UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

RECORD OF DECISION SUMMARY

BLACKBURN AND UNION PRIVILEGES SUPERFUND SITE

SEPTEMBER 30, 2008

TABLES

FIGURES

DECLARATION FOR THE RECORD OF DECISION

Blackburn and Union Privileges Superfund Site
Walpole, MA, County of Norfolk
MAD982191363

A. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Blackburn and Union Privileges Superfund Site, in Walpole, MA 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. The United States Environmental Protection Agency (EPA), Region 1, 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 Walpole Public Library and at the EPA Region 1 OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix E) to this Record of Decision (ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Massachusetts Department of Environmental Protection (MassDEP) 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 the Blackburn and Union Privileges Superfund Site (the Site), which has been divided into four management units: the area East of South Street (SO area), the Area of Containment west of South Street (AOC area), site-wide groundwater and surface water in the Former Mill Tailrace and Neponset River (SW area), and contaminated sediments and floodplain soils in the Former Mill Tailrace, Neponset River, and Lewis Pond (SSW area). After analyzing alternatives developed for each of the four areas, as described in the Feasibility Study for the Site, "Draft Final Feasibility Report, Blackburn and Union Privileges Superfund Site, Metcalf &

Eddy, June 2008", EPA has selected the following remedy that addresses each of the management units:

Groundwater in the area west of the Area of Containment will be collected and treated for the purpose of protecting surface water in the Former Mill Tailrace and the Neponset River (Alternative SW-3).

Collected groundwater will be pumped underground, treated on-site by a groundwater treatment system, and the treated water discharged to the Former Mill Tailrace. The treatment system will be located inside a new building to be constructed on-site (Alternative SW-3).

Groundwater use restrictions will be established within areas east and west of South Street where waste will be managed in place. Groundwater monitoring will confirm that contaminated groundwater is not migrating beyond the groundwater compliance boundary (Alternative SW-3).

Excavation and off-site disposal of all volatile organic compounds (VOC), lead, arsenic, asbestos, and polycyclic aromatic hydrocarbon (PAH) impacted soil east of South Street that exceeds cleanup levels and refilling the excavations to grade (Alternative SO-6).

Institutional controls will be established to prevent residential use in the areas east and west of South Street where waste will be managed in place. As part of the institutional controls, a soil management plan will be established for areas with inaccessible soils below existing buildings and for any contaminated soils to be managed in place (Alternatives AOC-3 and SO-6).

Long-term monitoring of institutional controls to ensure compliance with Site restrictions will be conducted in coordination with long-term monitoring of contaminated soil and groundwater (Alternative AOC-3 and SO-6).

Maintenance of the Area of Containment (AOC) soil and asphalt cover will be conducted to limit human and ecological exposure to contaminants (Alternative AOC-3).

Excavation and off-site disposal of approximately 2,500 cubic yards of contaminated soil from the Settling Basin #2 Containment Cell, located west of South Street will be conducted if testing shows the soil exhibits hazardous waste characteristics. Otherwise, maintenance of the existing cover over the area will be performed. If contaminated soil is removed, the area will be backfilled and the excavation area graded with clean fill and a grass cover similar to that used on the adjacent AOC (Alternative AOC-3).

Excavation and off-site disposal of contaminated soil from residential lots along the Neponset River (SSW-5) will be performed.

Dredging and excavation of contaminated sediment and floodplain soil in the Former Mill Tailrace, Neponset River, and Lewis Pond exceeding cleanup levels will be performed. An estimated 4,450 cubic yards of excavated sediment and floodplain soil will be disposed off-site (Alternative SSW-5).

The selected remedy is a comprehensive approach for this operable unit that addresses all current and potential future risks caused by soil, sediment, groundwater and surface water contamination. The remedial measures will prevent exposures to soils, sediments, and groundwater above cleanup levels, minimize the discharge of groundwater to the Former Mill Tailrace, and allow for the restoration of the Site to beneficial uses.

<u>The major components of this remedy are:</u>

1. Excavation and dredging with off-site disposal of contaminated soil and sediment West of South Street, East of South Street, in the Former Mill Tailrace, along the Neponset River, and within Lewis Pond;

2. Extraction and treatment of contaminated groundwater posing a risk to surface waters and discharge of treated groundwater to the Former Mill Tailrace;

3. Institutional controls, including environmental restrictions and easements, and the establishment of soil management practices on areas where waste will be left in place that will continue to pose a CERCLA risk, restrictions on the use of groundwater both east and west of South Street, and at least yearly monitoring of compliance with all institutional controls; and

4. Long term monitoring of all areas where waste will be left in place, as well as monitoring of groundwater to ensure that there are not exceedances of the cleanup standards for groundwater beyond the groundwater compliance boundary for the waste management areas east and west of South Street.

This Record of Decision is intended to be the final one at this Site.

The selected response action addresses principal and low-level threat wastes at the Site by: preventing human exposure to contaminated soils and sediments through excavation and off-site disposal; maintaining the previously installed soil and asphalt covers on the AOC; excavation and off-site disposal of characteristic hazardous waste, if present, in Settling Basin #2 west of South Street; utilization of institutional controls for groundwater and soils left in place at the Site; and the treatment and discharge of shallow groundwater effecting surface water quality in the former mill tailrace at the Site.

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.

This remedy also partially satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment), through treatment of contaminated groundwater that poses a threat to surface waters. No other treatment is proposed. Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure groundwater and land use restrictions will be necessary and 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.

E. SPECIAL FINDINGS

Issuance of this ROD embodies specific determinations made by the Regional Administrator pursuant to CERCLA, Section 404 of the Clean Water Act; as well as Executive Orders 11990 (Protection of Wetlands) and 11988 (Protection of Floodplains).

Because a portion of the Site is located within the 100 year floodplain and there are federal jurisdictional wetlands on site, Section 404 of the Clean Water Act and federal regulations that incorporate standards identified within Executive Orders 11990 (Protection of Wetlands) and 11988 (Protection of Floodplains) require a determination that federal actions involving dredging and filling or activities in wetlands and floodplains minimize the destruction, loss or degradation of wetlands and floodplains and to preserve and enhance the natural and beneficial values of wetlands and floodplains. Through its analysis of the alternatives, EPA has determined that because significant, high level contamination exists in the wetland and floodplain areas of the site, there is no practicable alternative to conducting work in these areas. EPA has determined that the selected alternatives are the least damaging practicable alternatives for protecting wetland and floodplain resources.

The data collected for the Remedial Investigation and the results of the Human Health Risk Assessment support this determination. Once EPA determines that there is no practical alternative to conducting work in wetlands and floodplains, EPA is then required to minimize potential harm or avoid adverse effects to the extent practicable. Best management practices would be used throughout the site to minimize adverse impacts on wetland and floodplain resources, including to fish and wildlife and their habitats. Damage to these resources would be mitigated through erosion control measures and proper regrading and revegetation of the impacted area with indigenous species. Dredging operations will be conducted in a manner that will minimize any short-term degradation of water quality. Following excavation activities, wetlands will be restored or replicated consistent with the requirements of the federal and state wetlands protection standards. Any lost flood storage capacity from cleanup activities within the 100-year floodplain will be restored.

F. 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.

1. Chemicals of concern (COCs) and their respective concentrations, page 40;
2. Baseline risk represented by the COCs, page 43;
3. Cleanup levels and Performance Standards established for COCs and the bases for the levels, Table L-1, Table L-2, Table L-3, and Tables L-4a, L-4b;
4. Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD, Section F, page 36;
5. Land and groundwater use that will be available at the site as a result of the selected remedy, Section F, page 36;
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, Tables L-5 through L-8,
7. Decisive factor(s) that led to selecting the remedy, Section L, page 107.

G. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for soil, sediment, as well as surface and groundwater at the Blackburn and Union Privileges Superfund Site. This remedy was selected by EPA with concurrence of the Massachusetts Department of Environmental Protection.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By: ______________________ Date: 9/30/08

James T. Owens, III
Director
Office of Site Remediation and Restoration
Region 1

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

- Blackburn and Union Privileges Superfund Site
  South Street
  Walpole, MA

- MAD982191363

- Lead entity: PRP

- Site type: former industrial facility and downstream impacted area.

A more complete description of the Site can be found in Section 1.2.1 of the "Remedial Investigation Report" (SHA, March 2007).

As shown on Figure A-1, the Site is located just south of the intersection of South Street and Common Street; approximately one-half mile south-southeast of the center of Walpole, Massachusetts. As depicted on Figure A-2, South Street bisects the Site in a generally north-south direction, and the Neponset River bisects the Site in a generally east-west direction.

The site, as defined in the 1999 RI/FS Administrative Order on Consent, includes 21 parcels of land over an area of approximately 22 acres. As defined in the Order, the Site consists of both on-facility properties, and off-facility properties, and such other places where contamination has come to be located. The on-facility properties are currently owned by various private interests, including Shaffer Realty Nominee Trust and the BIM Investment Corporation (collectively, the Shaffers). These properties, consisting of the following Walpole Tax Map parcels, have been the locus of various industrial activities spanning several hundred years:

- On-facility parcels located east of South Street, in recent years occupied by Cosmec, Inc, ('Cosmec'): Lots 33-126, 33-127, and 33-128 (formerly known as Lots 1235-2A, 1235-2B, and 1235-3, respectively);

- On-facility parcels located west of South Street including: Lots 33-172, 33-173, 33-174, and the northeastern portions of Lots 33-165-3, 33-165-10, 33-165-11, and 33-165-14 (formerly Lots 1235-4, 1235-8, 1235-1, and the northeastern portion of 1249, respectively).

- Off-facility parcels, which have historically been undeveloped or residential and are owned by various entities, including off-facility parcels located east of South Street:

- Lots 33-119, 33-120, and 33-121 (formerly Lot 1275-5), which make up the railroad right-of-way (ROW);

• Lots 33-122, 33-123, 33-124, and 33-125 (formerly Lots 1232-1A, 1232-1B, 1232-1, 1232-2, 1232-3, and 1232-4), located along Gleason Court;

• Lots 33-129, 33-130, 33-137, and 33-138 (formerly Lots 1235-5, 1235-7, 1235-6, and 1235-6);

• Off-facility parcels located west of South Street: Lots 33-208 and 33-209, located within the wetland/Former Mill Tailrace area (formerly Lots 1240-13 and 1240-14); and,

• Residential lots along the Neponset River floodplain between the Former Mill Tailrace and Lewis Pond, including, but potentially not limited to Lot 33-259 (formerly Lots 1245-8 and 1245-9).

