000
Settling Monuments		2	EA	4.00	8	100.00	200	$50.00	400		0	$600
Piezometer Installation, 1" Sch. 80 PVC	4 @ 40ft deep	160	LF	0.30	48	6.00	960	$50.00	2,400	8.00	1,280	$4,640
Piezometer Wellheads - Corrugated HDPE Covers	4 piezometers	4	EA	1.00	4	100.00	400	$50.00	200		0	$600
Security Fencing - 8' Chain Link	Perimeter, top rail and bottom tension wire	2,200	LF	0.16	352	16.00	35,200	$50.00	17,600	3.00	6,600	$59,400
Gates - Double Swing Door (20')		2	EA	22.00	44	1,200	2,400	$50.00	2,200	370.00	740	$5,340
Signage -- Restricted Personnel Only		1	LS	2.00	2	100.00	100	$50.00	100		0	$200
Access Roadway - grading & compaction	10 ft wide, 150 ft long	200	SY	0.05	10	0.00	0	$50.00	480	1.62	324	$804

TABLE L-2 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Access Roadway - gravel	10 ft wide w/6" crushed stone	200	SY	0.03	6	7.70	1,540	$50.00	280	1.42	284	$2,104
SUBTOTAL DIRECT COSTS					7,137		507,659		356,847		101,529	$966,034
CONTRACTOR OVERHEAD & PROFIT		21.00%										$202,867
SUBTOTAL												$1,168,901
CONTRACTOR'S CONTINGENCY		20.00%										$233,780
SUBTOTAL (rounded)												$1,403,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$249,256
EPA/MADEP OVERSIGHT												$188,061
TOTAL CAPITAL - SOURCE CONTROL												$1,840,317
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	2 clusters (clstr - 1SOB, 1DOB, 1BR)	120	LF	0.30	36	6.00	720	$50.00	1,800	8.00	960	$3,480
Monitoring Well Installation, 2" PVC, bedrock	2 clusters (clstr - 1SOB, 1DOB, 1BR)	120	LF	0.90	108	10.00	1,200	$50.00	5,400	24.00	2,880	$9,480
Mobilize/Demobilize Drilling S/C	1time	1	EA	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
Steel Casing & Locks	6 wells	6	EA	1.00	6	100.00	600	$50.00	300		0	$900
Protective Bollards	2 per well	12	EA	1.20	14	160.00	1,920	$50.00	720		0	$2,640
SUBTOTAL DIRECT COSTS					180		4,440		9,020		5,040	$18,500
CONTRACTOR OVERHEAD & PROFIT		21.00%										$3,885
SUBTOTAL												$22,385
CONTRACTOR'S CONTINGENCY		20.00%										$4,477
SUBTOTAL (rounded)												$27,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$1,350
EPA/MADEP OVERSIGHT												$4,050
TOTAL CAPITAL - MONITORING												$32,400
TOTAL CAPITAL												$1,872,717

TABLE L-2 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - RSI Landfill

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years) = 30								
i (%) 3								
d (%) 7								
Horizontal Containment								
Single Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		2.2	AC	Size of area to be capped	400	Putnam LF Closure/Post Closure Plan (Feb. 1998)	880	$15,000
SUBTOTAL COSTS							5,130	$87,000
CONTINGENCY	15.00%							$13,000
TOTAL O&M - SOURCE CONTROL								$100,000
Monitoring								
n (years) 5								
i (%) 3								
d (%) 7								
Groundwater Monitoring								
Laboratory Analytical Costs	13 locations	2	RD	Semi-annual monitoring	18,600	7 methods/groupings	37,200	$161,300
Field Sampling Costs	13 locations	2	RD	Semi-annual monitoring	18,600	7 methods/groupings	37,200	$161,300
Data Validation and Reporting	13 locations	2	RD	Semi-annual monitoring	21,700	7 methods/groupings	43,400	$188,200
Capital Repair / Replacement		3%		Percentage of direct capital cost	18,500		555	$2,400
SUBTOTAL COSTS							118,355	$513,000
CONTINGENCY	15.00%							$77,000
TOTAL O&M - SOURCE CONTROL								$590,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$690,000
TOTAL NET PRESENT VALUE OF REMEDY								$2,562,717

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-3 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - B&M Locomotive Shop Disposal Areas

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Single Barrier Cap												
Site Preparation	Clearing & grubbing - very light effort (mow)	4.7	AC	48.00	226	0.00	0	$50.00	11,280	1,150.00	5,405	$16,685
Erosion Control	Haybale/silt fence perimeter	3,000	LF	0.05	150	1.75	5,250	$50.00	7,500		0	$12,750
Dust Control	During initial grading	1	MO	80.00	80	0.00	0	$50.00	4,000	7,000.00	7,000	$11,000
Soil Subgrade/Gas Vent Layer	Sand fill (12 inches)	9,478	CY	0.05	474	10.00	94,783	$50.00	23,696	2.00	18,957	$137,436
LDPE Geomembrane	60 mil	204,732	SF	0.012	2,457	0.42	85,987	$30.00	73,704	0.05	10,237	$169,928
Drainage Geocomposite	Typical	204,732	SF	0.009	1,843	0.40	81,893	$30.00	55,278	0.05	10,237	$147,407
Cover Soil	Soil/gravel mix, 24"	18,957	CY	0.05	948	10.00	189,567	$50.00	47,392	1.65	31,279	$268,237
Topsoil	Loam/soil mix, 6"	4,739	CY	0.12	569	15.00	71,088	$50.00	28,435	1.65	7,820	$107,342
Toe Drain stone	3/4-inch washed stone	47	CY	0.15	7	18.00	846	$50.00	353	2.00	94	$1,293
Hydroseed	Lawn mix, no clover	4.7	AC	14.00	66	1,100	5,170	$50.00	3,290	330.00	1,551	$10,011
Drainage Swales	Bottom width 4', total width 12'	1,440	LF	0.10	144	0.00	0	$50.00	7,200	1.60	2,304	$9,504
Rip-Rap	Line drainage swale, 1' depth	640	CY	0.26	165	16.00	10,240	$50.00	8,256	8.00	5,120	$23,616
Crushed stone	Line bottom of drainage swales, 6 inches	110	CY	0.15	17	15.00	1,650	$50.00	825	2.00	220	$2,695
Geotextile	Use for toe drains and swales, 12 oz.	1,840	SY	0.01	18	1.35	2,484	$50.00	920	0.05	92	$3,496
Gas Vents	Use 4 vents - typical vents & risers (~18 ft)	4	EA	30.00	120	400.00	1,600	$50.00	6,000	100.00	400	$8,000
Settling Monuments		2	EA	4.00	8	100.00	200	$50.00	400		0	$600
Piezometer Installation, 1" Sch. 80 PVC	4 @ 40ft deep	160	LF	0.30	48	6.00	960	$50.00	2,400	8.00	1,280	$4,640
Piezometer Wellheads - Corrugated HDPE Covers	4 piezometers	4	EA	1.00	4	100.00	400	$50.00	200		0	$600
Security Fencing - 8' Chain Link	Perimeter, top rail and bottom tension wire	3,000	LF	0.16	480	16.00	48,000	$50.00	24,000	3.00	9,000	$81,000
Gates - Double Swing Door (20')		2	EA	22.00	44	1,200	2,400	$50.00	2,200	370.00	740	$5,340
Signage -- Restricted Personnel Only		1	LS	2.00	2	100.00	100	$50.00	100		0	$200
Access Roadway - grading & compaction	10 ft wide, 150 ft long	200	SY	0.05	10	0.00	0	$50.00	480	1.62	324	$804
Access Roadway - gravel	10 ft wide w/6" crushed stone	200	SY	0.03	6	7.70	1,540	$50.00	280	1.42	284	$2,104
Culvert Access to Large Area	18 foot wide earthern culvert with dual 24 inch CMP	1	LS									$10,000

TABLE L-3 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SUBTOTAL DIRECT COSTS					7.883		604.158		308.187		112.342	$1,034,687
CONTRACTOR OVERHEAD & PROFIT		21.00%										
SUBTOTAL												$217,284
CONTRACTOR'S CONTINGENCY		20.00%										$1,251,971
SUBTOTAL (rounded)												$250,394
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$1,502,000
EPA/MADEP OVERSIGHT												$261,356
												$197,411
TOTAL CAPITAL - SOURCE CONTROL												$1,960,767
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	3 clusters (clstr -1SOB, 1DOB, 1BR)	180	LF	0.30	54	6.00	1,080	$50.00	2,700	8.00	1,440	$5,220
Monitoring Well Installation, 2" PVC, bedrock	3 clusters (clstr -1SOB, 1DOB, 1BR)	180	LF	0.90	162	10.00	1,800	$50.00	8,100	24.00	4,320	$14,220
Mobilize/Demobilize Drilling S/C	1 time	1	EA	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
Steel Casing & Locks	9 wells	9	EA	1.00	9	100.00	900	$50.00	450		0	$1,350
Protective Bollards	2 per well	18	EA	1.20	22	160.00	2,880	$50.00	1,080		0	$3,960
SUBTOTAL DIRECT COSTS					263		6,660		13,130		6,960	$26,750
CONTRACTOR OVERHEAD & PROFIT		21.00%										
SUBTOTAL												$5,618
CONTRACTOR'S CONTINGENCY		20.00%										$32,368
SUBTOTAL (rounded)												$6,474
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$39,000
EPA/MADEP OVERSIGHT												$1,950
TOTAL CAPITAL - MONITORING												$5,850
TOTAL CAPITAL												$46,800
												$2,007,567

TABLE L-3 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - B&M Locomotive Shop Disposal Areas

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years) 30								
i (%) 3								
d (%) 7								
Horizontal Containment								
Single Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		4.7	AC	Size of area to be capped	400	Putnam LF Closure/Post Closure Plan (Feb. 1998)	1,880	$32,000
SUBTOTAL COSTS							6,130	$104,000
CONTINGENCY	15.00%							$16,000
TOTAL O&M - SOURCE CONTROL								$120,000
Monitoring								
n (years) 5								
i (%) 3								
d (%) 7								
Groundwater Monitoring								
Laboratory Analytical Costs	13 locations	2	RD	Semi-annual monitoring	12,100	5 methods/groupings	24,200	$104,900
Field Sampling Costs	13 locations	2	RD	Semi-annual monitoring	20,500	5 methods/groupings	41,000	$177,800
Data Validation and Reporting	13 locations	2	RD	Semi-annual monitoring	15,600	5 methods/groupings	31,200	$135,300
Capital Repair / Replacement		3%		Percentage of direct capital cost	26,750		803	$3,500
SUBTOTAL COSTS							97,203	$422,000
CONTINGENCY	15.00%							$63,000
TOTAL O&M - SOURCE CONTROL								$485,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$605,000
TOTAL NET PRESENT VALUE OF REMEDY								$2,612,567