A Site Vicinity Plan is provided as Figure A-2; a General Site Features Plan, including updated topography and Site features locations is included as Figure A-3. Key site features which are discussed in further detail in the RI Report include:

• The Neponset River was the site of the earliest industrial development in the Town of Walpole. In 1811, the Blackburn Privilege was reportedly established on the upstream portion of the Site, east of South Street, and in approximately 1812 the Union or Union Factory Privilege was established on the downstream portion of the Site, west of South Street. The term privilege refers to a grant enabling commercial usage of the Neponset River for water supply and power. Today, the Neponset River bisects the Site in a generally east-west direction.

• Lower Mill Pond (also known as [a/k/a] Union Pond) which was created by a dam located at South Street (a/k/a the Union Dam) on the Neponset River and was a predominant site feature between approximately 1904 and 1958. Water was diverted from the river at the dam and rerouted through a canal constructed just north of the Neponset River, through a power house and then a tailrace before discharging back in the Neponset River west of the Site in the area referred to as the former mill tailrace. Information included in the Existing Data Review and Analysis Report, or "EDRA", (SHA, 2000b) indicates that the Union Dam failed in 1959. The EDRA suggests that the headrace to the powerhouse and much of the tailrace were likely filled sometime between 1918 and 1926.

• Further upstream of the Site, the Blackburn Pond (south of Lot 33-137), created by the Blackburn Dam is present. The history of this Pond and dam are not well known, but the dam and pond are features referenced for their location adjacent to the Site.

• Lewis Pond (essentially a quiescent stretch of the Neponset River) is located approximately 0.7 miles northwest of the Site and is generally present as a result of the dam in the Neponset River at West Street. The Neponset River passes through the West Street Dam and travels approximately 0.6 miles to the impoundment at Stetson Pond (Figure A-4).

• West of South Street, the former mill building is currently unoccupied. Formerly, this building was used for a number of industrial purposes, including by the Standard Woven Fabric Company, whose name was changed to Multibestos Corporation, a manufacturer of asbestos specialties; and The Kendall Company (Kendall), who operated a cotton mercerizing operation at the Site. The property is currently owned by the Shaffers.

• East of South Street, the five buildings on the industrial portion of the Site are occupied by Cosmec Inc., which recently maintained foundry operations here.

• During Kendall's occupation of the Site, wastewater discharges from on-Site operations were treated in a neutralization tank (a/k/a mixing tank) located at the southwest corner of Kendall's facility. Neutralized wastewater was then discharged to one of two settling basins (Settling Basin Nos. 1 and 2) prior to discharge to the Walpole sanitary sewer.

• As described below, during a 1992 Removal Action, asbestos-containing soil excavated from various areas of the Site was consolidated on-Site in an area located south of the former mill building. In addition, excavated contaminated soil from the former mill tailrace was consolidated in a high density polyethylene (HDPE)-lined containment cell constructed in former Settling Basin No. 2 west of the former mill building. These areas south and west of the former mill building, along with an existing area of asbestos-containing soil north of the former mill building have been designated the Area of Containment (AOC). South and west of the former mill building, the AOC is covered with six inches of clean topsoil, placed over 24 inches of clean sand; north of the mill building, the AOC is covered with an asphalt cover. The AOC is subject to deed restrictions and its perimeter is surrounded by an eight-foot high barbed-wire security fence.

• In addition, during the 1992 Removal Action, a plate arch culvert approximately 400 feet in length was installed along the original alignment of the Neponset River through the AOC to prevent potential future erosion of asbestos-containing soils from the banks of the Neponset River in this area.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

As described in detail in the Existing Data Review and Analysis Report, or "EDRA: (SHA, 2000b), On-facility portions of the Site have been the locus of various industrial activities spanning several hundred years. Until circa 1891, on-facility portions of the Site were used for a variety of manufacturing purposes, including a sawmill, corn mill, snuff factory, forge, tan yard, and cloth manufacturing; processing of cotton and wool; and manufacturing of mattresses, cotton batting, lamp wicks, and carpet linings. Between circa 1891 and 1915, the Site was used for manufacture of tires, rubber goods, and insulating materials. The Site was used to manufacture asbestos clutch and brake linings between 1915 and 1935. Subsequently, the Site was again used for a variety of manufacturing purposes, including manufacturing of non-woven cotton products, dye flocking of cotton, manufacturing of instant coffee, and rag and paper recycling. On-facility portions of the Site to the west of South Street are currently vacant. As noted above, Cosmec recently maintained foundry operations east of South Street. The EDRA Report contains a detailed description of the Site history, and includes historical timelines to help place the Site history into perspective.

In the EDRA Report and in the Work Plan, the Site was apportioned into a number of horizontally-stratified areas, with the probability of environmental impact noted qualitatively for each area on the basis of historical Site use. These areas are shown on Figure A-2 and include the following:

Manufacturing Areas with Current Evidence of Chemical Impact - These include two areas at the Site. The first area is located *west* of South Street in the vicinity of the former mill building, and includes the AOC. The second area, located on the *east* side of South Street includes Lots 33-126 and 33-127. Both areas have an extensive industrial history, and data obtained as part of pre-removal action investigations indicated the presence of chemical contamination within each of these areas. The area west of South Street is currently unoccupied; current and future land use in a substantial portion of this area is subject to deed restrictions to ensure that the protective soil and asphalt-covers and the culvert are not disturbed. The area east of South Street was recently used for manufacturing operations by Cosmec.

Lower Mill Pond - Historical information indicates that the Lower Mill Pond covered Lot 33-128 and portions of Lots 33-129 until 1959. As such, there is no indication of manufacturing activities in this area prior to 1959, nor is there historical information to suggest that manufacturing activities have occurred in this area since that time.

Areas Peripheral to Manufacturing Activities - Both historical information and existing chemical data indicate that areas peripheral to manufacturing activities have a low potential for significant levels of chemical constituents. These areas include the northern portion of Lot 33-174, which has historically been used for residential purposes or as a vacant lot and only in more recent times as a support area for certain manufacturing operations; portions of Lots 33-173, 33-208, 33-209, and Lots 33-165-3, 33-165-10, 33-165-11, and 33-165-14; and the former railroad right of way, Lots 33-119, 33-120, 33-121.

Historically Residential or Undeveloped Properties - Historical information indicates that a number of properties included in the definition of the Site have been residential or undeveloped historically and continue to be so at this time. Although asbestos was detected in soil samples from limited areas of Lots 33-123 and 33-259, the 1992 Removal Action was effective in removing asbestos containing soil from these lots. At the remainder of the residential parcels, including Lots 33-130, 33-137, and 33-138, asbestos was not detected at concentrations greater than the detection limit at the time, of 1 %. During the public comment period on the Proposed Plan, a commenter noted that potential debris (brake linings) from the former manufacturing operations at the Site appear to be present in Lot 33-130. As indicated in the Responsiveness Summary, this area will be further investigated and a determination made whether any further response action is required.

In addition to the above-described areas, Lewis Pond was identified in the Work Plan as an area of interest because it was assumed to be a depositional area that might contain sediments contaminated as a result of historic activities at the Site.

Previous Site Investigations and Remedial Action

Environmental investigations to review possible impacts to the Site engendered by historical industrial activities were initiated in 1985, and were generally carried through 1990. Environmental data were also generated as a result of historical above ground and underground storage tank (AST and UST) closure and removals (primarily in 1987), and the Removal Action conducted primarily in 1992 by Canonie Environmental Services Corporation (Canonie) to address the presence of asbestos-contaminated soil at the Site.

As detailed in Section 2.3.2 of the EDRA Report (SHA, 2000b), former Settling Basin Nos. 1 and 2 received discharge from a mixing / neutralization tank designed to neutralize (with respect to pH) the process water used in the cotton bleaching / mercerizing process located on the Southwest corner of the former bleachery. Subsequent to neutralization, process water was discharged to the settling basins (where cotton fibers settled out) and then discharged to the sanitary sewer system. Former Settling Basin No. 2 was used during the 1992 Removal Action to contain excavated asbestos-containing soil from the former mill tailrace removed by Canonie during the 1992 removal action; these sediments were consolidated in a high density polyethylene (HDPE)-lined and capped containment cell constructed within the former settling basin. Chemical analyses of these former mill tailrace sediments by Dames and Moore in 1989, indicated elevated semi-volatile organic compounds (SVOCs) and some metals, as well as elevated pH. Toxicity characteristic leaching procedures (TCLP) analyses performed on a composite sediment sample from these tailrace sediments by Canonie in 1992, indicated that only lead exceeded the threshold concentration for toxicity characteristics (with a concentration of 13 milligrams per liter [mg/L], equivalent to parts per million [ppm]). TCLP results for VOCs and SVOCs in the composite sample were below the analytical detection limit. Sediments from the former mill tailrace were mixed with cement (for stabilization) prior to being placed in the containment cell. The Settling Basin No. 2 cap is covered by two feet of sand and six inches of vegetated topsoil.

As discussed in Section 5.5.2 of the EDRA Report (SHA, 2000b), prior to construction of the containment cell, Dames & Moore collected six samples in 1989 from the sediments within Settling Basin No. 2. The analytical results of these sediments represent the quality of the soil underlying the Settling Basin No. 2 containment area and indicated concentrations of metals (including barium, copper, lead, nickel, and zinc) below Massachusetts Department of Environmental Protection (MADEP) S-1/GW-1 soil standards. In addition, low level concentrations of PAHs were also detected in these samples, ranging from approximately 0.35 to 55 milligrams per kilogram (mg/kg).

A more detailed description of the Site history can be found in Section 1.2.2 of the Remedial Investigation Report (SHA, March 2007). For additional information regarding the Site and Site history, the reader is referred to SHA's "Existing Data Review and Analysis Report" (EDRA [SHA, 2000b]).

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

Shaffer Realty Corporation was issued a Notice of Responsibility (NOR) by the Massachusetts Department of Environmental Quality Engineering (MA DEQE) on November 4, 1986 following a preliminary investigation of asbestos at the Site. A second NOR to Shaffer Realty Corporation followed on January 14, 1987, which lead to investigations regarding underground storage tanks (including the removal of 5 underground storage tanks (USTs) and 5 above ground storage tanks (ASTs)), as well as sampling of asbestos containing soils within the Site. Asbestos, # 6 fuel oil, and elevated pH conditions were identified as issues requiring further study.

On September 28, 1987, US EPA approved an Action Memorandum authorizing a Removal Action at the South Street Site. On December 15, 1987, EPA issued an Administrative Order for Removal Action to Shaffer Nominee Trust and BIM Investment Trust which incorporated an approved work plan for a Site Assessment to "evaluate the vertical and horizontal distribution of asbestos at the Site; to assess the location of other known or suspected contaminant sources, and to provide a basis for planning a Removal Action at the Site..." The results of the sampling performed pursuant to this Order were reported in the Dames & Moore's Site Assessment Report (1989). Follow up asbestos sampling focusing on "off-facility properties" was reported by the Dames & Moore "Supplemental Investigation Report" dated August 30, 1990. Weston and Sampson was retained in 1990 to study remaining USTs and the contents of containers within the former mill building.

In 1991 Canonie Environmental Services Corporation was retained by WR Grace to respond to the First Order. On January 31, 1991, EPA issued a second administrative order for Removal Action ("Second Order) to WR Grace and the landowners of the on-facility properties. The Removal Action work began in July of 1992, and was completed by May of 1993. The Removal Action included but was not limited to these main activities:

- Relocation of a sanitary sewer;
- Temporary diversion of the Neponset River;
- Construction of an arch plate culvert approximately 400 feet in length along the original alignment of the Neponset River to prevent erosion of asbestos contaminated soils from the banks of the River;
- Excavation of asbestos exceeding 1% in soils from various areas;
- Consolidation of asbestos contaminated soils to the AOC located south of the former mill building and subsequent coverage of these materials with 2 feet of clean soil and 6 inches of seeded topsoil;
- Excavation and stabilization of sediments from the former mill tail race with consolidation of these materials in a high density polyethethylene (HDPE) lined containment cell constructed in former Settling Basin #2 and subsequent coverage of the HDPE liner with 2 feet of clean soil and 6 inches of vegetated topsoil;
- A land use restriction which prohibits the disturbance of the soil and asphalt cover was put in place for the AOC.

On September 29, 1997 ATSDR released the final Preliminary Health Assessment Report for the Site which recommended that further characterization of the contamination of various environmental media be performed at the Site, and that the usage and quality of private groundwater in the area be determined.

In 1999 an Administrative Order by Consent for the performance of the RI/FS was entered into by EPA with Tyco Healthcare and WR Grace.

3. History of CERCLA Enforcement Activities

In November and December of 1987, EPA notified parties (including Shaffer Realty Corporation, Kendall Company, and WR Grace & Co.) 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.

WR Grace performed the Removal Action in 1992-3 under the terms of the second Administrative Order issued by EPA.

In March of 1999 EPA issued Special Notice letters for RI/FS activities to Shaffer Nominee Trust, Irving Shaffer, Burton Shaffer, Milton Shaffer, BIM Investment Trust, Shaffer Realty, WR Grace & Co., and the Kendall Company.

In 1999 an agreement for payment of past response costs, Docket No. 1-99-0027 was reached with Tyco Healthcare and W.R. Grace.

Tyco Healthcare and WR Grace have been active in the RI/FS study process for this Site. Sanborn Head Associates (SHA) under contract with Tyco Healthcare, produced the RI and RI Addendum and a draft of the Feasibility Study that was used by EPA in drafting the FS under the terms of the 1999 Administrative Order on Consent. Tyco, WR Grace, and the landowners of the industrial portions of the Site provided comments during the public comment period for the Proposed Plan. The summary of EPA's responses to those comments, along with others received during the comment period, are included in the Responsiveness Summary appended to this document.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been significant. Below is a brief chronology of public outreach efforts.

- On July 13, 2000, EPA held an informational meeting explaining the Superfund process, the site's history, and the components of the upcoming Remedial Investigation. A fact sheet was distributed summarizing the information.

- In April 2001, EPA issued a $100,000 Superfund Redevelopment Initiative Grant to the Town of Walpole to study and gather input regarding potential reuses of the Site. In 2005, the Town of Walpole developed a report entitled: "Reuse and Redevelopment Planning Alternatives." The report recommended that the Town in the future consider acquiring some of the on-facility properties and designate them for municipal uses, commercial offices/light industrial uses, or age-restricted housing. The current and potential future uses of the Site are discussed further in Section F of this ROD.

- On October 8, 2003, EPA held an informational meeting providing results of Phase 1A of the Remedial Investigation and outlining planned Phase 1B Remedial Investigation activities. The Town also discussed redevelopment activities. A site update summarizing the Remedial Investigation progress was distributed to meeting attendees and the mailing list.

- On April 12, 2006, EPA held an informational meeting in Walpole, MA to discuss the results of the Remedial Investigation. A site update summarizing the preliminary Remedial Investigation results was distributed to the mailing list as well as made available to the meeting attendees.

- On June 28, 2007, EPA distributed a flyer to residents abutting Lewis Pond asking people to avoid contacting exposed pond sediment while dam levels were restored.

- In June 2007, EPA distributed flyers to some site abutters about a 2-day sampling effort.

- In April 2008, EPA distributed a site update newsletter to its mailing list summarizing the Remedial Investigation findings and outlining the next steps including the Feasibility Study and Proposed Plan timeframes.

- On May 29, 2008 and June 5, 2008, EPA published a notice and brief analysis of the draft Proposed Plan in the Walpole Times newspaper. This notice was also distributed to the mailing list. The final proposed plan was made available to the public records repositories on June 18, 2008 and sent to the mailing list.

- On June 9, 2008, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the draft Feasibility Study and to present the Agency's draft Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA, MassDEP and the PRPs answered questions from the public.

- On June 18, 2008, EPA made the administrative record available for public review at the information repositories at EPA's offices in Boston and at the Walpole Public Library, 65 Common Street, Walpole, MA. These are the primary information repositories for local residents and will be kept up to date by EPA.

- From June 18, 2008 to July 18, 2008, 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 18, 2008.

- On July 14, 2008, the Agency held a public meeting and hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of the hearing 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

The selected remedy was developed by combining components of different source control and management of migration alternatives for the four management areas to obtain a comprehensive approach for Site remediation. In the past, removal actions have been utilized to stabilize and secure the Site to address principal threats as detailed in Section B of this ROD. These actions included but were not limited to the excavation of soils and sediments containing asbestos and other COCs followed by disposal on-site under soil and asphalt covers.

In summary, the remedy addresses the principal and low-level threats through a combination of the following components:

- Monitoring of contaminated surface and subsurface soil remedies will be performed to ensure they remain protective and monitoring of contaminated groundwater performed to ensure it does not migrate to off-site receptors;

- On-site groundwater impacting the former mill tailrace will be treated and discharged on-site in order to ensure that cleanup standards are met;

- Soils and sediments exceeding unacceptable human health risk levels and/or applicable and relevant and appropriate federal and state standards (ARARs) will be excavated and disposed of off-site; and

- Soils and groundwater left in place that exceed ARARs or EPA's acceptable risk range will be addressed through the implementation of institutional controls.

The principal and low-level threats that this ROD addresses are summarized in Table D-1.

E. SITE CHARACTERISTICS

The Conceptual Site Model (CSM) for soil, sediment, groundwater, biota, and air at the Blackburn and Union Privileges Superfund Site is provided in Figure E-1. The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, 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 soil, sediment, groundwater, biota and air is based on this CSM.

The significant findings of the Remedial Investigation are summarized below.

Site Investigations and Remedial Actions

Environmental investigations to review possible impacts to the Site engendered by historical industrial activities were initiated in 1985, and were generally carried through 1990. Environmental data were also generated as a result of historical above ground and underground storage tank (AST and UST) closure and removals (primarily in 1987), and the Removal Action conducted primarily in 1992 by Canonie to address the presence of asbestos-contaminated soil at the Site. The reader is referred to the EDRA Report (SHA, 2000b) for a more detailed description of previous investigations and removal actions.

In 1999, SHA initiated the RI at the Site. See also the RI Report and RI Addendum Report for a summary of investigations completed as part of the RI. The purpose of the RI was to evaluate the nature and extent of contaminants of potential concern (COPCs) in various media at the Site, and to evaluate the potential risks that these COPCs may pose to human health or the environment. In general, the RI consisted of the following:

1. A review of background information and previous environmental activities completed at the Site;
2. Completion of multiple field investigations with associated laboratory analyses;
3. An evaluation of the quality of the data collected as part of the RI;
4. An evaluation of the physical characteristics of the Site;
5. An evaluation of the nature and extent of the COPCs detected at the Site;
6. An evaluation of the transport and fate of the COPCs detected at the Site; and
7. An evaluation of the potential risk that these COPCs pose to human health or the environment (i.e., ecological receptors).

Figures 4 through 8 of the FS summarize soil boring, monitoring well, surface water, sediment, and soil vapor exploration locations completed during the RI.

Site Conditions and Hydrogeology

The following is a summary of the Site conditions and hydrogeology as described in the RI Report.

Site Climate

The average wintertime high temperatures vary between approximately 17 and 40 degrees Fahrenheit (°F), while average summertime high temperatures are generally around 80°F. The National Climatic Data Center (NCDC) data indicate that the average annual precipitation is approximately 47 inches and is nearly equally distributed between the warmer half and colder half of the year. Annual snowfall can be over 50 inches, and snow cover normally lasts from mid- to late-December until approximately the last week of March. Bare ground is not unusual in the winter, and during some years, snow remains on the ground later into the season.

Site Geology

Knowledge of Site geologic conditions is based on observations made during the completion of approximately 4,000 linear feet of overburden and bedrock test borings, combined with observations of surface exposures of Site soils in the area of the Neponset River.

The following sequence briefly describes the Site geology from shallowest to deepest units encountered:

- **Soil fill** underlies much of the developed portion of the Site. In general, the fill appears to consist primarily of reworked sand/sand and gravel, or glacial till soils with variable amounts of other miscellaneous fill materials such as brick, wood, concrete, ash, metal, plastic, and glass. The thickness of soil fill encountered across the Site varies from about one foot to as much as 23 feet. Portions of the fill are saturated, with the largest area of saturated fill coinciding with the soil-capped portion of the AOC.

- **Stream and floodplain deposits** are reworked soils consisting of late-glacial alluvium and post-glacial swamp deposits of sand, silty sand, and sand and silt interbedded with organic silt or peat, related to the Neponset River and its tributaries. Soil grain size is predominately fine to coarse sand and/or gravel, and trace amounts of silt and clay. These soils are either exposed at the ground surface (in areas proximate to the Neponset River floodplain) or are located beneath soil fill, and are typically less than 4 feet thick. In general, the thickness of these deposits is inferred to be greatest proximate to the existing and former drainage channels of the Neponset River. Under conditions normally observed at the Site, the stream and floodplain deposits are typically saturated.

- **Ice-contact sand/sand and gravel sediments** were deposited during subsequent stages of glaciation by a combination of glacial ice and glacial meltwater streams. These sediments consist of poorly to well-sorted silty sand, sand, and sand and gravel, of varying density. Major constituents are either sand or gravel with little to trace amounts of fines. Localized horizons of finer-grained silty sand, sand and silt, or silt have been identified beneath portions of the Site, as well as horizons primarily consisting of cobbles and boulders. This stratum occurs across much of the Site with the exception of an area of shallow glacial till directly north of the wetland and Former Mill Tailrace, and an area in the central portion of the AOC. Where present, the layer ranges in thickness to greater than 40 feet. Sand and gravel soils have generally been differentiated from glacial till on the basis of lesser fines content, the localized presence of thin stratified horizons, and/or a slightly lower density. However, due to the heterogeneous texture and very dense nature of the ice-contact sand/sand and gravel at the Site, differentiating between some portions of this stratum and the underlying glacial till is difficult. In general, the ice-contact sand / sand and gravel deposits are typically partially or fully saturated throughout the Site. The groundwater contained in this unit is referred to as overburden "shallow" groundwater.