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-4 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - Old B&M Oil/Sludge Recycling Area

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Single Barrier Cap												
Demolition, Removal & Disposal	Includes asphalt removal of entire area	7.0	AC	200.00	1,400	0.00	0	$50.00	70,000	12,000	84,000	$154,000
Site Preparation		7.0	AC	48.00	336	0.00	0	$50.00	16,800	1,150	8,050	$24,850
Erosion Control	Perimeter	2,100	LF	0.05	105	1.75	3,675	$50.00	5,250		0	$8,925
Dust Control		1	LS	160.00	160	0.00	0	$50.00	8,000	14,000	14,000	$22,000
Excavation and Grading	Assume excavate 5 inches and grade entire area	4,707	CY	0.10	471	0.00	0	$50.00	23,534	1.41	6,637	$30,171
Gravel Base Course, 2"	Entire area	1,883	CY	0.12	226	15.00	28,241	$50.00	11,296	1.65	3,106	$42,644
Bituminous Concrete Intermediate Course, 3"	Entire area	33,900	SY	0.018	610	3.89	131,871	$50.00	30,510	0.35	11,865	$174,246
Bituminous Concrete Surface Course, 1"	Entire area	33,900	SY	0.009	305	1.53	51,867	$50.00	15,255	0.19	6,441	$73,563
Concrete / Granite Edging, 4 1/2" x 12"	Assume half of perimeter	1,050	LF	0.187	196	5.00	5,250	$50.00	9,818	2.09	2,195	$17,262
Concrete / Granite Curb, 6" x 18"	Assume half of perimeter	1,050	LF	0.096	101	1.77	1,859	$50.00	5,040		0	$6,899
Manhole Repositioning	Assume 2 per acre	14	EA	0.34	5	0.00	0	$50.00	238	30.50	427	$665
Catchbasin / Drain Repositioning	Assume 2 per acre	14	EA	0.34	5	0.00	0	$50.00	238	30.50	427	$665
SUBTOTAL DIRECT COSTS					3,920		222,762		195,979		137,148	$555,889
CONTRACTOR OVERHEAD & PROFIT		21.00%										$116,737
SUBTOTAL												$672,625
CONTRACTOR'S CONTINGENCY		20.00%										$134,525
SUBTOTAL (rounded)												$807,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$200,000
EPA/MADEP OVERSIGHT												$150,000
TOTAL CAPITAL - SOURCE CONTROL												$1,157,000

TABLE L-4 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.30	72	6.00	1,440	$50.00	3,600	8.00	1,920	$6,960
Monitoring Well Installation, 2" PVC, bedrock	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.90	216	10.00	2,400	$50.00	10,800	24.00	5,760	$18,960
Mobilize/Demobilize Drilling S/C	1 time	1	EA	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
Steel Casing & Locks	12 wells	12	EA	1.00	12	100.00	1,200	$50.00	600		0	$1,800
Protective Bollards	2 per well	24	EA	1.20	29	160.00	3,840	$50.00	1,440		0	$5,280
SUBTOTAL DIRECT COSTS					345		8,880		17,240		8,880	$35,000
CONTRACTOR OVERHEAD & PROFIT		21.00%										$7,350
SUBTOTAL												$42,350
CONTRACTOR'S CONTINGENCY		20.00%										$8,470
SUBTOTAL (rounded)												$51,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$2,550
EPA/MADEP OVERSIGHT												$7,650
TOTAL CAPITAL - MONITORING												$61,200
TOTAL CAPITAL												$1,218,200

TABLE L-4 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - Old B&M Oil/Sludge Recycling Area

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years) = 30								
i (%) = 3								
d (%) = 7								
Horizontal Containment								
Single Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,400
General Maintenance		1,695	SY	Replace 50% of both asphalt layers every 10 years	7.31	Price for both asphalt layers	12,390	$211,000
SUBTOTAL COSTS							16,640	$283,400
CONTINGENCY	15.00%							$43,000
TOTAL O&M - SOURCE CONTROL								$326,000
Monitoring								
n (years) = 5								
i (%) = 3								
d (%) = 7								
Groundwater Monitoring								
Laboratory Analytical Costs	13 locations	2	RD	Semi-annual monitoring	18,100	6 methods/groupings	36,200	$157,000
Field Sampling Costs	13 locations	2	RD	Semi-annual monitoring	18,500	6 methods/groupings	37,000	$160,400
Data Validation and Reporting	13 locations	2	RD	Semi-annual monitoring	18,700	6 methods/groupings	37,400	$162,200
Capital Repair / Replacement		3%		Percentage of direct capital cost	35,000		1,050	$4,600
SUBTOTAL COSTS							111,650	$484,000
CONTINGENCY	15.00%							$73,000
TOTAL O&M - SOURCE CONTROL								$557,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$883,000
TOTAL NET PRESENT VALUE OF REMEDY								$2,101,200

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre	i - interest rate	RD - round
CY - cubic yard	LF - linear foot	SF - square foot
d - discount rate	LS - lump sum	SY - square yard
EA - each	MH - manhours	UN - units
HR - hour		

TABLE L-5 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - Contaminated Soils Area

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Single Barrier Cap												
Demolition, Removal & Disposal	Includes asphalt removal for half the area	6.7	AC	200.00	1,343	0.00	0	$50.00	67,149	12.000	80,579	$147,727
Site Preparation		6.7	AC	48.00	322	0.00	0	$50.00	16,080	1.150	7,705	$23,785
Erosion Control	Assume perimeter of PRG exceedance area plus	3,000	LF	0.05	150	1.75	5,250	$50.00	7,500		0	$12,750
Dust Control		1	LS	160.00	160	0.00	0	$50.00	8,000	14,000	14,000	$22,000
Excavation and Grading		2,400	CY	0.10	240	0.00	0	$50.00	12,000	1.41	3,384	$15,384
Gravel Base Course, 2"	Only on areas not currently paved - Assume half the area	903	CY	0.12	108	15.00	13,542	$50.00	5,417	1.65	1,490	$20,448
Bituminous Concrete Intermediate Course, 3"	Entire area	32,500	SY	0.018	585	3.89	126,425	$50.00	29,250	0.35	11,375	$167,050
Bituminous Concrete Surface Course, 1"	Entire area	32,500	SY	0.009	293	1.53	49,725	$50.00	14,625	0.19	6,175	$70,525
Concrete / Granite Edging, 4 1/2" x 12"	Assume half of perimeter	1,400	LF	0.187	262	5.00	7,000	$50.00	13,090	2.09	2,926	$23,016
Concrete / Granite Curb, 6" x 18"	Assume half of perimeter	1,400	LF	0.096	134	1.77	2,478	$50.00	6,720		0	$9,198
Manhole Repositioning	Assume 2 per acre	14	EA	0.34	5	0.00	0	$50.00	238	30.50	427	$665
Catchbasin / Drain Repositioning	Assume 2 per acre	14	EA	0.34	5	0.00	0	$50.00	238	30.50	427	$665
SUBTOTAL DIRECT COSTS					3,606		204,420		180,306		128,487	$513,213
CONTRACTOR OVERHEAD & PROFIT		21.00%										$107,775
SUBTOTAL												$620,988
CONTRACTOR'S CONTINGENCY		20.00%										$124,198
SUBTOTAL (rounded)												$745,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$37,250
EPA/MADEP OVERSIGHT												$111,750
TOTAL CAPITAL - SOURCE CONTROL												$894,000

TABLE L-5 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.30	72	6.00	1,440	$50.00	3,600	8.00	1,920	$6,960
Monitoring Well Installation, 2" PVC, bedrock	4 clusters (clstr=1SOB, 1DOB, 1BR)	240	LF	0.90	216	10.00	2,400	$50.00	10,800	24.00	5,760	$18,960
Steel Casing & Locks	12 wells	12	EA	1.00	12	100.00	1,200	$50.00	600		0	$1,800
Protective Bollards	2 per well	24	EA	1.20	29	160.00	3,840	$50.00	1,440		0	$5,280
MOB-DEMOB		1	LS	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
SUBTOTAL DIRECT COSTS					345		8,880		17,240		8,880	$35,000
CONTRACTOR OVERHEAD & PROFIT		21.00%										$7,350
SUBTOTAL												$42,350
CONTRACTOR'S CONTINGENCY		20.00%										$8,470
SUBTOTAL (rounded)												$51,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$2,550
EPA/MADEP OVERSIGHT												$7,650
TOTAL CAPITAL - MONITORING												$61,200
TOTAL CAPITAL												$955,200

TABLE L-5 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - Contaminated Soils Area

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years) = 30								
i (%) 3								
d (%) 7								
Horizontal Containment								
Single Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		1,625	SY	Replace 50% of both asphalt layers every 10 years	7.31	Price for both asphalt layers	11,879	$202,000
SUBTOTAL COSTS							16,129	$274,000
CONTINGENCY	15.00%							$41,000
TOTAL O&M - SOURCE CONTROL								$315,000
Monitoring								
n (years) 5								
i (%) 3								
d (%) 7								
Groundwater Monitoring								
Laboratory Analytical Costs	25 locations	2	RD	Semi-annual monitoring	35,200	6 methods/groupings	70,400	$305,300
Field Sampling Costs	25 locations	2	RD	Semi-annual monitoring	40,900	6 methods/groupings	81,800	$354,700
Data Validation and Reporting	25 locations	2	RD	Semi-annual monitoring	36,700	6 methods/groupings	73,400	$318,300
Capital Repair / Replacement		3%		Percentage of direct capital cost	33,000		990	$4,300
SUBTOTAL COSTS							226,590	$983,000
CONTINGENCY	15.00%							$147,000
TOTAL O&M - SOURCE CONTROL								$1,130,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$1,445,000

TOTAL NET PRESENT VALUE OF REMEDY	$2,400,200

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-6 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - Asbestos Landfill

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
INSTITUTIONAL ACTIONS												
Access Restrictions												
Deed Restrictions												
Legal Fees and Investigation	MBTA, B&M Corp.	2	Lot	12.00	24	0.00	0	$150	3,600		0	$3,600
Fencing & Security Measures												
Security Fencing - 8' Chain Link	Perimeter on figure is 3952 ft	4,000	LF	0.16	640	16	64,000	$50.00	32,000	3.00	12,000	$108,000
Gates - Double Swing Door (20')		2	EA	22.00	44	1,200	2,400	$50.00	2,200	370.00	740	$5,340
Signage -- Warning: Hazardous Waste Area		1	LS	2.00	2	100.00	100	$50.00	100		0	$200
SUBTOTAL DIRECT COSTS					710		66,500		37,900		12,740	$117,140
CONTRACTOR OVERHEAD & PROFIT		21.00%										$24,599
SUBTOTAL												$141,739
CONTRACTOR'S CONTINGENCY		20.00%										$28,348
SUBTOTAL (rounded)												$170,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$8,500
EPA/MADEP OVERSIGHT												$25,500
TOTAL CAPITAL - SOURCE CONTROL												$204,000