- **Glacial Till** is material deposited directly from glacial ice as a discontinuous layer during continued advance, retreat, and re-advance of glacial ice in the region. Results of drilling using conventional split-spoon sampling methods as well as sonic and air rotary drilling methods indicate the till stratum beneath the Site is very dense, and is heterogeneous in texture. Portions of soil cores of the till obtained during sonic drilling were often difficult to break apart, approaching the consistency of concrete. The texture of the till varies both laterally and vertically from sand-rich to silt-rich, but generally consists of a heterogeneous mixture of sand, silt, gravel, and clay with lesser amounts of cobbles and boulders. Some of the boulders encountered using sonic drilling methods were greater than 20 feet in diameter and appeared highly weathered. Grain size results indicate the glacial till stratum typically has a greater percentage of clay and silt as compared to the sand/sand and gravel stratum. In general, the glacial till soils encountered ranged in thickness from about 10 feet to 64 feet, and are typically fully saturated throughout the extent of the Site. The groundwater contained in the till unit is referred to as overburden "deep" groundwater.

- **Bedrock** - Sedimentary rock types encountered beneath the Site typically include: shale; quartzofeldspathic sandstone; siltstone; fine- to coarse-grained pebble conglomerate; and a coarse-grained granule conglomerate. The degree of weathering of these rock types varies across the Site. The depth to bedrock encountered beneath the Site ranged from about 14 to 80 feet below ground surface (bgs). Groundwater occurrence in Site bedrock is typically dependant upon and occurs within fractures. Groundwater contained in the bedrock unit is referred to as "bedrock" groundwater.

Site Hydrology

Surface Water

There are several surface water bodies at and in the vicinity of the Site including:

- The **Neponset River**, flows through the AOC in the aluminum culvert installed during the 1992 Removal Action and downstream into Lewis Pond.

- The reconstructed wetland/remnant of the **Former Mill Tailrace which is** located west of the AOC, which is connected to the Neponset River.

- **Lewis Pond** is an impounded section of the Neponset River, behind the West Street dam, with a relatively large floodplain, located northwest of the industrial portions of the Site.

The discharge of the Neponset River measured during an April 2001 stream gauging event was approximately 60.8 cubic feet per second (cfs); the discharge of the Neponset River measured during an August 2001 stream gauging event was approximately 3.6 cfs.

<u>Groundwater Flow Conditions</u>

Figures 9, 10, and 11 of the FS depict groundwater elevation contours for shallow, deep, and bedrock groundwater, respectively for the September 2006 water level round. The following general observations are made regarding Site groundwater flow conditions:

- Shallow overburden groundwater at the Site generally flows to the west to northwest (Figure 9 of the FS).

- Deep overburden groundwater generally flows in a westerly direction until reaching the central portion of the Site (approximately the well SH-01D location), while west of this area, groundwater generally flows northwest (Figure 10 of the FS).

- In the vicinity of monitoring well SH-01D is an area of apparent converging groundwater flow that is likely a result of the presence of high pH fluids - dense aqueous phase liquid (DAPL [i.e., pHs above about 12.5 standard units (s.u.)]). These fluids have a density greater than ambient groundwater. This density contrast between DAPL and ambient groundwater likely inhibits mixing of DAPL and ambient groundwater in a manner similar to that of a salt water / fresh water interface in coastal aquifers. Based on hydrologic and chemical data, it is expected that a relatively distinct boundary between DAPL and ambient groundwater exists at the Site with limited mixing occurring between the DAPL and ambient groundwater. Hence, this limited mixing of DAPL with ambient groundwater, and the increased density of DAPL relative to ambient groundwater results in lower water levels that result in an area of converging flow in the vicinity of SH-01D.

- Bedrock groundwater at the Site generally flows in a west-northwesterly direction (Figure 11 of the FS).

- In general, downward vertical gradients were observed in upland areas of the Site (e.g., on the AOC and the area east of South Street), indicating expected recharging conditions. Upward vertical gradients are prevalent in westerly portions of the Site and near the wetland areas (e.g., west of the AOC and the Former Mill Tailrace), indicating discharge conditions.

- Both horizontal and vertical groundwater flow conditions indicate that Site groundwater discharges to the Former Mill Tailrace and nearby Neponset River.

- As documented in the RI Report and RI Addendum Report, multiple water level measurement rounds conducted from 2001 to 2006 suggest that seasonal fluctuations in water levels have little effect on the overall groundwater flow regime.

Summary of RI Findings

This section presents a summary of the overall findings and conclusions of the RI regarding the nature and extent of analytes in various matrices at the Site, the transport and fate of these analytes, and the potential risks that these analytes pose to human health or ecological receptors.

The presence and distribution of the highest concentrations of analytes at the Site generally correlates with manufacturing operations that have occurred on portions of the Site over at least the past 100 years, and possibly dating back to the late 17th century. The principal analytes observed at the Site during the RI are elevated pH (defined as pH greater than 9 s.u.), metals, semi-volatile organic compounds (SVOCs – primarily PAHs) and VOCs (with the exception of trichloroethene (TCE), consisting primarily of aromatic volatile organic compounds (AVOCs)).

In general, the discussion in this section is limited to those analytes that contribute significantly[1] to potential risk to human health or ecological receptors based on the risk assessments summarized in Section 2 of the FS. For complete information about the entire data set collected at the Site, please refer to the RI Report and the RI Addendum Report.

<u>Summary of Analytes in Soil and Soil Vapor</u>

Approximately 145 soil samples[2] and 10 soil vapor samples were submitted for laboratory analysis during the RI. The soil vapor samples were collected to investigate the potential for VOC soil

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1 For the purpose of adding perspective to the risk assessment results in the context of the Site characterization results, significant contributions of analytes in Site media are those analytes that present potential adverse ecological effects, and those analytes that contribute to a cumulative incremental lifetime cancer risk (ILCR) greater than 10^{-4} and pose an ILCR of $>10^{-6}$ for workers or residents, or pose a non-cancer hazard quotient >1, and/or probability of exceeding a blood lead level >5%.
2 Note that the BHHRA (Baseline Human Health Risk Assessment and BERA (Baseline Ecological Risk Assessment) consider floodplain sediment (i.e., in the Floodplain Area and Orlando Property (located on Lot 33-259) to be "soil" as opposed to "sediment" due to the manner in which receptors are exposed to this matrix. However, the transport and fate

contaminants to migrate into indoor air. Since the analytes detected in soil vapor are directly related to the analytes detected in soil, a discussion related to soil vapor analytes has been included in this section.

Contaminated Soils in the AOC

During the 1992 asbestos Removal Action, asbestos-containing soil excavated from various areas of the Site was consolidated on-Site with existing asbestos-containing soil by others in an area located south of the former mill building. In addition, excavated asbestos-containing soil/sediment from the Former Mill Tailrace was consolidated in the HDPE-lined Settling Basin #2 Containment Cell. These areas south and west of the former mill building, along with an existing area of asbestos-containing soil north of the former mill building have been designated the AOC. South and west of the former mill building, the AOC is covered with six inches of clean vegetated topsoil, placed over 24 inches of clean sand; north of the former mill building, the AOC is covered with an asphalt cover. The AOC is subject to deed restrictions limiting its disturbance and an eight-foot high barbed-wire security fence surrounds its perimeter.

In general, the highest concentrations of soil analytes were detected below the AOC. Elevated pH conditions and elevated concentrations of metals, SVOCs (primarily PAHs), AVOCs, and asbestos[3] remain in this area.

The distribution of metals analytes in soil beneath the AOC is relatively heterogeneous, presumably reflecting historical fill placement practices. In some areas of the AOC, these soils are located beneath the groundwater table. The primary organic analytes detected in AOC soils were PAHs and to a lesser extent AVOCs – predominantly the lighter molecular weight PAHs (naphthalene and 2-methylnaphthalene) and benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds), suggesting petroleum related sources for organic analytes in this area (such as former petroleum related ASTs and USTs located in the AOC), or coal/ash sources.

The risk assessment did not consider soils in the AOC, as this area was addressed as part of the earlier CERCLA Removal Action. An assessment of risk to human health or the environment would indicate potential risk in the absence of the cap, fence, and deed restriction.

Soils and Soil Vapor East of South Street

Elevated concentrations of metals, PAHs, TCE, lead and limited areas of asbestos in soil were observed in the East of South Street, Old Railroad, and Former Lower Mill Pond areas of the Site (collectively the East of South Street Area). As depicted on Figure 14A of the FS, the highest

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of analytes in floodplain sediment is due to migration with surface water and sediment in the Neponset River; therefore, summary discussions related to floodplain sediment have been presented in Section 1.4.1.4 of the Feasibility Study.
3 SHA did not analyze soil samples from the AOC for asbestos; however, given that the AOC was the result of an asbestos Removal Action, elevated concentrations of asbestos in soil are known to be present at that location.

concentrations of TCE in soil were observed in the northeast portion of the East of South Street Area (near soil boring SB-09). TCE was also observed in soil vapor samples collected in this area (Figure 14B of the FS). However, elevated concentrations of TCE detected in the northeast portion of the East of South Street Area were limited to within approximately 15 feet of soil boring SB-09, suggesting a relatively localized area of elevated concentrations of TCE in soil and soil vapor. Notably, soil vapor samples collected from along the property boundary with the residential lots on Gleason Court contained relatively low concentrations of VOCs. Accordingly, as described below, no significant risk to current residents from vapor migration to indoor air on Gleason Court was identified.

There is no significant risk predicted to current human receptors from the elevated concentrations of analytes in soil or soil vapor in the East of South Street Area of the Site.

With regard to possible future scenarios, there are potential risks to hypothetical future human receptors in the East of South Street Area, which are summarized below:

- *Carcinogenic PAHs and arsenic* concentrations in soil pose potential cancer risk from direct contact with soil for a potential future resident at the East of South Street Area. In addition, arsenic concentrations in soil pose potential non-cancer hazards from direct contact with soil and ingestion of garden produce for a potential future resident at the Old Railroad and Former Lower Mill Pond Portions of the East of South Street Area. Figures 12 and 13 of the FS depict the distribution of total PAHs in shallow (0-1 ft bgs) and deep (1-10 ft bgs) soils, respectively. Figures 15 and 16 of the FS depict the distribution of arsenic in shallow and deep soils, respectively.

- *Trichloroethene* concentrations in soil pose a potential carcinogenic risk from inhalation of indoor air in the northeast portion of the East of South Street Area for a potential future resident or Site worker. Figure 14A of the FS depicts the distribution of TCE in soil in the East of South Street Area. Figure 14B of the FS depicts the distribution of TCE in soil vapor in the East of South Street Area.

Outside of the AOC, the only area of the industrial portion of Site where soil with asbestos concentrations greater than or equal to 1% has been observed is at one sample location on the East of South Street Area (refer to Figure 17 of the FS) [4].

A risk assessment to evaluate risks from inhalation of asbestos in soil becoming airborne for a current and future resident, current trespasser, current and future site worker, and future construction worker was conducted by EPA (Appendix B-1 of the FS). This risk assessment was

4 These samples were collected by USEPA's oversight contractor (M&E) as part of a soil and sediment sampling program aimed at further delineating the extent of asbestos in these matrices. Refer to M&E's Data Evaluation Report for Additional Asbestos Investigations in Appendix I of the Feasibility Study for further detail.

based on data from activity-based sampling performed at the Site in an area previously determined to be at an asbestos level of <1% in soils (Appendix B-2 of the FS).

During the previous 1992 Removal Action, asbestos was cleaned up using a standard of 1% in soil. In order to assess any remaining risks that could exist in these cleaned-up areas, EPA conducted site-specific activity-based sampling to measure potential asbestos air concentrations during low intensity (raking) and high intensity (lawn mowing) soil disturbance activities. The test location was selected because it was considered representative of the contaminant levels, terrain, and anticipated land uses found at other areas of potential concern. The raking activity data are considered applicable to other low intensity activities, like walking and jogging, which may occur at the site. The lawn mowing activity data are considered applicable to other high intensity activities like biking, gardening, landscaping, and soil excavation, which may occur at the site. In light of the activity-based sampling results, EPA's risk assessment found that areas previously cleaned up to below 1% asbestos in soil do not pose an unacceptable risk from any potential remnant asbestos in the soil that could become air-borne.

Some asbestos was found at levels above 1% in soil on the industrial portion of the site and within the floodplain of the Neponset River. This asbestos-contaminated soil could pose unacceptable risk due to inhalation of airborne fibers from disturbed soil. Asbestos at levels greater than 1% found in sediment along portions of the banks of the Neponset River, between the site and Lewis Pond and in Lewis Pond sediment, pose an unacceptable risk due to the potential for inhalation of airborne fibers from sediment that is, or could become, exposed.

As stated in Appendix B-1 to the FS, data collected from the activity based sampling event, including the background data, are considered applicable to all areas of the site potentially impacted by asbestos at levels up to 1%. See also Section G, Summary of Site Risks.

At the remainder of the residential parcels investigated, asbestos was not detected in soil at concentrations greater than the 1% detection limit during the 1992-3 Removal Action. Based on the activity-based sampling conducted, it was determined that exposures to airborne asbestos in these areas also did not pose unacceptable risks under CERCLA.

There is potential ecological risk to terrestrial birds and/or small mammals from elevated concentrations of aluminum, lead, selenium, vanadium, and zinc in soils east and west of South Street. These potential ecological risks are compared to background risks (e.g., the potential risks in the soil reference area) in Section 2 of the FS.

Summary of Analytes in Groundwater

Elevated pH and other groundwater analyte concentrations are present in the area beneath the AOC and the Former Mill Building, extending to the Neponset River in the vicinity of the Former Mill Tailrace. Groundwater contaminants are also elevated beneath an area east of South Street.

Historical releases of sodium hydroxide have resulted in the formation of a zone of significantly elevated pH conditions beneath the AOC and the Former Mill Building (refer to Figures 18 through 20 of the FS). Although the original sodium hydroxide source was eliminated over 20 years ago with termination of manufacturing activities, sodium hydroxide DAPL (pH conditions greater than approximately 12.5 s.u.) resides beneath and proximate to the westerly-extending wing of the Former Mill Building (where the former sodium hydroxide ASTs and the former bleachery were located).

The DAPL is limited in lateral and vertical extent to groundwater from deep overburden and shallow bedrock within the AOC. The increased density of the DAPL causes these fluids to migrate downward in the subsurface generally under the influence of gravity. The density and viscosity contrast between DAPL and ambient groundwater also likely inhibits mixing of DAPL and ambient groundwater; such that the DAPL has remained in the subsurface for decades. The DAPL serves as a source of sodium hydroxide to ambient groundwater. Accordingly, a plume of elevated pH (elevated pH is defined as pH greater than 9 s.u.) in groundwater extends westerly from the DAPL source to where groundwater discharges to the Former Mill Tailrace and nearby Neponset River (refer to Figures 18 through 20 of the FS).

Metals, PAHs, and VOCs are also present in groundwater beneath the Site at elevated concentrations, primarily within and extending downgradient of the AOC, and generally coinciding with or in close proximity to the elevated pH plume. Some metals and organic analytes are also present at elevated concentrations in soils in the elevated pH area, apparently due to a general co-location of their source areas with the elevated pH source area.

As described in the RI Addendum Report, the elevated pH, metals, PAH, and AVOC conditions in groundwater are likely well evolved (at "steady-state"). This is supported by two observations presented in the RI Addendum Report: (1) review of groundwater elevations and flow directions suggest that seasonal fluctuations in water levels have little effect on the overall groundwater flow regime (Section 4.2 of the RI); and (2) review of historical data shows consistent, or slightly decreasing, contaminant concentrations (Section 6.1 of the RI). These conditions are expected to remain relatively consistent, with slow attenuation, for an extended time frame likely lasting several decades or more. Groundwater monitoring down gradient of the AOC showed that contaminated groundwater was not migrating off the Site (see Figure A-1 of the ROD).

Currently, there are no human or ecological receptors that are exposed to Site groundwater, except where it discharges to surface waters at the former mill tailrace. Existing public and private wells in Walpole are located at least 500 feet from this steady-state groundwater plume and thus are not likely to be impacted in the future by contaminated Site groundwater.

With regard to future scenarios, there is potential risk to a hypothetical future construction worker coming into contact with groundwater with elevated pH conditions in the industrial area west of South Street. Use of site groundwater as tap water is currently prohibited, since no wells can be installed under the existing deed restriction in the Area of Containment. The potential risk from Site groundwater being used as tap water by hypothetical future residents beyond the boundary of the waste management areas was assessed, and resulted in risk being predicted from pH, metals, PAHs, and/or VOCs if the contaminated groundwater were to move beyond the industrial areas east and west of South Street.

<u>Summary of Analytes in Surface Water</u>

As described previously, groundwater from the Site migrates from the industrial portions of the Site towards the Neponset River. The discharge area for impacted groundwater is the Former Mill Tailrace and nearby Neponset River. Consequently, the highest concentrations of analytes in surface water were observed in the Former Mill Tailrace, including elevated pH and elevated concentrations of metals and PAHs. With the exception of a few metals (iron, arsenic, barium, and manganese) that are likely associated with background[5] concentrations in surface water, no analytes were detected at concentrations above human health or ecological screening levels in the Neponset River. Accordingly, while groundwater with elevated analyte concentrations discharges to the Former Mill Tailrace and nearby Neponset River, this groundwater discharge has only adversely impacted surface water quality within the Former Mill Tailrace and has not adversely impacted surface water quality in the Neponset River.

There is potential risk to a wader in the Former Mill Tailrace due to elevated pH conditions in surface water in this area. This potential risk is based on exceedances of pH criteria, not on a calculated human health risk or hazard. No other significant current or potential future risks to human receptors exposed to surface water were identified in the Baseline Human Health Risk Assessment (BHHRA).

There is potential for adverse effects to fish and benthic invertebrates in the western portion of the Former Mill Tailrace from surface water exposures of barium, copper, lead, manganese, vanadium, benzo(a)anthracene and benzo(a)pyrene as indicated by exceedances of ecological surface water benchmarks; however, fish tissue data, sediment toxicity data, and bioaccumulation testing suggest that these exceedences in surface water do not result in risk to fish or benthic invertebrates in the Former Mill Tailrace or Neponset River. Note that the Baseline Ecological Risk Assessment (BERA) included the western portion of the Former Mill Tailrace as part of the Neponset River for the analysis of potential impacts to fish and benthic invertebrates. Outside of the Former Mill Tailrace, only barium concentrations in the Neponset River exceed ecological benchmarks. As described above, barium concentrations observed in the Neponset River and Former Mill Tailrace appear to be associated with background conditions. Further discussion of comparison to background is presented in Section 2 of the FS, along with a comparison of surface water concentrations to ARARs.

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5 In general, the RI Report did not present a comparison of concentrations of analytes in Site media to "background" conditions; however, in the case of surface water data, a "background" comparison is helpful to understand the contaminant concentrations in surface water upstream of the Site.

Summary of Analytes in Sediment

Sediment samples were collected from the Neponset River, Former Mill Tailrace, Lewis Pond, and the floodplain of the Neponset River (including the Orlando Property)[6]. The RI also included collection of fish tissue samples, earthworm samples, and invertebrate samples exposed to Site sediment in these areas.

A general discussion of potential adverse ecological effects due to exposure to sediment and/or one or more of these biological media is presented here. The reader is referred to the BERA report for a discussion of the nature and extent, and the fate and transport of analytes in these media, and their relative contributions to ecological risk.

Elevated concentrations of metals, PAHs, and asbestos occur in sediment samples collected as part of the RI. In general, the highest concentrations of analytes were detected in sediment from the Former Mill Tailrace and Lewis Pond. However, elevated concentrations of analytes were also detected in sediment from the Neponset River, and Neponset River floodplain. In general, once these analytes entered the surface environment at the Site, they were likely transported to their current location with surface water and sediment migrating in the Neponset River.

Human health risk from exposure to lead in sediment at the Site was identified in floodplain sediment (soil) on Lot #33-257. Lead concentrations in soil on residential Lot #33-257 pose a potential hazard from direct contact with soil for both a current and future resident, and potential future construction worker. However, this estimate of hazard is based on just two soil samples collected on this lot. Additional delineation of lead on Lot #33-257 was proposed as part of the RI to improve the estimate of lead exposures; however, the property owner denied access.