TABLE L-6 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	5 clusters (clstr=1SOB, 1DOB, 1BR)	300	LF	0.30	90	6.00	1,800	$50.00	4,500	8.00	2,400	$8,700
Monitoring Well Installation, 2" PVC, bedrock	5 clusters (clstr=1SOB, 1DOB, 1BR)	300	LF	0.90	270	10.00	3,000	$50.00	13,500	24.00	7,200	$23,700
Mobilize/Demobilize drilling s/c	1 time	1	EA	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
Steel Casing & Locks	15 wells	15	EA	1.00	15	100.00	1,500	$50.00	750		0	$2,250
Protective Bollards	2 per well	30	EA	1.20	36	160.00	4,800	$50.00	1,800		0	$6,600
SUBTOTAL DIRECT COSTS					427		11,100		21,350		10,800	$43,250
CONTRACTOR OVERHEAD & PROFIT		21.00%										$9,083
SUBTOTAL												$52,333
CONTRACTOR'S CONTINGENCY		20.00%										$10,467
SUBTOTAL (rounded)												$63,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$3,150
EPA/MADEP OVERSIGHT												$9,450
TOTAL CAPITAL - MONITORING												$75,600
TOTAL CAPITAL												$279,600

Operation and Maintenance Costs for Remedy - Asbestos Landfill

DESCRIPTION	ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
INSTITUTIONAL ACTIONS							
n (years) 30							
i (%) 3							
d (%) 7							
Access Restrictions							
Deed Restrictions (no O&M costs)							
Fencing & Security Measures							
Capital Repair / Replacement	1%		Percentage of direct capital cost	113,540		1,135	$19,000

TABLE L-6 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
Horizontal Containment								
Existing Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		12.0	AC	Size of capped area	400	Putnam LF Closure/Post Closure Plan (Feb. 1998)	4,800	$82,000
SUBTOTAL COSTS							10,185	$173,000
CONTINGENCY	15.00%							$26,000
TOTAL O&M - SOURCE CONTROL								$199,000
Monitoring								
	n (years) = 5							
	i (%) 3							
	d (%) 7							
Groundwater Monitoring								
Laboratory Analytical Costs	16 locations	2	RD	Semi-annual monitoring	26,100	6 methods/groupings	52,200	$226,400
Field Sampling Costs	16 locations	2	RD	Semi-annual monitoring	25,100	6 methods/groupings	50,200	$217,700
Data Validation and Reporting	16 locations	2	RD	Semi-annual monitoring	31,300	6 methods/groupings	62,600	$271,500
Capital Repair / Replacement		3%		Percentage of direct capital cost	43,250		1,298	$5,600
SUBTOTAL COSTS							166,298	$721,000
CONTINGENCY	15.00%							$108,000
TOTAL O&M - SOURCE CONTROL								$829,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$1,028,000
TOTAL NET PRESENT VALUE OF REMEDY								$1,307,600

Notes

Cost estimates may be refined when remedy is designed and are within -50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-7 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Capital Costs for Remedy - Asbestos Lagoons

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SOURCE CONTROL												
Horizontal Containment												
Single Barrier Cap												
Site Preparation	Clearing and grubbing - very light effort	2.8	AC	48.00	132	0.00	0	$50.00	6,600	1,150.00	3,163	$9,763
Erosion Control	Haybale/silt fence perimeter	2,025	LF	0.05	101	1.75	3,544	$50.00	5,063		0	$8,606
Dust Control	During initial grading - maybe level C	1	LS	160.00	160	0.00	0	$50.00	8,000	14,000	14,000	$22,000
Excavation and Grading	Grade berms for sloping - maybe level C	2,700	CY	0.10	270	0.00	0	$50.00	13,500	1.41	3,807	$17,307
Soil Subgrade	Granular fill <1.5 inches, 5 lifts likely for slope	21,385	CY	0.10	2,139	12.00	256,620	$50.00	106,925	2.00	42,770	$406,315
Geotextile	Typical, 12 oz.	13,333	SY	0.01	133	1.35	18,000	$50.00	6,667	0.05	667	$25,333
Low Density PE Geomembrane - 60 mil	60 mil LDPE	120,000	SF	0.012	1,440	0.42	50,400	$50.00	72,000	0.05	6,000	$128,400
Drainage Geocomposite	Typical	120,000	SF	0.009	1,080	0.40	48,000	$50.00	54,000	0.05	6,000	$108,000
Cover Soil	Soil/gravel mix, 24"	11,150	CY	0.12	1,338	12.00	133,800	$50.00	66,900	1.65	18,398	$219,098
Topsoil	Loam/soil mix, 6"	2,800	CY	0.12	336	15.00	42,000	$50.00	16,800	1.65	4,620	$63,420
Toe Drain stone	3/4-inch washed stone	52	CY	0.15	8	18.00	936	$50.00	390	2.00	104	$1,430
Drainage Pipe, 6" PVC, perforated	6" PVC perforated pipe with Toe Drain	1,400	LF	0.16	224	2.66	3,724	$50.00	11,200		0	$14,924
Geotextile	Use for toe drains and swales, 12 oz.	1,920	SY	0.01	19	1.35	2,592	$50.00	960	0.05	96	$3,648
Hydroseed	Lawn mix, no clover	2.9	AC	14.00	41	1,100	3,190	$50.00	2,030	330.00	957	$6,177
Drainage Swales	Riprap swales, 12' wide, 1' thick riprap	1,400	LF	0.10	140	0.00	0	$50.00	7,000	1.60	2,240	$9,240
Rip-Rap	For drainage swales	625	CY	0.26	163	16.00	10,000	$50.00	8,125	8.00	5,000	$23,125
Crushed stone	6" layer, 4' width along swales	105	CY	0.15	16	15.00	1,575	$50.00	788	2.00	210	$2,573
Detention Basins	Use 2 basins, 75' x 75' x 4' depth	1,670	CY	0.10	167	0.00	0	$50.00	8,350	1.41	2,355	$10,705
Piezometer Installation, 1" Sch. 80 PVC	4 @ 40ft deep	160	LF	0.30	48	6.00	960	$50.00	2,400	8.00	1,280	$4,640
Piezometer Wellheads - Corrugated HDPE Covers	4 piezometers	4	EA	1.00	4	100.00	400	$50.00	200		0	$600
Security Fencing - 8' Chain Link	Perimeter, top rail and bottom tension wire	1,800	LF	0.16	288	16.00	28,800	$50.00	14,400	3.00	5,400	$48,600
Gates - Double Swing Door (20')		2	EA	22.00	44	1,200	2,400	$50.00	2,200	370.00	740	$5,340
Signage -- Warning: Hazardous Waste Area		1	LS	2.00	2	100.00	100	$50.00	100		0	$200

TABLE L-7 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

DESCRIPTION	BASIS	QUAN-TITY	UN	MANHOURS		MATERIAL		LABOR		EQUIPMENT		TOTAL DIRECT COST
				MH/ UNIT	TOTAL MH	UNIT COST	TOTAL MATL	WAGE RATE	TOTAL LABOR	UNIT RATE	TOTAL EQUIP	
SUBTOTAL DIRECT COSTS					8,292		607,041		414,597		117,805	$1,139,443
CONTRACTOR OVERHEAD & PROFIT		21.00%										$239,283
SUBTOTAL												$1,378,726
CONTRACTOR'S CONTINGENCY		20.00%										$275,745
SUBTOTAL (rounded)												$1,654,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$279,933
EPA/MADEP OVERSIGHT												$211,767
TOTAL CAPITAL - SOURCE CONTROL												$2,145,700
Monitoring												
Groundwater Monitoring												
Monitoring Well Installation, 2" PVC, overburden	4 clusters (clstr 1SOB, 1DOB, 1BR)	240	LF	0.30	72	6.00	1,440	$50.00	3,600	8.00	1,920	$6,960
Monitoring Well Installation, 2" PVC, bedrock	4 clusters (clstr 1SOB, 1DOB, 1BR)	240	LF	0.90	216	10.00	2,400	$50.00	10,800	24.00	5,760	$18,960
Mobilize/Demobilize Drilling S/C	1 time	1	EA	16.00	16	0.00	0	$50.00	800	1,200.00	1,200	$2,000
Steel Casing & Locks	12 wells	12	EA	1.00	12	100.00	1,200	$50.00	600		0	$1,800
Protective Bollards	2 per well	24	EA	1.20	29	160.00	3,840	$50.00	1,440		0	$5,280
SUBTOTAL DIRECT COSTS					345		8,880		17,240		8,880	$35,000
CONTRACTOR OVERHEAD & PROFIT		21.00%										$7,350
SUBTOTAL												$42,350
CONTRACTOR'S CONTINGENCY		20.00%										$8,470
SUBTOTAL (rounded)												$51,000
BIDDING/DESIGN/CONSTRUCTION SUPERVISION												$2,550
EPA/MADEP OVERSIGHT												$7,650
TOTAL CAPITAL - MONITORING												$61,200
TOTAL CAPITAL												$2,206,900

TABLE L-7 COST ESTIMATE SUMMARY FOR THE SELECTED REMEDY

Operation and Maintenance Costs for Remedy - Asbestos Lagoons

DESCRIPTION		ANNUAL QUAN-TITY	UN	QUANTITY BASIS	UNIT COST	COST BASIS	ANNUAL COST ($/YEAR)	NPV
SOURCE CONTROL								
n (years)	30							
i (%)	3							
d (%)	7							
Horizontal Containment								
Single Barrier Cap								
Labor								
	Specialist (eng., specialty reps)	50	HR	5 specialist-days per year @ 10 hrs/day	85.00		4,250	$72,000
General Maintenance		2.8	AC	Size of area to be capped	400	Putnam LF Closure/Post Closure Plan (Feb. 1998)	1,100	$19,000
SUBTOTAL COSTS							5,350	$91,000
CONTINGENCY	15.00%							$14,000
TOTAL O&M - SOURCE CONTROL								$105,000
Monitoring								
n (years)	5							
i (%)	3							
d (%)	7							
Groundwater Monitoring								
Laboratory Analytical Costs	13 locations	2	RD	Semi-annual monitoring	18,100	6 methods/groupings	36,200	$157,000
Field Sampling Costs	13 locations	2	RD	Semi-annual monitoring	21,000	6 methods/groupings	42,000	$182,100
Data Validation and Reporting	13 locations	2	RD	Semi-annual monitoring	18,700	6 methods/groupings	37,400	$162,200
Capital Repair / Replacement		3%		Percentage of direct capital cost	35,000		1,050	$4,600
SUBTOTAL COSTS							116,650	$506,000
CONTINGENCY	15.00%							$76,000
TOTAL O&M - SOURCE CONTROL								$582,000
TOTAL OPERATIONS & MAINTENANCE NET PRESENT VALUE								$687,000

TOTAL NET PRESENT VALUE OF REMEDY	$2,893,900

Notes

Cost estimates may be refined when remedy is designed and are within +50 to -30% accuracy expectation.

AC - acre
CY - cubic yard
d - discount rate
EA - each
HR - hour
i - interest rate
LF - linear foot
LS - lump sum
MH - manhours
RD - round
SF - square foot
SY - square yard
UN - units

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
	Location Specific	NO			
	Action Specific	NO			

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Limited Action: Institutional Controls					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near wetland and floodplain areas. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.
	Federal Regulatory Requirements	Executive Order 11988; "Floodplain Management" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a 100-year floodplain. Action to avoid, whenever possible, the long- and short-term impacts associated with the occupancy and modifications of floodplains development, wherever there is a practical alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If new monitoring wells are needed, and no practical alternative to locating them in floodplain, then measures will be taken to minimize impacts.
	Federal Regulatory Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	This alternative includes work near the historic Middlesex Canal. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Advisory Council on Historic Preservation.
	Federal Regulatory Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 CFR Part 65)	Applicable	This alternative includes work near the historic Middlesex Canal. The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Department of the Interior.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.
	Massachusetts Regulatory Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	This alternative includes work near the historic Middlesex Canal. Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.
	Action Specific	YES			

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 CFR Parts 260-262 and 264)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. However this Alternative will not be meet the closure/post closure standards because institutional controls alone will not address requirements to prevent ecological risks nor prevent migration of contaminants to surface and groundwater.
	Federal Regulatory Requirements	EPA Alternative Cap Guidance	To be Considered	Provides standards for alternative cap design to address risks from wastes left in place from human exposure, ecological risk, and migration to surface and groundwater.	These standards will not be met because institutional controls alone will not address requirements to prevent ecological risks nor prevent migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); - Waste Analysis (310 CMR 30.513), Closure (310 CMR 30.580), Post-Closure (310 CMR 30.590), Landfill Closure (310 CMR 30.633)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	Because of the past disposal of wastes at AOC #1 that would be considered hazardous wastes by today's standards, all remedial actions must be in conformance with these rules. Waste analysis, closure and post-closure performance standards are spelled out. A final cover will be designed and constructed to provide long-term minimization of migration of liquids. After final closure, maintenance and monitoring will be conducted throughout the post-closure care period.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. However this Alternative will not be meet the closure/post closure standards because institutional controls alone will not address requirements to prevent ecological risks nor prevent migration of contaminants to surface and groundwater.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes remediation activities in wetlands and buffer zones. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Any discharges from well installation or monitoring will be managed in compliance with these standards.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Monitored Natural Attenuation (in-situ)					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be completed in a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near wetland and floodplain areas. 'Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.
	Federal Regulatory Requirements	Executive Order 11988; "Floodplain Management" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a 100-year floodplain. Action to avoid, whenever possible, the long and short-term impacts associated with the occupancy and modifications of floodplains development, wherever there is a practical alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	A determination has been made that there is no practical alternative to these construction activities in the floodplain. Remedial actions that involve construction in the floodplain will include all practicable means to minimize harm to and preserve beneficial values of floodplains.
	Federal Regulatory Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	This alternative includes work near the historic Middlesex Canal. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Advisory Council on Historic Preservation.
	Federal Regulatory Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 CFR Part 65)	Applicable	This alternative includes work near the historic Middlesex Canal. The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Department of the Interior.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zones, then measures will be taken to minimize impacts.
	Massachusetts Regulatory Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	This alternative includes work near the historic Middlesex Canal. Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the national Historic Preservation Act.	Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 CFR Parts 260-262 and 264)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. However this Alternative will not be meet the standards for landfill closure.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	EPA Alternative Cap Guidance	To be Considered	Provides standards for alternative cap design to address risks from wastes left in place from human exposure, ecological risk, and migration to surface and groundwater.	This Alternative will not be meet the standards for landfill closure.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); - Waste Analysis (310 CMR 30.513), Closure (310 CMR 30.580), Post-Closure (310 CMR 30.590), Landfill Closure (310 CMR 30.633)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	Because of the past disposal of wastes at AOC #1 that would be considered hazardous wastes by today's standards, all remedial actions must be in conformance with these rules. Waste analysis, closure and post-closure performance standards are spelled out. A final cover will be designed and constructed to provide long-term minimization of migration of liquids. After final closure, maintenance and monitoring will be conducted throughout the post-closure care period.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. However this Alternative will not be meet the standards because natural attenuation alone will not meet the standards for landfill closure.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes work to be performed in or near a wetland. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or buffer zones, then measure will be taken to minimize impacts.
Cap Waste	**Chemical Specific**	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Given the location of contamination in wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. This alternative includes work to be completed in a defined wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Given the location of contamination in wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Resource Conservation and Recovery Act (42 U.S.C. §6901 *et seq.*); Location Standards (40 CFR §264.18)	Relevant and Appropriate	This altenative includes work to be performed in or near a 100-year floodplain. This regulation places limitations on where RCRA TSDFs may be located. It also outlines the criteria for constructing a RCRA facility on a 100-year floodplain.	A determination has been made that there is no practical alternative to these construction activities in the flood plain. Remedial actions that involve construction in the floodplain areas will include all practicable means to minimize harm to and preserve beneficial values of floodplains.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near defined wetland and floodplain areas. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Services and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Services should Remedial Activities involve the modification of a body of water.
	Federal Regulatory Requirements	Executive Order 11988; "Floodplain Management" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a 100-year floodplain. Action to avoid, whenever possible, the long and short-term impacts associated with the occupancy and modifications of floodplains development, wherever there is a practical alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	A determination has been made that there is no practical alternative to these construction activities in the floodplain. Remedial actions that involve construction in the floodplain areas will include all practicable means to minimize harm to and preserve beneficial values of floodplains.
	Federal Regulatory Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	This alternative includes work near the historic Middlesex Canal. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Advisory Council on Historic Preservation.
	Federal Regulatory Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 CFR Part 65)	Applicable	This alternative includes work near the historic Middlesex Canal. The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Department of the Interior.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Substantive standards for protecting State wetland resources will be complied with. Mitigation of impacts on wetlands and regulated buffer zones will be addressed.
	Massachusetts Regulatory Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	This alternative includes work near the historic Middlesex Canal. Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the national Historic Preservation Act.	Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 CFR Parts 260-262 and 264)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. This Alternative will meet the closure/post closure standards through capping, monitoring and institutional controls.

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	EPA Alternative Cap Guidance	To be Considered	Provides standards for alternative cap design to address risks from wastes left in place from human exposure, ecological risk, and migration to surface and groundwater.	These standards will be met because because the alternative cap design will prevent risks to human health and the environment and prevent migration of contaminants to surface and groundwater.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); - Waste Analysis (310 CMR 30.513), Closure (310 CMR 30.580), Post-Closure (310 CMR 30.590), Landfill Closure (310 CMR 30.633)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	Because of the past disposal of wastes at AOC #1 that would be considered hazardous wastes by today's standards, all remedial actions must be in conformance with these rules. Waste analysis, closure and post-closure performance standards are spelled out. A final cover will be designed and constructed to provide long-term minimization of migration of liquids. After final closure, maintenance and monitoring will be conducted throughout the post-closure care period.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. This Alternative will meet all closure/post closure standards.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Contingency Plan, Emergency Procedures, Preparedness, and Prevention (310 CMR 30.520)	Relevant and Appropriate	This area is being closed in accordance with hazardous waste requriements. Includes requriements for contingency plan, emergency procedures, preaparedness and prevention.	This requirement will be met for this alternative

TABLE L-8. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M RAILROAD LANDFILL

Alternative	Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes remediation activities in wetlands and buffer zones. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Activities will be conducted in accordance with these requriements to protect State wetland resources.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

TABLE L-9. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE RSI LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
	Location Specific	NO			
	Action Specific	NO			

TABLE L-9. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE RSI LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Cap Waste					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq* .); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Given the location of contamination in wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Given the location of contamination in wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.

TABLE L-9. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE RSI LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Substantive standards for protecting State wetland resources will be complied with. Mitigation of impacts on wetlands and regulated buffer zones will be addressed.
	Federal Regulatory Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 CFR part 800)	Applicable	This work includes work to be performed near the historic Middlesex Canal. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Advisory Council on Historic Preservation.
	Federal Regulatory Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 CFR Part 65)	Applicable	This alternative includes work to be performed near the historic Middlesex Canal. The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Should this alternative impact historical properties (such as the Middlesex Canal), activities will be coordinated with the Department of the Interior.

TABLE L-9. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE RSI LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (Mass. Regs. Code tit. 950, §70.00); Antiquities Act and Regulations (Mass.Gen.Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	This alternative includes work to be performed near the historic Middlesex Canal. Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the national Historic Preservation Act.	Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.
	Action Specific	YES			
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	This Alternative will be meet the landfill design standards to prevent human contact and migration of contaminants to surface and groundwater.

TABLE L-9. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE RSI LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes work to be performed in or near a wetland. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Activities will be conducted in accordance with these requriements to protect State wetland resources.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard not met since alternative does not address lead soil risks.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
	Location Specific	No			
	Action Specific	No			

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Limited Action: Institutional Controls					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by preventing human access to lead contaminated soil.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zone, then measures will be taken to minimize impacts.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not be meet the closure/post closure standards because institutional controls alone will not address requirements to protect ecological receptors and prevent migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	Waste analysis performance standards are spelled out.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address landfill design standards.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	Establishes criteria and standards for discharging into wetlands and surface waters	If new monitoring wells are needed, any discharges from well installation or maintenance will meet these standards

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Monitored Natural Attenuation (in-situ)					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by preventing human access to lead contaminated soil through institutional controls as part of the remedy.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If new monitoring wells are needed, and no practical alternative to locating in wetlands, then measures will be taken to minimize impacts.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed in or near a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zones, then measures will be taken to minimize impacts.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not be meet the closure/post closure standards because it will not address requirements to protect ecological receptors and prevent migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	Waste analysis performance standards are spelled out.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address standards for landfill design.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	Establishes criteria and standards for discharging into wetlands and surface waters	If new monitoring wells are needed, any discharges from well installation or maintenance will meet these standards

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Excavate and Place Under Another On-Site AOC Cap					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by removing lead contaminated soil and placing it under a cap.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by removing potential carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by removing potential non-carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq*.); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Adverse impacts will be minimized to the maximum extent practical.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Adverse impacts will be minimized to the maximum extent practical.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near a wetland. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed in or near a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to wetlands and regulated buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of excavation activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact, ecological risk, and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes work to be performed in or near a wetland. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Activities will be conducted in accordance with these requriements to protect State wetland resources.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Excavate & Treat On-Site: solidification & stabilization					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq* .); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Adverse impacts will be minimized to the maximum extent practical.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be perfomed in or near a wetland. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	Adverse impacts will be minimized to the maximum extent practical.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Adverse impacts will be minimized to the maximum extent practical.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to wetlands and regulated buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact, ecological risk, and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management - Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	This alternative includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes remediation activities in wetlands and buffer zones. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Adverse impacts will be minimized to the maximum extent practical to protect State wetland resources.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Excavate & Treat On-Site: soil washing & chemical extraction					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq* .); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Adverse impacts will be minimized to the maximum extent practical.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near a wetland. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Adverse impacts will be minimized to the maximum extent practical.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to wetlands and regulated buffer zones will be minimized to the maximum extent practical.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact, ecological risk, and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management - Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	This alternative includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes remediation activities in wetlands and buffer zones. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Adverse impacts will be minimized to the maximum extent practical to protect State wetland resources.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be met during any excavation of materials.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Cap Waste					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by capping soil and maintaining institutional controls to eliminate lead risk.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq* .); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Given the location of contamination on the edge of wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be completed in a defined wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Given the location of contamination on the edge of wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources will be minimized to the maximum extent practical and mitigation conducted if required.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near a wetland. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Substantive standards for protecting State wetland resources will be complied with. Mitigation of impacts on wetlands and regulated buffer zones will be addressed.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Federal Regulatory Requirements	CWA Ambient Water Quality Criteria (AWQC) (40 CFR 120)	Relevant and Appropriate	This provision sets standards for protecting surface water quality.	Activities will be conducted to ensure that the impact of site-related contaminants to surface water will be minimzed.