In addition to lead, asbestos was detected at concentrations greater than 1% in the Former Mill Tailrace, Neponset River floodplain, Lot #33-257, and Lewis Pond as part of SHA's RI sampling activities in 2000 and 2001. Figure 21 of the FS depicts the distribution of asbestos in sediment samples collected during the RI[7]. There is potential ecological risk to terrestrial birds and/or small mammals from elevated concentrations of aluminum, cadmium, chromium, lead, selenium, vanadium, and zinc within the floodplain of the Neponset River (including the Orlando Property) in either sediment and/or biota. In addition, there is potential ecological risk to aquatic wildlife from elevated concentrations of aluminum, bis(2-ethylhexyl)phthalate, lead, nickel, and/or vanadium within the upper Former Mill Tailrace, Lewis Pond and the Neponset River in either sediment and/or

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6 The BHHRA and BERA consider floodplain sediment to be soil as opposed to sediment, due to the manner in which receptors are exposed to this matrix. However, the transport and fate of analytes in floodplain sediment is due to migration with surface water and sediment in the Neponset River; therefore, summary discussions related to floodplain sediment are presented in this sub-section .
7 Some of the asbestos samples collected during the RI and depicted on Figure 21 of the FS were collected by USEPA's oversight contractor M&E. Refer to the notes of Figure 21 of the FS for further discussion of this matter

biota. These potential ecological risks are compared to background risks (e.g., the potential risks in the soil/sediment or biota from reference areas) in Section 2 of the FS.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

1. Land Uses

Current on-site land uses

Currently, the industrial portion of the Site is within the Town of Walpole's Limited Manufacturing (LM) zoning district, which permits both industrial and limited uses by children (but not residential use). The remainder of the Site is zoned for residential use. The former mill building west of South Street has been vacant for several decades. The industrial area east of south street most recently housed Cosmec, Inc. The AOC is subject to a land use restriction which prohibits the disturbance of the soil and asphalt cover pursuant to the 1992 Removal Action.

Current adjacent/surrounding land uses

The remainder of the Site is currently zoned and in residential use.

Reasonably anticipated future land uses and basis for future use assumptions

In 2005, the Town of Walpole developed a report entitled: "Reuse and Redevelopment Planning Alternatives". The report recommended that the Town in the future consider acquiring some of the on-facility properties and designate them for municipal uses, commercial offices/light industrial uses, or age-restricted housing.

The reasonably anticipated future use (RAFU) of the industrial portions of the Site is based on the Town's reuse report as well as the current zoning of the properties. The RAFU for the remainder of the site (residential properties) is residential in accordance with the current use and zoning.

Therefore, current and possible future exposure scenarios for the industrial portion of the Site include the Site worker, construction worker, and trespasser, as well as a municipal or commercial worker, groundskeepers engaged in landscaping activities, and children attending libraries, schools, and daycare facilities. A second set of COCs and PRGs were developed assuming zoning changes in the allowed uses to preclude uses by children. Precluding daycare exposure, the current and possible future exposure scenarios include Site worker, construction worker, and trespasser.

Unrestricted future residential use is not considered to be a reasonably anticipated future use in the LM zoning district. However, given the mixed uses allowed at the Site, PRGs could be calculated for a variety of current and possible future exposure scenarios. To simplify the calculations, one adult exposure scenario was selected and one child exposure scenario was selected: the current allowed use (future young child attending daycare) and more restricted site use (current/future site worker).

In order to allow for future flexibility in the selection of a remedy at this Site in the event the Town of Walpole changes the allowed uses in the LM zoning district, two sets of PRGs have been developed for soils in the East of South Street Area. Accordingly, remedial alternatives evaluated for this portion of the Site also considered these two potential redevelopment alternatives. Refer to Appendix B of the FS for further discussion of this matter.

The AOC was covered under the previous CERCLA removal action and was not evaluated in the risk assessment. The AOC is known to contain asbestos in soils above the cleanup level used in the Removal Action (equal or greater than 1%). Due to this contamination, the AOC area is subject to a deed restriction which restricts land uses at this part of the Site/

2. Groundwater/Surface Water Uses

Current ground/surface water uses

Currently there are no known uses of groundwater at the site. The entire area of the Site has municipal water supplies available to it, and there are no known extraction wells in the area for irrigation or industrial purposes.

Regarding surface waters, there is potential access to the former mill tailrace, so there is a potential exposure pathway to waders and others who come in contact with surface waters that are degraded from contaminated groundwater discharge into the waterway. There are no known surface water withdrawals from the former mill tailrace or the adjacent reach of the Neponset River.

Potential beneficial ground/surface water uses (e.g., potential drinking water, irrigation, recreational) and basis for future use assumptions (e.g., Comprehensive State Ground Water Protection Plan (CSGWPP), promulgated State classification, EPA ground-water classification guidelines)

An April 2004 MassDEP Use and Value Determination for an approximately 22 acre area at and around the Site (based on a two mile radius delineated from the Site's center) identified most of the aquifer as classified GW-1. The Commonwealth's groundwater regulations, 314 C.M.R. § 6.03(1), state that ground waters assigned to this class are fresh ground waters found in the saturated zone of unconsolidated deposits or consolidated rock and bed rock and are designated as a source of potable water supply. MassDEP also identified the aquifer as being of Medium Use and Value.

The area has also been identified as a 'sole source aquifer' under the Federal Safe Drinking Water Act (SDWA), 42 U.S.C. § 300f *et seq.* (area designated in 53 FR 49920). Section 1424(e) of the Act, 42 U.S.C. § 300h-4(e), states that within the area no federal financial assistance may be entered for any action that will contaminate the aquifer as to create a significant hazard to public health.

Although the federal and state groundwater designations are in place, there is no anticipated future use of groundwater under the east and west of South Street areas where groundwater currently does meet drinking water standards (including the AOC). Any future redevelopment of the area under local zoning standards would utilize municipal water sources. Groundwater currently meets and will continue to meet federal and state groundwater standards beyond the east and west of South Street areas and is available for use. However, there are no known plans to utilize any groundwater anywhere on the Site for drinking water or any other purposes.

Regarding surface waters, the entire length of the Neponset River within the Site is designated Class B waters. The Commonwealth's surface water regulations, 314 C.M.R. § 4.05(b), state that surface waters assigned to this class are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Unless contaminated groundwater discharges are addressed, surface waters within the former mill tailrace will continue to be degraded and not be suitable for Class B designated uses.

Future ground/surface water uses

The future land use assumptions for the Site and surrounding areas are based on the current zoning of the property, the current institutional controls now in place at the Site, as well as the "Reuse and Redevelopment Planning Alternatives" report generated by the Town of Walpole in 2005. Community and stakeholder input were sought and incorporated through active outreach with the Town of Walpole Superfund Committee which generated the "Reuse and Redevelopment Planning Alternatives" report and with Town officials and interested community members.

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 baseline 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

A baseline human health risk assessment (HHRA) was completed for the Blackburn & Union Privileges Site to evaluate the likelihood and magnitude of potential human health effects associated with historical disposal practices (Science Collaborative, 2007). Direct exposures at the Area of Containment (AOC) were not evaluated in the HHRA due to the presumption that this area where asbestos-containing materials were consolidated, will remain capped, surrounded by a security fence, and subject to deed restrictions limiting its disturbance. The HHRA evaluated the potential for contaminants in soil at the East of South Street On-Facility Area, West of South Street On-Facility Area, the Old Railroad and Former Lower Mill Pond Area, and residential lots adjacent to the AOC and On-Facility Areas (i.e., the Off-Facility Area); floodplain soils at residential lots adjacent to the Neponset River and Lewis Pond; surface water, sediment in the Former Mill Tail Race, Neponset River, and Lewis Pond; groundwater beneath the On-Site Area, the Off-Facility Area, and the area to the east of the Neponset River; and indoor and outdoor air impacted via subsurface migration of volatile compounds across the Site to impact human receptor populations. A baseline HHRA addendum was also completed for the Site as part of the Feasibility Study (FS) to address risk from exposures to asbestos-containing soils (Appendix B-1 of the FS; M&E, 2008). The HHRA addendum evaluated asbestos air results obtained from the activity-based sampling effort conducted in 2008 for high intensity (lawn mowing) and low intensity (raking) activities. In addition, a supplemental risk assessment scenario (i.e., day care child) was evaluated for all contaminants as part of the Feasibility Study (FS), since future residential use of the On-Facility Areas is restricted by current zoning standards. (Appendix B-3 of the FS).

Section a: Identification of Chemicals of Concern

Thirty-nine of the more than 100 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 2.1 through 2.8 of Appendix C of the baseline risk assessment (Science Collaborative, 2007) and Table 2 of the risk assessment addendum (Appendix B-1 of the FS; M&E, 2008). From this, a subset of the chemicals were identified in the FS as presenting a significant current or future risk and are referred to as the chemicals of concern (COCs) in this ROD and summarized in Tables G-1 through G-6 for surface soil (0-1'), soil (0-10'), indoor air, groundwater beneath the On-Site Area, groundwater beneath the Off-Facility Area, and surface water in the Former Mill Tailrace. 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 3.1 through 3.6 of Appendix F of the baseline risk assessment (Science Collaborative, 2007) and Table 3 of the risk assessment addendum (Appendix B-1 of the FS; M&E, 2008).

Section b: Exposure Assessment

Current and potential future Site-specific pathways of exposure to chemicals of concern were determined. The extent, frequency, and duration of current or future potential exposures were estimated for each pathway. From these, exposure parameters, a daily intake level for each Site-related chemical was estimated.

The portion of the Site east of South Street consists of On-Facility and Off-Facility areas. The currently occupied Cosmec, Inc. (Cosmec) area (East of South Street On-Facility) is mostly paved and consists of five buildings that currently are used for foundry-related and associated support operations. Peripheral to the Cosmec property is the Old Railroad and Former Lower Mill Pond area, and three residential and one vacant Gleason Court Lots (Off-Facility). The portion of the Site west of South Street consists of the Area of Containment (AOC), the West of South Street On-Facility area, and three Off-Facility areas. The AOC is capped and access is restricted by the presence of an eight-foot high barbed-wire security fence. The West of South Street On-Facility area includes the currently unoccupied former mill building. Areas peripheral to the West of South Street On-Facility area and the AOC are mostly residential. Other residential lots and a commercial lot are located along the Neponset River and Lewis Pond.

The following is a brief summary of the exposure pathways that were found to present a significant risk (greater than 10^{-4} or a HI>1) at the Site. 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 3.0 and on Tables 4.1 through 4.12 of Appendix G of the baseline human health risk assessment (Science Collaborative, 2007), Section 3.0 and Table 4 of the risk assessment addendum (Appendix B-1 of the FS; M&E, 2008), and in Section B-3.3.3.2 of Appendix B-3 of the FS (M&E, 2008).

The following current/future exposure pathways were found to present a significant risk at the Site:

- Resident (young child) with exposure to lead in floodplain soil (by ingestion) along the Neponset River;[8]
- Recreational user with exposure to elevated pH conditions in surface water (by dermal contact) in the Former Mill Tailrace;[9] and
- Recreational user with exposure to asbestos in sediments (by inhalation of fugitive dust) along the Neponset River and in Lewis Pond.[10]

The following future exposure pathways were found to present a significant risk at the Site:

- Resident (adult and young child) with exposure to soil (by ingestion, dermal contact and inhalation of fugitive dust) at the East of South Street On-Facility Area, West of South Street On-Facility Area, and Old Railroad and Former Lower Mill Pond Area;[11]
- Resident (adult and young child) with exposure to indoor air (by inhalation) at the SB-09 Area of the East of South Street On-Facility Area;[12]
- Site worker with exposure to indoor air (by inhalation) at the SB-09 Area of the East of South Street On-Facility Area;[13]
- Resident (adult and young child) with exposure to untreated groundwater (by ingestion, dermal contact, and inhalation) from On-Site monitoring wells and Off-Facility monitoring wells;[14] and

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[8] For current/future residential floodplain soil exposures, a young child was evaluated for lead exposure using the Integrated Exposure Uptake Biokinetic (IEUBK) Model. Default EPA assumptions and an arithmetic mean exposure point concentration were used as inputs to the model.