TABLE L-10. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE B&M LOCOMOTIVE SHOP DISPOSAL AREAS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact, ecological risk, and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	This Alternative will be meet the landfill design standards to prevent human contact, ecological risk, and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Massachusetts Clean Waters Act (Mass. Gen. Laws ch. 21, §§26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the United States within the Commonwealth (314 CMR §9.00)	Applicable	This alternative includes work to be performed in or near a wetland. Establishes criteria and standards for dredging, handling and disposal of fill material and dredged material.	Activities will be conducted in accordance with these requriements to protect State wetland resources.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard not met since alternative does not address lead soil risks.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
	Location Specific	NO			
	Action Specific	NO			

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Limited Action: Institutional Controls					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met through preventing human access to lead contaminated soil.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zone, then measures will be taken to minimize impacts.
	Action Specific	YES			

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	Waste analysis performance standards are spelled out.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not meet the closure/post closure standards because institutional controls alone will not address requirements to prevent migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address landfill design standards.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Monitored Natural Attenuation (in-situ)					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by preventing human access to lead contaminated soil through institutional controls as part of the remedy.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
	Location Specific	YES			

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zone, then measures will be taken to minimize impacts.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not be meet the closure/post closure standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management Regulations (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	Waste analysis performance standards are spelled out.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address standards for landfill design.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Excavate and Place Under Another On-Site AOC Cap					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by removing lead contaminated soil and placing it under a cap at another AOC.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by removing potential carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by removing potential non-carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed in or near a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of excavation activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials.
Excavate & Treat On-Site: solidification & stabilization					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management - Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	This alternative includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials.
Excavate & Treat On-Site: soil washing & chemical extraction					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Hazardous Waste Management - Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	This alternative includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Applicable	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials.
Cap Waste					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by capping soil and maintaining institutional controls to eliminate lead risk.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.

TABLE L-11. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE OLD B&M OIL/SLUDGE RECYCLING AREA

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
	Action Specific	YES			
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard not met since alternative does not address lead soil risks.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
Location Specific	NO			
Action Specific	NO			
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met through preventing human access to lead contaminated soil.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
Location Specific	YES			
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not meet the closure/post closure standards because institutional controls alone will not address requirements to prevent migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address landfill design standards.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by preventing human access to lead contaminated soil through institutional controls as part of the remedy.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative might meet this standard if potential carcinogenic hazards caused by migration of contaminants into groundwater are naturally attenuated over time. Potential carcinogenic hazards caused by exposure to contaminants would be addressed through institutional controls.
Location Specific	YES			

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zone, then measures will be taken to minimize impacts.
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not be meet the closure/post closure standards.
Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address standards for landfill design.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
Location Specific	YES			
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
Action Specific	YES			

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510); Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste. This alternative also includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
Location Specific	YES			
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
Action Specific	YES			

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510); Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste. This alternative also includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Chemical Specific	YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by capping soil and maintaining institutional controls to eliminate lead risk.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
Location Specific	YES			
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	This Alternative will be meet the landfill design standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.
Chemical Specific	~~NO~~ YES			
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
Location Specific	YES			
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510); Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste. This alternative also includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.
Chemical Specific	~~NO~~ YES			

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by treating soil to eliminate lead risk.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	Standard will be met by treating soil to eliminate risks from carcinogenic contaminants.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	Standard will be met by treating soil to eliminate risks from non-carcinogenic contaminants.
Location Specific	YES			
Massachusetts Regulatory Requirements	Massachusetts Endangered Species Act (Mass. Gen. Laws ch. 131, §40); Massachusetts Endangered Species Act Regulations, Part III: Alteration of Significant Habitat (321 CMR §§10.30-10.43)	Applicable	The MESA establishes state's list of threatened and endangered species and species of special concern. Habitat of such species is protected by the regulations promulgated under the MA Wetlands Protection Act.	Should this alternative alter this habitat, it will comply with the substantive requirements of these regulations.
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Federal Regulatory Requirements	RCRA Subtitle D (40 U.S.C. § 6901)	Applicable	These standards govern the disposal of non-hazardous waste.	This Alternative meets the closure/post closure standards by treating the waste so that it no longer poses a risk

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510); Storage and Treatment in Tanks (310 CMR 30.690)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste. This alternative also includes treatment of wastes in tanks. Specifies requirements for tank systems used to store or treat hazardous wastes in tanks. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards. Design and installation requirements will be followed for any on-site treatment of hazardous wastes in tanks. Since the classification of wastes has not been established as characteristic hazardous waste, the need for compliance with these regulations will be determined after sampling and analysis of each media to be treated or handled. Specifications will include secondary containment, if necessary.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.
Chemical Specific	YES			

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Federal Regulatory Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposured to Lead in Soil	To be Considered	EPA guidance for evaluating the risks posed by lead in soil.	Standard will be met by removing contaminated soil and disposing off-site.
Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by removing potential carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by removing potential non-carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
Location Specific	YES			
Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	Adverse impacts to regulated wetland buffer zones will be minimized to the maximum extent practical.
Action Specific	YES			
Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of treatment activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

LE L-12. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CONTAMINATED SOILS AREA

ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste. Identifies general operating requirements, and closure and post-closure care.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address disposal of non-hazardous waste and closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of treatment activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	Relevant and Appropriate	This alternative includes excavation and/or earthwork. Prohibits burning or emissions of dust which causes or contributes to a condition of air pollution. Standards for dust are contained in 310 CMR 7.09.	These standards will be complied with during any excavation of materials at the Site.

TABLE L-13. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	The long-term risks from asbestos will not be addressed since the landfill cap will not be maintained.
	Location Specific	NO			
	Action Specific	NO			

TABLE L-13. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Limited Action: Institutional Controls					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard since risks from asbestos will be addressed by maintaining the existing cap and preventing access to the Site.
	Location Specific	YES			
	Federal Regulatory Requirements	Clean Water Act (33 U.S.C. §1251 *et seq* .); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230, 231 and 33 CFR Parts 320-323)	40 CFR 230, 231 are Applicable; 33 CFR 320-323 are Relevant and Appropriate	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Given the location of contamination on the edge of wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources from cap maintenance, fencing and well installation activitiy will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Executive Order 11990; "Protection of Wetlands" (40 CFR Part 6, Appendix A)	Applicable	This alternative includes work to be completed in a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Given the location of contamination on the edge of wetlands, this Alternative has been determined to be the best practical alternative. Adverse impacts to wetland resources from cap maintenance, fencing and well installation activitiy will be minimized to the maximum extent practical and mitigation conducted if required.
	Federal Regulatory Requirements	Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.); Fish and wildlife protection (40 CFR §6.302(g))	Applicable	This alternative includes work to be performed in or near wetland and floodplain areas. Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of a body of water.

TABLE L-13. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed in or near a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zones and/or fencing needs to be constructed in wetland and/or regulated buffer zone, then measures will be taken to minimize impacts.

TABLE L-13. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LANDFILL

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Action Specific	YES			
	Federal Regulatory Requirements	Clean Air Act - National Emission Standard for Asbestos, Subpart M (40 CFR Part 61.150, 61.151)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards will be complied with for any asbestos-containing materials handled/disposed of at the Site. Furthermore, maintenance and monitoring of the cap will meet these standards.
	Federal Regulatory Requirements	Toxic Substances Control Act - Transport and Disposal of Asbestos Waste (40 CFR 763, Subpart E, Appendix D)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for transport and disposal of materials that contain asbestos. Requires proper wetting and containerization. Disposal involves the isolation of asbestos material to prevent fiber release. Landfilling is recommended. Final cover of an area containing asbestos waste is at least 30 inches of nonasbestos material to provide a 36-inch final cover. Signs warning "Breathing Asbestos Dust May Cause Lung Disease and Cancer" should be displayed.	These standards will be complied with for any asbestos-containing materials handled/disposed of at the Site. Furthermore, maintenance and monitoring of the cap will meet these standards.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.15)	Relevant and Appropriate	This alternative includes excavation and/or earthwork of asbestos-contaminated areas. Provides standards for demolition and renovation of facilities or facility components that contain asbestos. Requires notice to the DEP of work to be done. Specifies procedures to prevent and control asbestos emissions. Identifies waste disposal requirements.	These standards will be complied with as relevant and appropriate to any disturbance of asbestos-containing materials handled/disposed of at the Site.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
No Action					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since risks from asbestos not addressed.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by exposure to contaminants not addressed.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants not addressed.
	Location Specific	NO			
	Action Specific	NO			

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Limited Action: Institutional Controls					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will partially meet this standard since risks from asbestos will be reduced by preventing access to the Site. However, migration of asbestos from the Site will not be prevented.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will not meet this standard since potential carcinogenic hazards caused by migration of contaminants into groundwater will not be addressed through institutional controls.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed in or near a wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If new monitoring wells are needed, and no practical alternative to locating in wetlands or regulated buffer zones, then measures will be taken to minimize impacts.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Action Specific	YES			
	Federal Regulatory Requirements	Clean Air Act - National Emission Standard for Asbestos, Subpart M (40 CFR Part 61.150, 61.151)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards will not be met because institutional controls alone won't meet disposal requirements for leaving asbestos in the lagoons in place.
	Federal Regulatory Requirements	Toxic Substances Control Act - Transport and Disposal of Asbestos Waste (40 CFR 763, Subpart E, Appendix D)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for transport and disposal of materials that contain asbestos. Requires proper wetting and containerization. Disposal involves the isolation of asbestos material to prevent fiber release. Landfilling is recommended. Final cover of an area containing asbestos waste is at least 30 inches of nonasbestos material to provide a 36-inch final cover. Signs warning "Breathing Asbestos Dust May Cause Lung Disease and Cancer" should be displayed.	These standards will not be met because institutional controls alone won't meet disposal requirements for leaving asbestos in the lagoons in place.
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. However this Alternative will not meet the closure/post closure standards because institutional controls alone will not address requirements to prevent migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	These standards will not be met because institutional controls alone will not address landfill design requirements.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.15)	Relevant and Appropriate	This alternative includes excavation and/or earthwork of asbestos-contaminated areas. Provides standards for demolition and renovation of facilities or facility components that contain asbestos. Requires notice to the DEP of work to be done. Specifies procedures to prevent and control asbestos emissions. Identifies waste disposal requirements.	These standards will not be met because institutional controls alone won't meet disposal requirements for leaving asbestos in the lagoons in place.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Excavate and Place Under Another On-Site AOC Cap					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard by removing asbestos and putting it under a cap at another AOC where it will be properly managed and monitored.
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by removing potential carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by removing potential non-carcinogenic hazards and putting it under a cap at another AOC where it will be properly managed and monitored.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a defined wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If excavation activities occur within regulated buffer zones, then measures will be taken to minimize impacts.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Action Specific	YES			
	Federal Regulatory Requirements	Clean Air Act - National Emission Standard for Asbestos, Subpart M (40 CFR Part 61.150, 61.151)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	Excavation of asbestos contaminated material will be conducted in compliance with these standards.
	Federal Regulatory Requirements	Toxic Substances Control Act - Transport and Disposal of Asbestos Waste (40 CFR 763, Subpart E, Appendix D)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for transport and disposal of materials that contain asbestos. Requires proper wetting and containerization. Disposal involves the isolation of asbestos material to prevent fiber release. Landfilling is recommended. Final cover of an area containing asbestos waste is at least 30 inches of nonasbestos material to provide a 36-inch final cover. Signs warning "Breathing Asbestos Dust May Cause Lung Disease and Cancer" should be displayed.	Excavation of asbestos contaminated material will be conducted in compliance with these standards.
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500); Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of excavation activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.15)	Relevant and Appropriate	This alternative includes excavation and/or earthwork of asbestos-contaminated areas. Provides standards for demolition and renovation of facilities or facility components that contain asbestos. Requires notice to the DEP of work to be done. Specifies procedures to prevent and control asbestos emissions. Identifies waste disposal requirements.	These standards will be complied with as relevant and appropriate to any disturbance of asbestos-containing materials handled at the Site.
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of excavation activities that is determined to be non-hazardous would be managed and disposed of in accordance with these standards. This Alternative will meet the closure/post closure standards by removing all non-hazardous waste from the Site.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
Cap Waste					
	Chemical Specific	YES			
	Federal Regulatory Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard by capping the asbestos and maintaining and monitoring the cap
	Federal Regulatory Requirements	Cancer Slope Factors (CSF).	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard by capping potential carcinogenic hazards and maintaining and monitoring the cap.
	Federal Regulatory Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to characterize human health risks due to non-carcinogens in site media.	This alternative will meet this standard by capping potential non-carcinogenic hazards and maintaining and monitoring the cap.
	Location Specific	YES			
	Massachusetts Regulatory Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	This alternative includes work to be performed within 100 feet of a defined wetland. Sets performance standards for dredging, filling, altering of inland wetlands and within 100 feet of a wetland. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated. Resource areas at the site covered by the regulations include banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, riverfront, and estimated habitats of rare wildlife.	If excavation and capping activities occur within regulated buffer zones, then measures will be taken to minimize impacts.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Action Specific	YES			
	Federal Regulatory Requirements	Clean Air Act - National Emission Standard for Asbestos, Subpart M (40 CFR Part 61.150, 61.151)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards for managing asbestos and capping the area will be met.
	Federal Regulatory Requirements	Toxic Substances Control Act - Transport and Disposal of Asbestos Waste (40 CFR 763, Subpart E, Appendix D)	Applicable	This alternative includes remedial actions of areas containing asbestos. Provides standards for transport and disposal of materials that contain asbestos. Requires proper wetting and containerization. Disposal involves the isolation of asbestos material to prevent fiber release. Landfilling is recommended. Final cover of an area containing asbestos waste is at least 30 inches of nonasbestos material to provide a 36-inch final cover. Signs warning "Breathing Asbestos Dust May Cause Lung Disease and Cancer" should be displayed.	These standards for managing asbestos and capping the area will be met.
	Federal Regulatory Requirements	RCRA Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 CFR Parts 260-262 and 264)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.
	Massachusetts Regulatory Requirements	Management Standards for all Hazardous Waste Facilities (310 CMR 30.500), Waste Analysis (310 CMR 30.513); Management Standards (310 CMR 510)	Applicable	These rules are used to identify, manage, and dispose of hazardous waste.	Any media generated as part of monitoring activities will be tested for hazardous waste characteristics. If determined to be hazardous waste, then they will be stored, transported, and disposed off site in accordance with these standards.

TABLE L-14. ARARS, CRITERIA, ADVISORIES, AND GUIDANCE FOR THE ASBESTOS LAGOONS

Alternative	ARAR, Media and Authority	Requirements	Status	Triggering Action & Requirement Synopsis	Action to be taken to attain ARAR
	Massachusetts Regulatory Requirements	Mass Solid Waste Management Regulations (310 CMR 19.00)	Applicable for disposal standards; Relevant and Appropriate for Closure/Post Closure Standards	These regulations address management and disposal of non-hazardous waste, closure, post-closure, and maintenance of solid waste landfills.	Any media generated as part of monitoring activities that is determined to be non-hazardous would be managed and disposed off site in accordance with these standards. This Alternative will be meet the closure/post closure standards to prevent human contact and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	This Alternative will be meet the landfill design standards to prevent human contact and migration of contaminants to surface and groundwater.
	Massachusetts Regulatory Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.15)	Relevant and Appropriate	This alternative includes excavation and/or earthwork of asbestos-contaminated areas. Provides standards for demolition and renovation of facilities or facility components that contain asbestos. Requires notice to the DEP of work to be done. Specifies procedures to prevent and control asbestos emissions. Identifies waste disposal requirements.	These standards will be complied with as relevant and appropriate to any disturbance of asbestos-containing materials handled at the Site.

APPENDIX D: Glossary of Terms and Acronyms

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/ Abbreviation	Definition
ACO	Administrative Consent Order
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BRA	Baseline Risk Assessment
BTEX	Benzene, toluene, ethylbenzene and xylene
CAA	Clean Air Act
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System Database
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Contaminants of Potential Concern
CWA	Clean Water Act
EO	Executive Order
ERA	Environmental Risk Assessment
ESD	Explanation of Significant Difference
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
FS	Feasibility Study
HQ	Hazard Quotient
HRS	Hazard Ranking System
IEUBK	Integrated Exposure and Uptake Biokinetic model
LNAPL	Light Non-Aqueous Phase Liquid
LOAEL	Lowest Observed Adverse Effects Level
LTM	Long Term Monitoring
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
M&E	Metcalf & Eddy, Inc.
MNA	Monitored Natural Attenuation
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
ND	Not Detected
NHESP	Natural Heritage and Endangered Species Act
NOAEL	No Observed Adverse Effects Level
NOED	No Observed Effects Dose
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OSWER	EPA Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
ppb	parts per billion
ppm	parts per million
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Dose
RI	Remedial Investigation

RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
SC	Source Control
SVOC	Semi-Volatile Organic Compound
TBCs	To Be Considered
TCE	Trichloroethene
TEL	Threshold Effects Level
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
VOC	Volatile Organic Compound

APPENDIX E:
Administrative Record Index and Guidance Documents

IRON HORSE PARK
NPL Site Administrative Record
Record of Decision (ROD)
Operable Unit 3

Index

Record of Decision Signed
September 2004

Administrative Record Released
February 2006

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the Administrative Record file for the Iron Horse Park Superfund site, North Billerica, MA, OU 3, Rest of Site, Record of Decision (ROD) Proposed Plan, released June 2004. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This file includes, by reference, the administrative record file for the Iron Horse Park, OU 1 Record of Decision, issued September 15, 1988 and the administrative record file for the Iron Horse Park, OU 2 Record of Decision, issued June 27, 1991.

PLEASE NOTE: The best available copies were used to create this collection.

The administrative record file is available for review at:

Billerica Public Library
15 Concord Road
Billerica, MA 01821
978-671-0948 (phone)
www.billericalibrarv.org

EPA New England Superfund Records & Information Center
1 Congress Street, Suite 1100 (HSC)
Boston, MA 02114 (by appointment)
617-918-1440 (phone)
617-918-1223 (fax)
www.epa.goviregion01/superfund/resource/records.htm

Questions about this administrative record file should be directed to the EPA New England site manager.

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

IRON HORSE PARK
REST OF SITE
ADMINISTRATIVE RECORD FILE
IRON HORSE ROD PROPOSED PLAN

3. REMEDIAL INVESTIGATION (RI)

1. LETTER: EPA'S COMMENTS ON DRAFT HEALTH ASSESSMENT FOR IRON HORSE PARK
TO: MARILYN DISIRIO, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
AUTHOR: JOHN GALLAGHER, US EPA REGION 1
DOC ID: 209745 01/20/1989 3 PAGES

2. MEMO: REVIEW OF HEALTH ASSESSMENT FOR IRON HORSE PARK AS AMENDED APRIL 4, 1990
TO: LOUISE A HOUSE, US PUBLIC HEALTH SERVICE/ATSDR
AUTHOR: DON MCELROY, US EPA
DOC ID: 209746 08/20/1990 5 PAGES

3. LETTER: REVIEW OF PROPOSAL FOR TRENCH EXCAVATION AT BNZ MATERIALS INC.
TO: ROGER P THIBAULT, GZA GEOENVIRONMENTAL INC
AUTHOR: DALE YOUNG, MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 209731 11/06/1990 2 PAGES

4. LETTER: SCOPING MEETING SUMMARY, IRON HORSE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)
TO: DON MCELROY, US EPA
AUTHOR: DEBORAH M SIMONE, METCALF & EDDY INC
DOC ID: 209733 10/29/1992 7 PAGES

5. MEMO: IRON HORSE PARK, OU3 REMEDIAL INVESTIGATION (RI) - SCOPE
TO: NANCY BARMAKIAN, US EPA REGION 1
AUTHOR: DON MCELROY, US EPA
DOC ID: 209734 11/16/1992 2 PAGES

6. LETTER: COMMENTS ON "DRAFT WORK PLAN FOR REMEDIAL INVESTIGATION (RI)"
TO: DON MCELROY, US EPA
AUTHOR: HELEN WALDORF, MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 209739 01/05/1993 5 PAGES