[9] The potential current/future surface water risk is based on exceedances of surface water pH criteria, not on a calculated human health risk or hazard.

[10] The potential current/future sediment risk is assumed based on the presence of asbestos concentrations greater than 1%, not on a calculated human health risk.

[11] For future residential soil exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 70 kg and 15 kg were used for the adult and child, respectively. Dermal contact was assumed with 5,700 cm^2 of surface area for the adult and 2,800 cm^2 for the child. Future soil exposures were assumed to occur 150 days/year. Asbestos exposures were assumed to occur 22 days/year during the following high intensity activities: mowing (2 hours/day), landscaping (2 hours/day) and biking (1 hour/day).

[12] For future residential indoor air exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Future indoor air exposures were assumed to occur 24 hours/day for 350 days/year.

[13] For future site worker indoor air exposures, an exposure duration of 25 years was presumed. Future indoor air exposures were assumed to occur 12 hours/day for 250 days/year.

[14] For future residential exposures to untreated groundwater, drinking water ingestion rates of 2 L/day and 1.5 L/day for the adult and young child, respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. Dermal contact was assumed with 18,000 cm^2 of surface area for the adult, and 6,600 cm^2 for the child.

- Construction worker with exposure to untreated groundwater (by dermal contact) from On-Site monitoring wells and Off-Facility monitoring wells;[15]
- Construction worker with exposure to lead in floodplain soil (by ingestion) along the Neponset River;[16]
- Day care child with exposure to soil (by ingestion, dermal contact and inhalation of fugitive dust) at the East of South Street On-Facility Area and Former Railroad and Lower Mill Pond Area;[17] and
- Day care child with exposure to indoor air (by inhalation) at the SB-09 Area of the East of South Street On-Facility Area.[18]

Section c: Toxicity Assessment

The BHHRA assessed the potential for cancer risks and non-cancer health effects.

The potential for carcinogenic effects is evaluated with chemical-specific cancer slope factors (CSFs) and inhalation unit risk values. A weight of evidence classification is available for each chemical. CSFs 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 calculated using the CSF is unlikely to be greater than the risk predicted. A summary of the cancer toxicity data relevant to the chemicals of concern at the Site is presented in Table G-7.

The potential for non-cancer health effects is quantified by reference doses (RfDs) for oral exposures and reference concentrations (RfCs) for inhalation exposures. RfDs and RfCs have been developed by EPA and they represent an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure that is likely to be without an appreciable risk of deleterious health effects during a lifetime. RfDs and RfCs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A summary of the non-carcinogenic toxicity data relevant to the chemicals of concern at the Site is presented in Table G-8.

Showers/baths were assumed to occur 350 days/year for 0.58 hr/day for the adult and 1 hr/day for the child. For VOCs, the inhalation dose was assumed to be equal to the ingestion dose to estimate inhalation risks associated with household water use.

[15] For future construction worker exposures to untreated groundwater, an exposure frequency of 156 days/year was used with an exposure duration of 1 year. Dermal contact was assumed with 3,300 cm^2 of surface area.

[16] For future construction worker floodplain soil exposures, a female worker was evaluated for lead exposure using EPA's Adult Lead Model (ALM). Default EPA assumptions and an arithmetic mean exposure point concentration were used as inputs to the model.

[17] For future day care child soil exposures, an exposure duration of 6 years and body weight of 15 kg were presumed for a young child. Dermal contact was assumed with 2,800 cm^2 for 150 days/year. Asbestos exposures for young child while playing in the vicinity of adults or older children performing high-intensity activities were assumed to occur 22 days/year during the following high intensity activities: mowing (2 hours/day), landscaping (2 hours/day) and biking (1 hour/day).

[18] For future day care child indoor air exposures, an exposure duration of 6 years was presumed. Future indoor air exposures were assumed to occur 8 hours/day for 250 days/year.

Section d: Risk Characterization

Risk characterization combines estimates of exposure with toxicity data to estimate potential health effects that might occur if no actions were taken.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the daily intake levels (see *Section b: Exposure Assessment*) by the CSF or by comparison to the unit risk value. These toxicity values are conservative upper bound estimates, approximating a 95% upper confidence limit, on the increased cancer risk from a lifetime exposure to a chemical. Therefore, the true risks are unlikely to be greater that the risks predicted. Cancer risk estimates are expressed as a probability, e.g., one in a million. Scientific notation is used to express probability. One in a million risk (1 in 1,000,000) is indicated by 1×10^{-6} or 1E-06. In this example, an individual is not likely to have greater than a one in a million chance of developing cancer over a lifetime as a result of exposure to the concentrations of chemicals at a site. All risks estimated represent an "excess lifetime cancer risk" in additional to the background cancer risk experienced by all individuals over a lifetime. 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's practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake by the RfD or RfC. A HQ ≤ 1 indicates that an exposed individual's dose of a single contaminant is less than the RfD or RfC and that a toxic effect is 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 ≤ 1 indicates that toxic non-carcinogenic effects are unlikely.

The following is a summary of the media and exposure pathways that were found to present a significant risk exceeding EPA's cancer risk range and non-cancer threshold at the Site. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 5.0 and Appendices L and M of the baseline risk assessment (Science Collaborative, 2007), Section 5.0 and Tables 9.1 through 9.53 of the risk assessment addendum (Appendix B-1 of the FS; M&E, 2008), and Attachment 1 of Appendix B-3 of the FS (M&E, 2008) 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.

<u>Future Site Worker at the East of South Street On-Facility Area</u>

Table G-9 depicts the carcinogenic risk summary for the chemicals of concern in indoor air evaluated to reflect potential future commercial exposure corresponding to the RME scenario.

For the future site worker, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6}. The exceedance was due primarily to the presence of trichloroethene in soil gas.

Residential Groundwater Use

Tables G-10 through G-13 depict the carcinogenic and non-carcinogenic risk summary for the chemicals of concern in future residential wells evaluated to reflect potential future potable water exposure corresponding to the RME scenario, under the assumption that groundwater from the On-Site Area and Off-Facility Area are used as a source of potable water in the future. For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of benzene, ethylbenzene, methylene chloride, naphthalene, trichloroethene, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, 4-methylphenol, bis(2-ethylhexyl)phthalate, carbazole, antimony, arsenic, chromium, manganese, nickel, vanadium, and zinc in On-Site groundwater, and benzene, naphthalene, benzo(a)pyrene, dibenz(a,h)anthracene, arsenic, manganese, and vanadium in Off-Facility groundwater.

Resident at the East of South Street On-Facility Area

Table G-14 depicts the carcinogenic risk summary for the chemicals of concern in soil evaluated to reflect potential future residential exposure corresponding to the RME scenario. For the future young child and adult resident, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6}. The exceedance was due primarily to the presence of carcinogenic polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), trichloroethene, arsenic, and asbestos in soil. In addition, for the SB-09 area, trichloroethene in soil gas, with the potential to impact indoor air quality, exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6}.

Resident at the West of South Street On-Facility Area

Table G-15 depicts the carcinogenic risk summary for the chemicals of concern in soil evaluated to reflect potential future residential exposure corresponding to the RME scenario. For the future young child and adult resident, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6}. The exceedance was due primarily to the presence of carcinogenic polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), arsenic, and asbestos in soil.

Resident at the Old Railroad and Former Lower Mill Pond Area

Tables G-16 and G-17 depict the carcinogenic and non-carcinogenic risk summaries for the chemicals of concern in soil evaluated to reflect potential future residential exposure corresponding to the RME scenario. For the future young child and adult resident, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1. The exceedance was due primarily to the presence of carcinogenic polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), arsenic, and asbestos in soil.

Day Care Child at the East of South Street On-Facility Area

Table G-18 depicts the carcinogenic risk summary for the chemicals of concern in soil evaluated to reflect potential future day care exposure corresponding to the RME scenario. For the future young child in day care, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6}. The exceedance was due primarily to the presence of carcinogenic polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), trichloroethene, arsenic, and asbestos in soil. In addition, for the SB-09 area, trichloroethene in soil gas, with the potential to impact indoor air quality, contributed to the exceedance of the EPA acceptable risk range of 10^{-4} to 10^{-6}.

Day Care Child at the Old Railroad and Former Lower Mill Pond Area

Tables G-19 and G-20 depict the carcinogenic and non-carcinogenic risk summaries for the chemicals of concern in soil evaluated to reflect potential future day care exposure corresponding to the RME scenario. For the future young child in day care, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1. The exceedance was due primarily to the presence of carcinogenic polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), arsenic, and asbestos in soil.

Section e: Uncertainties

Trichloroethene is being re-evaluated for carcinogenic potency by EPA. The high-end of the range of oral slope factors and unit risk values was used for risk estimation. This approach may have resulted in an overestimate of the risk associated with trichloroethene in soil, soil gas, and groundwater. These uncertainties will be periodically reviewed to address changes in and availability of toxicity values for trichloroethene.

For the groundwater dermal contact pathway, risk associated with dermal absorption of the carcinogenic polycyclic aromatic hydrocarbons was not assessed because permeability constants for these compounds are outside the effective predictive range of the correlation modeling. This uncertainty may result in an underestimate of risk. In addition, risk associated with dermal absorption of chlorinated solvents (e.g., trichloroethene) is likely underestimated. Permeability constants for this class of compounds are underestimated by correlation modeling. These uncertainties will be periodically reviewed to address changes in the dermal absorption values for these compounds.

Airborne concentrations of volatile compounds for the showering/bathing scenario and for indoor/outdoor air were estimated using accepted EPA methods or exposure models. The use of these methods or modeling to estimate airborne concentrations of volatile compounds likely results in an overestimate of risk since conservative assumptions were employed in the exposure modeling. These uncertainties will be periodically reviewed in light of technical advances that occur in the evaluation of these air pathways.