7. MEMO: COMMENTS ON IRON HORSE DRAFT WORKPLAN FOR OU3
TO: DON MCELROY, US EPA
AUTHOR: MARGARET MCDONOUGH, US EPA REGION 1
DOC ID: 209740 01/07/1993 5 PAGES

8. MEMO: COMMENTS ON DRAFT WORK PLAN FOR REMEDIAL INVESTIGATION (RI)
TO: DON MCELROY, US EPA
AUTHOR: PATTI LYNNE TYLER, US EPA REGION 1
DOC ID: 209741 01/10/1993 6 PAGES

9. REPORT: SCOPE OF WORK SUMMARY FOR THE FIELD ACTIVITIES FOR THE REMEDIAL INVESTIGATION (RI)
AUTHOR: METCALF & EDDY INC
DOC ID: 209735 02/01/1993 24 PAGES

10. REPORT: FINAL WORK PLAN FOR REMEDIAL INVESTIGATION (RI)
AUTHOR: METCALF R EDDY INC
DOC ID: 209742 06/01/1993 131 PAGES

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3.REMEDIAL INVESTIGATION (RI) (cont)

11. REPORT: HYDROGEOLOGICAL ASSESSMENT REPORT
TO: US EPA REGION 1
AUTHOR: METCALF K EDDY
DOC ID: 65002 02/01/1994 226 PAGES

12. MEMO: REVIEW OF THE "BENTHIC INVERTEBRATE RECONNAISSANCE SURVEY, IRON HORSE PARK, BILLERICA, MA"
TO: DON MCELROY, US EPA
AUTHOR: PATTI LYNNE TYLER, US EPA REGION 1
DOC ID: 209747 04/01/1994 2 PAGES

13. REPORT: FINAL WORK PLAN AMENDMENT FOR REMEDIAL INVESTIGATION (RI)
AUTHOR: METCALF & EDDY INC
DOC ID: 209743 09/01/1994 106 PAGES

14. LETTER: COMMENTS ON "DRAFT WORK PLAN AMENDMENT FOR REMEDIAL 1NVESTIGATION (RI)"
TO: DEBORAH M SIMONE, METCALF & EDDY INC
AUTHOR: DON MCELROY, US EPA
DOC ID: 209744 09/16/1994 6PAGES

15. MEMO: COMMENTS ON REMEDIAL INVESTIGATION (RI) DRAFT REPORT
TO: DON MCELROY, US EPA
AUTHOR: PATTI LYNNE TYLER, US EPA REGION 1
DOC ID: 209736 10/08/1996 10 PAGES

16. LETTER: REVIEW OF "REMEDIAL INVESTIGATION (RI) DRAFT REPORT" FOR THE THIRD OPERABLE UNIT
TO: DON MCELROY, US EPA
AUTHOR: JAY NAPARSTEK, MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 209732 12/10/1996 4 PAGES

17. MEMO: COMMENTS ON REMEDIAL INVESTIGATION (RI) DRAFT REPORT
TO: DON MCELROY, US EPA
AUTHOR: MARGARET MCDONOUGH, US EPA REGION 1
DOC ID: 209737 02/28/1997 2 PAGES

18. LETTER: DRAFT REMEDIAL INVESTIGATION (RI) COMMENTS
TO: DEBORAH M SIMONE, METCALF & EDDY INC
AUTHOR: DON MCELROY, US EPA
DOC ID: 209738 07/14/1997 53 PAGES

19. MEMO: SURFACE SOIL HOT SPOTS AT IRON HORSE PARK, MEMO TO FILE
AUTHOR: JOHN YOUNG, METCALF k EDDY INC
DOC ID: 209748 08/15/1997 5 PAGES

20. REPORT: REMEDIAL INVESTIGATION (RI) FINAL REPORT, VOLUME 1 OF 5, TEXT
AUTHOR: METCALF & EDDY
US EPA REGION 1
DOC ID: 204924 09/01/1997 489 PAGES

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3.REMEDIAL INVESTIGATION (RI) (cont)

21. REPORT: REMEDIAL INVESTIGATION (RI) FINAL REPORT, VOLUME 2 OF 5, TABLES
AUTHOR: METCALF 86 EDDY
US EPA REGION 1
DOC ID: 204925 09/01/1997 410 PAGES

22. REPORT: REMEDIAL INVESTIGATION (RI) FINAL REPORT, VOLUME 3 OF 5, FIGURES
AUTHOR: METCALF % EDDY
US EPA REGION 1
DOC ID: 204926 09/01/1997 95 PAGES

23. REPORT: REMEDIAL INVESTIGATION (RI) FINAL REPORT, VOLUME 4 OF 5, APPENDICES A-E
AUTHOR: METCALF K EDDY
US EPA REGION 1
DOC ID: 204927 09/01/1997 702 PAGES

24. REPORT: REMEDIAL INVESTIGATION (RI) FINAL REPORT, VOLUME 5 OF 5, APPENDICES F-I
AUTHOR: METCALF & EDDY
US EPA REGION 1
DOC ID: 204928 09/01/1997 1798 PAGES

25. MEMO: COMMENTS ON THE BASELINE HUMAN HEALTH RISK ADDENDUM, OLD B&M OIL/SLUDGE RECYCLING AREA
TO: DON MCELROY, US EPA
AUTHOR: MARGARET MCDONOUGH, US EPA REGION 1
DOC ID: 65003 12/04/2001 2 PAGES

4. FEASIBILITY STUDY (FS)

1. LETTER: TRANSMITTAL OF DRAFT FEASIBILITY STUDY WORK PLAN
TO: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
AUTHOR: DON MCELROY, US EPA
DOC ID: 64996 05/19/1998 1 PAGE

2. LETTER: MADEP COMMENTS ON THE FEASIBILITY STUDY DRAFT REPORT
TO: DON MCELROY, US EPA
AUTHOR: JAY NAPARSTEK, MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 65004 05/08/2000 11 PAGES

3. MEMO: COMMENTS ON THE DRAFT FEASIBILITY STUDY
TO: DON MCELROY, US EPA
AUTHOR: MARGARET MCDONOUGH, US EPA REGION 1
DOC ID: 65005 08/01/2000 2 PAGES

4. MEMO: REVIEW OF THE DRAFT FEASLBILITY STUDY REPORT
TO: DON MCELROY, US EPA
AUTHOR: PATTI LYNNE TYLER, US EPA REGION 1
DOC ID: 65006 08/16/2000 6 PAGES

5. MEMO: REVIEW OF IRON HORSE PARK SAMPLING DATA
TO: DON MCELROY, US EPA
AUTHOR: DARRYL LUCE, US EPA REGION 1
DOC ID: 64998 03/21/2001 2 PAGES

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4.FEASIBILITY STUDY (FS) (cont)

6. MEMO: CONFERENCE CALL ON ISSUES WITH RESPECT TO A POTENTIAL GROUND WATER REMEDY
TO: DON MCELROY, US EPA
AUTHOR: DARRYL LUCE, US EPA REGION 1
DOC ID: 64999 05/08/2001 1 PAGE

7. MEMO: REVIEW OF GROUND WATER MODEL AND INFORMATION RELEVANT TO A GROUND WATER REMEDY
TO: DON MCELROY, US EPA
AUTHOR: DARRYL LUCE, US EPA REGION 1
DOC ID: 65000 06/06/2001 1 PAGE

8. LIST: RESPONSE TO REVIEW COMMENTS ON THE DRAFT FEASIBILITY STUDY REPORT
AUTHOR: METCALF & EDDY INC
DOC ID: 65007 09/06/2001 28 PAGES

9. LETTER: MADEP COMMENTS ON METCALF & EDDY RESPONSE TO REVIEW COMMENTS ON THE DRAFT FEASIBILITY STUDY REPORT
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 65008 10/31/2001 3 PAGES

10. MEMO: MADEP COMMENTS ON SUPPLEMENTAL ANALYSIS OF ECOLOGICAL RISK IN EAST & WEST MIDDLESEX CANAL
TO: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
AUTHOR: NANCY BETTINGER, MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 65009 12/03/2001 8 PAGES

11. LETTER: MADEP REVIEW OF "COMPARATIVE ANALYSIS OF THE REMEDIAL TECHNOLOGIES BY AOC"
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 65010 03/11/2002 4 PAGES

12. MEMO: MEETING MINUTES ON COMMENTS TO SECTION 7 OF THE DRAFT FEASIBILITY STUDY REPORT
TO: D ROBERTS, ROBERTS ENVIRONMENTAL
D SILVERMAN, METCALF & EDDY INC
DEBORAH M SIMONE, METCALF & EDDY INC
DON MCELROY, US EPA
JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
S CZARNIECKI, METCALF & EDDY INC
AUTHOR: LAURIE OSOWSKI, METCALF & EDDY INC
DOC ID: 65011 10/29/2002 4PAGES

13. LETTER: RESPONSE TO REVIEW COMMENTS ON THE DRAFT FEASIBILITY STUDY REPORT
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 65012 11/07/2002 2 PAGES

14. MEMO: ATTACHMENT TO MA DEP MEMO ON OU #3 ISSUES
AUTHOR: MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 65013 12/10/2002 4 PAGES

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4.FEASIBILITY STUDY (FS) (cont)

15. REPORT: FEASIBILITY STUDY (FS) FINAL REPORT, VOLUME 1 OF 3, TEXT
AUTHOR: METCALF &, EDDY
US EPA REGION 1
DOC ID: 204929 03/01/2003 769 PAGES

16. REPORT: FEASIBILITY STUDY (FS) FINAL REPORT, VOLUME 2 OF 3, TABLES AND FIGURES
AUTHOR: METCALF &, EDDY
US EPA REGION 1
DOC ID: 204930 03/01/2003 499 PAGES

17. REPORT: FEASIBILITY STUDY (FS) FINAL REPORT, VOLUME 3 OF 3, APPENDICES
AUTHOR: METCALF 86 EDDY
US EPA REGION 1
DOC ID: 204931 03/01/2003 1087 PAGES

18. MISC: OU #3 ISSUES
AUTHOR: MA DEP/BUREAU OF WASTE SITE CLEANUP WESTERN REG OFFICE
DOC ID: 64995 04/01/2003 5 PAGES

19. LETTER: MADEP COMMENTS ON THE FINAL FEASIBILITY STUDY
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 64997 04/04/2003 2 PAGES

20. MEMO: CLEANUP GOALS AT IRON HORSE PARK
TO: DON MCELROY, US EPA
AUTHOR: MARGARET MCDONOUGH, US EPA REGION 1
DOC ID: 65017 04/25/2003 1 PAGE

21. MEMO: REVIEW OF ECO PRGS
TO: CHESTER L JANOWSKI, US EPA REGION 1
DON MCELROY, US EPA
AUTHOR: RICHARD SUGATT, US EPA REGION 1
DOC ID: 65016 04/25/2003 1 PAGE

22. LETTER: REVIEW OF THE FEASIBILITY STUDY FINAL REPORT
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 65019 03/04/2004 2 PAGES

23. LETTER: REVIEW OF THE DRAFT PROPOSED PLAN
TO: DON MCELROY, US EPA
AUTHOR: JANET WALDRON, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING
DOC ID: 65015 04/22/2004 3 PAGES

24. FACT SHEET: PROPOSED PLAN, IRON HORSE PARK SUPERFUND SITE
AUTHOR: US EPA REGION 1
DOC ID: 209725 06/01/2004 25 PAGES

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9. STATE COORDINATION

1. MAP: PRELIMINARY ASSESSMENT MAP: 1, ½, & 1/4 MILE RADII
AUTHOR: MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 209749 04/23/1998 I PAGE

2. MEMO: GROUNDWATER USE AND VALUE DETERMINATION, IRON HORSE PARK
AUTHOR: MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 209750 06/01/1998 3 PAGES

3. LIST: MADEP ITEMS THAT NEED TO BE ADDRESSES FOR OU 3
AUTHOR: MA DEPT OF ENVIRONMENTAL PROTECTION
DOC ID: 65021 09/04/2002 6 PAGES

16. NATURAL RESOURCE TRUSTEE

1. LETTER: REVIEW OF THE IRON HORSE PARK 3RD OPERABLE UNIT SCOPE OF SERVICES FOR SURFACE WATER AND SEDIMENT SAMPLING
TO: DON MCELROY, US EPA
AUTHOR: STEVEN E MIERZYKOWSKI, US DOI/US FISH k WILDLIFE SERVICE
DOC ID: 209751 06/03/1992 3 PAGES

2. LETTER: REVIEW OF THE DRAFT REMEDIAL INVESTIGATION (RI) WORKPLAN FOR IRON HORSE PARK, OPERABLE UNIT 3
TO: DON MCELROY, US EPA
AUTHOR: KENNETH FINKLESTEIN, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
DOC ID: 209752 02/24/1993 1 PAGE

17. SITE MANAGEMENT RECORDS

1. PHOTOGRAPH: SITE ANALYSIS AND WETLANDS ASSESSMENT: IRON HORSE PARK, BILLERICA, MASSACHUSETTS, VOLUME 2, EPIC BOOK
TO: US EPA REGION 1
AUTHOR: US EPA - ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CTR (EPIC)
DOC ID: 209724 03/01/1987 1 PAGE

GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Superfund Records Center in Boston, Massachusetts.

TITLE
INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA.

DOCDATE	OSWER/EPA ID	DOCNUMBER
10/1/1988	OSWER #9355.3-01	2002

TITLE
GEOPHYSICAL TECHNIQUES FOR SENSING BURIED WASTES AND WASTE MIGRATION

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/1/1984	EPA-600/7-84/064	2111

TITLE
TEST METHODS FOR EVALUATING SOLID WASTE, LABORATORY MANUAL PHYSICAL/CHEMICAL METHODS, THIRD EDITION (VOLUMES IA, IB, IC, AND II)

DOCDATE	OSWER/EPA ID	DOCNUMBER
11/1/1986		2118

TITLE
CHEMICAL, PHYSICAL 8 BIOLOGICAL PROPERTIES OF COMPOUNDS PRESENT AT HAZARDOUS WASTE SITES

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/27/1985	OSWER 09850.3	5001

TITLE
GUIDELINES FOR CARCINOGEN RISK ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, p. 33992

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/24/1986		5003

TITLE
GUIDELINES FOR EXPOSURE ASSESSMENT (FEDERAL REGISTER, SEPTEMBER 24, 1986, p. 34042)

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/24/1986		5004

TITLE
GUIDELINES FOR THE HEALTH RISK ASSESSMENT OF CHEMICAL MIXTURES (FEDERAL REGISTER, SEPTEMBER 24, 1986,p. 34014)

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/24/1986		5007

TITLE
HEALTH EFFECTS ASSESSMENT DOCUMENTS (58 CHEMICAL PROFILES)

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/1/1984	EPA/540/1-86/001-058	5008

TITLE
EXPOSURE FACTORS HANDBOOK

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/1989	EPA/600/8-89/043	5020

TITLE
RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME I, HUMAN HEALTH EVALUATION MANUAL

DOCDATE	OSWER/EPA ID	DOCNUMBER
9/29/1989	OSWER #9285.7-01a	5023

TITLE
RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME II, ENVIRONMENTAL EVALUATION MANUAL

DOCDATE	OSWERJEPA ID	DOCNUMBER
3/1/1989	EPA/540/1-89/001	5024

TITLE
TOXICOLOGICAL PROFILE FOR ARSENIC
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
3/1/1989 5028

TITLE
TOXICOLOGICAL PROFILE FOR BENZENE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
5/1/1989 5029

TITLE
TOXICOLOGICAL PROFILE FOR BERYLLIUM
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
12/1/1988 5030

TITLE
TOXICOLOGICAL PROFILE FOR CADMIUM
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
3/1/1989 5031

TITLE
TOXICOLOGICAL PROFILE FOR CHROMIUM
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
7/1/1989 5033

TITLE
TOXICOLOGICAL PROFILE FOR Dl(2-ETHYLHEXYL)PHTHALATE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
4/1/1989 5034

TITLE
TOXICOLOGICAL PROFILE FOR HEPTACHLOR/HEPTACHLOR EPOXIDE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
4/1/1989 5035

TITLE
TOXICOLOGICAL PROFILE FOR METHYLENE CHLORIDE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
4/1/1989 5036

TITLE
TOXICOLOGICAL PROFILE FOR N-NITRO SODIPHENYLAMINE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
12/1/1988 5037

TITLE
TOXICOLOGICAL PROFILE FOR NICKEL
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
12/1/1988 5038

TITLE
TOXICOLOGICAL PROFILE FOR SELECTED PCBs (AROCLOR-1260, -1254, -1248, -1242, -1232, -1221, AND -1016)
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
6/1/1989 5039

TITLE
TOXICOLOGICAL PROFILE FOR TRICHLOROETHYLENE
DOCDATE **OSWER/EPA ID** **DOCNUMBER**
10/1/1989 5040

TITLE
TOXICOLOGICAL PROFILE FOR VINYL CHLORIDE

DOCDATE	OSWER/EPA ID	DOCNUMBER
8/1/1989		5041

TITLE
DEVELOPMENT OF STATISTICAL DISTRIBUTION OR RANGES STANDARD FACTORS USED IN EXPOSURE ASSESSMENTS

DOCDATE	OSWER/EPA ID	DOCNUMBER
3/1/1985	EPA OHEA-E-16	C020

TITLE
NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN.

DOCDATE	OSWER/EPA ID	DOCNUMBER
		C063

TITLE
SUPPLEMENTAL RISK ASSESSMENT GUIDANCE FOR THE SUPERFUND PROGRAM. DRAFT FINAL

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/1/1989	EPA 901/5-89-001	C104

TITLE
GUIDANCE FOR EVALUATING THE TECHNICAL IMPRACTICABILITY OF GROUND WATER RESTORATION.

DOCDATE	OSWER/EPA ID	DOCNUMBER
10/4/1993	OSWER 9234.2-25	C158

TITLE
ESTIMATING POTENTIAL FOR OCCURRENCE OF DNAPL AT SUPERFUND SITES.

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/1/1992	9355.4-07FS	C218

TITLE
DERMAL EXPOSURE ASSESSMENT: PRINCIPLES AND APPLICATIONS. INTERIM REPORT.

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/1/1992	EPA/600/8-91/011B	C227

TITLE
CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES.

DOCDATE	OSWER/EPA ID	DOCNUMBER
12/1/1979	FWS/OBS-79/31	C233

TITLE
ECOLOGICAL ASSESSMENT OF HAZARDOUS WASTE SITES: A FIELD AND LABORATORY REFERENCE.

DOCDATE	OSWER/EPA ID	DOCNUMBER
3/1/1989	EPA/600/3-89/013	C251

TITLE
ROLE OF THE BASELINE RISK ASSESSMENT IN SUPERFUND REMEDY SELECTION DECISIONS

DOCDATE	OSWER/EPA ID	DOCNUMBER
4/22/1991	OSWER #9355.0-30	C276

TITLE
RISK-BASED CONCENTRATION TABLE, THIRD QUARTER 1994

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/11/1994		C277

TITLE
RISK UPDATE ISSUE NO. 2

DOCDATE	OSWER/EPA ID	DOCNUMBER
8/1/1994		C288

TITLE
ECOLOGICAL RISK ASSESSMENT GUIDANCE FOR SUPERFUND PROCESS FOR DESIGNING AND CONDUCTING ECOLOGICAL RISK ASSESSMENTS (EPA 540-R-97-006)

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/2/1997		C361

TITLE
FRAMEWORK FOR ECOLOGICAL RISK ASSESSMENT (EPA/630/R-92/001)

DOCDATE	OSWER/EPA ID	DOCNUMBER
2/1/1992		C364

TITLE
TOXICOLOGICAL BENCHMARKS FOR WILDLIFE: 1996 REVISION

DOCDATE	OSWER/EPA ID	DOCNUMBER
6/1/1996		C368

TITLE
ECOLOGICAL RISK ASSESSMENT ISSUE PAPERS (EPA/630/R-94/009)

DOCDATE	OSWER/EPA ID	DOCNUMBER
11/1/1994		C369

TITLE
TOXICOLOGICAL BENCHMARKS FOR SCREENING POTENTIAL CONTAMINANTS OF CONCERN FOR EFFECTS ON AQUATIC BIOTA: 1994 REVISION

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/1994		C376

TITLE
GUIDELINES FOR THE PROTECTION AND MANAGEMENT OF AQUATIC SEDIMENT QUALITY IN ONTARIO

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/1/1996		C390

TITLE
GREAT LAKES WATER QUALITY INITIATIVE CRITERIA DOCUMENTS FOR THE PROTECTION OF WILDLIFE (PROPOSED) DDT MERCURY 2,3,7,8 - TCDD PCBS

DOCDATE	OSWER/EPA ID	DOCNUMBER
4/1/1983		C400

TITLE
GUIDELINES FOR DERIVING NUMERICAL NATIONAL WATER QUALITY FOR THE PROTECTION OF AQUATIC ORGANISMS AND THEIR USES

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/1/1985		C447

TITLE
RECOMMENDATIONS OF THE TECHNICAL REVIEW WORK GROUP FOR LEAD FOR AN INTERIM APPROACH

DOCDATE	OSWER/EPA ID	DOCNUMBER
12/1/1996		C511

TITLE
RISK ASSESSMENT GUIDANCE FOR SUPERFUND, VOLUME 1, HUMAN HEALTH EVALUATION MANUAL, INTERIM

DOCDATE	OSWER/EPA ID	DOCNUMBER
1/1/1998		C530