Section f: Asbestos evaluation

The HHRA addendum was performed to determine if further response actions were necessary for soils in areas previously cleaned up to less than a 1% asbestos standard. Supplemental soil sampling was performed where previous detects of asbestos were reported at less than 1%. In order to assess the inhalation risk associated with fugitive dust release in these asbestos-impacted areas, site-specific activity-based sampling was conducted to measure asbestos air concentrations during low intensity (raking) and high intensity (lawn mowing) soil disturbance activities. Activity-based sampling was targeted to areas of the site believed to be representative of the site as a whole. The raking activity was considered applicable to other low intensity activities (walking and jogging) while the lawn mowing activity was considered applicable to other high intensity activities (biking, gardening, landscaping, and soil excavation). The mowing activity was selected to provide an upper bound of exposures due to its ability to generate high energy airborne fibers from soil. Because the actual proportion (relative to other dust components) of asbestos in dust may be higher or lower than what is in soil, activity-based sampling data were gathered to measure asbestos in air during typical soil disturbance activities in order to quantify risk from asbestos in soil. The direct measurement of asbestos concentrations in air during applicable activities and the use of these direct measurement values in the risk calculations might reduce the uncertainty associated with the asbestos risk evaluation.

However, there are uncertainties associated with the use of asbestos toxicity values, adjusted to reflect less-than-lifetime exposures and applicable only to fibers that meet specific dimension (length and width) requirements. Risks could be underestimated if actual exposures occur over longer time frames or asbestos fibers were present, but not quantified, because they did not fall within the specific requirements of the analytical method. These uncertainties will be periodically reviewed, including during the Five year review process, to address changes in and the availability of toxicity values for asbestos.

2. Ecological Risk Assessment

A baseline ecological risk assessment (BERA) was completed for the Blackburn and Union Privileges Superfund Site, including off-site and on-site study areas. The study area for the

BERA included adjacent wetland and upland habitats, and the aquatic habitats of the on-Site and downstream reaches of the Neponset River as far as Lewis Pond. Similarly to the BHHRA, direct exposures at the Area of Containment (AOC) were not evaluated due to the presumption that this area will remain capped, surrounded by a security fence, and subject to deed restrictions limiting its disturbance. The BERA evaluated the potential for adverse ecological effects from the exposure of receptor populations to chemicals of potential ecological concern (COPECs) in the terrestrial and aquatic habitats of the Site.

Section a: Identification of Contaminants of Potential Ecological Concerns

Chemicals of Potential Ecological Concern (COPECs) were identified in the Screening Ecological Risk Assessment (SLERA) using effects-based screening involving the comparison of maximum contaminant concentrations to ecological benchmarks for each medium and exposure area, and included all COPEC that would bioaccumulate. The refinement of COPECs in the BERA excluded COPECs that were never detected in the ecologically accessible areas of the site. Data used to identify COPECs are summarized in Tables G-21and G-22 (surface water), Tables G-23 to G-25 (sediment), and Tables G-26 and G-27(soil).

For purposes of evaluation in the BERA, the on-site soil exposure areas were subdivided into three separate exposure areas. The BERA also evaluated the Former Mill Tailrace sediment and surface water into two separate exposure areas: Upper Former Mill Tailrace and Lower Former Mill Tailrace, based on habitat assessment. The Lower Former Mill Tailrace was evaluated as part of the Neponset River in the BERA.

COPECs identified in surface water, sediment, and soils were metals and SVOCs. All of the exposure areas had one or more metals and SVOCs identified in each media as COPECs.

Section b: Exposure Assessment

As part of the ecological risk assessments, aquatic and terrestrial habitats on site were identified and characterized. Habitats on-site include terrestrial and aquatic habitats surrounding the former industrial area and existing residential areas. South Street approximately bisects the Site in a generally north-south direction, and the Neponset River approximately bisects the Site in a generally east-west direction. There are several surface water bodies at and in the vicinity of the Site including the Neponset River, the Former Mill Tailrace, which is connected to the Neponset River, and Lewis Pond which is an impounded section of the Neponset River, behind the West Street dam, with a relatively large floodplain.

Wetlands on the Site are mainly associated with the Neponset River. These occur upstream, adjacent to, and downstream of the Site in discontinuous sections, broken by a section of culvert north of South Street, and relatively long channelized reaches of the river. Eleven distinctly defined wetlands were identified that are generally less than one or two acres. The largest is the seven-acre Lewis Pond, which includes emergent marsh and small open water areas.

The 100-year floodplain of the Neponset River is approximately 60 to 450 feet wide and includes bordering wetlands and residential or commercial properties all along its length. Most of the floodplain is residential and represents potential habitat for small mammals and songbirds. The remaining uplands associated with the Site are generally small and disconnected. They include residential lawn, mowed fields, small white pine/oak forest, and industrialized property with poor habitat.

Based on State Natural Heritage mapping data, there are no habitats of rare wildlife, or Areas of Critical Environmental Concern in the vicinity of the Site. There are no known occurrences of State-listed rare plants or animals, or exemplary natural communities in the area of the Site. There are no known occurrences of Federally-listed endangered or threatened species at the Site.

Based on the conceptual site model, complete exposure pathways were identified, sampled, tested, and evaluated in each habitat area separately. Consistent with the site conceptual model, exposure pathways, assessment endpoints, and measurement endpoints were developed and are summarized in Table G-28.

Based on the evaluation in the BERA, COPECs with complete exposure pathways were identified for semi-aquatic wildlife (kingfisher, great blue heron, muskrat, and raccoon) and for terrestrial wildlife (American robin and short-tailed shrew). Potential receptors in aquatic habitat include aquatic invertebrate and fish populations exposed to COPECs in surface water or sediment in Lewis Pond, Neponset River, and Upper Former Mill Tailrace. Exposures of semi-aquatic wildlife (kingfisher, great blue heron, muskrat, and raccoon) were also evaluated in each of these three exposure areas. The evaluation of terrestrial wildlife was conducted for four terrestrial exposure areas including: the Neponset River Floodplain; West of South Street; East of South Street; and the Orlando Property. Exposure of terrestrial and semi-aquatic wildlife receptors was evaluated in the BERA by calculating the daily intake of COPECs via multiple pathways including diet and incidental sediment and soil ingestion. Dietary doses were based on site-specific data including, exposure point concentrations of COPECs in each media, and measured concentrations in earthworm tissue, fish tissue, benthic invertebrate tissue from laboratory bioaccumulation testing with Site sediment, and calculated concentrations of plant tissue.

Section c: Ecological Effects

The measurement and assessment endpoints identified in Table G-28 were evaluated in the BERA to assess the potential adverse ecological effects resulting from the exposure to COPECs in on-site surface water, sediments, or soil. In aquatic habitats, the assessment endpoint included the evaluation of the sustainability of local populations of benthic invertebrates and fish, and secondly, the potential effects on populations of wildlife exposed to COPECs in the aquatic environment (kingfisher, great blue heron, muskrat, and raccoon) through dietary modeling.

The aquatic receptor endpoints included comparisons of surface water COPECs to NRWQC values, as well as the assessment of site-specific benthic invertebrate and whole body fish tissue concentrations of COPECs compared to published tissue residue effects levels that are indicative of adverse affects.

The effects assessment also estimated toxicity or adverse effects associated with the additive effects of specific categories of COPECs (Narcosis Model for PAHs and hydrophobic organics in fish); and evaluated the toxicity from exposure to COPECs in sediment using laboratory toxicity testing. Sediment toxicity testing using the freshwater amphipod, *Hyalella azteca* was performed for five on-site locations and two reference locations.

For the evaluation of the semi-aquatic wildlife receptors (kingfisher, great blue heron, muskrat, and raccoon), dietary modeling was performed using site-specific fish and benthic invertebrate tissue data, and calculated plant tissue concentrations. The daily dose for each receptor, based on dietary assumptions, was compared to published Toxicity Reference Values (TRVs), for chronic and acute exposures for both no observed adverse effects levels (NOAEL) and lowest observed adverse effects level (LOAEL) TRVs. The NOAEL is the highest dose of a particular chemical at which no adverse effects are observed in the test species, and the LOAEL is the lowest dose at which adverse effects are observed.

In terrestrial habitats, the assessment endpoint included the evaluation of the sustainability of local populations of wildlife receptors exposed to COPECs in the upland environment (American robin and short-tailed shrew) through dietary modeling. Similar to the modeling for semi-aquatic receptors, the concentrations in soil invertebrates and soil were used in the exposure models that estimated exposure to COPECs from food and soil ingestion. Potential exposures to wildlife that use the Site habitat were compared to appropriate LOAEL and NOAEL TRVs to assess potential adverse effects of exposure on each receptor for each of the four upland habitat areas.

Section d: Ecological Risk Characterization

The ecological risk evaluation concluded that there is potential for adverse effects to fish and benthic invertebrates in the western portion of the Former Mill Tailrace from surface water exposures of COPECs as indicated by exceedances of ecological surface water benchmarks; however, fish tissue data, sediment toxicity data, and bioaccumulation testing suggest that these exceedences in surface water do not result in risk to fish or benthic invertebrates in the Former Mill Tailrace or Neponset River. Note that the BERA included the western portion of the Former Mill Tailrace as part of the Neponset River for the analysis of potential impacts to fish and benthic invertebrates. Outside of the Former Mill Tailrace, only barium concentrations in the Neponset River exceeded ecological benchmarks. Risks associated with the Site were concluded to be insignificant, as barium concentrations observed in the Neponset River and Former Mill Tailrace appear to be associated with background conditions.

Concentrations of several analytes in surface water exceed their respective NRWQCs for chronic freshwater exposure and/or Massachusetts Surface Water Quality Standards (MSWQSs) in the lower portion of the Former Mill Tailrace, including: aluminum, copper, lead, and pH. The concentration representing a protective level for aquatic receptors was selected as the NRWQC/MSWQS, which are also the levels required to comply with Site ARARs (Table G-29).

For the semi-aquatic wildlife receptors, risks to wildlife were assessed by calculating Hazard Quotients (HQs) for each of the selected ecological receptors for each COPEC. Based on the dietary models, there were no significant ecological risks to wildlife receptors exposed to aquatic habitats. Although dietary models indicated a potential risk from exposure to aluminum, these risks were determined to be low and similar to reference locations (Table G-29). Through evaluation of the distribution of the COPECs, the risks associated with them were determined to not be elevated above reference conditions, and site-specific clean-up levels were not established.

There is potential ecological risk to terrestrial birds and/or small mammals from elevated concentrations of metals (including aluminum, lead, and selenium) in soils east and west of South Street, the Orlando property, and within the floodplain of the Neponset River (Table G-29). In each of these cases, these potential ecological risks were compared to background risks (e.g., the potential risks in the soil reference area) and were determined to be similar to reference locations. Through evaluation of the distribution of the COPECs, the risks associated with them were determined to not be elevated above reference conditions, and site-specific clean-up levels were not established.

Section e: Uncertainties

Ecological risk assessments are subject to a variety of uncertainties as the result of both the assumptions used to describe the site conditions, habitats and estimated receptor exposures, plus variability in receptor exposure and toxicological response. As a result, the assessment must estimate or infer the information concerning individuals to reach a conclusion about risk at the population level.

The BERA provided an evaluation of potential sources of uncertainty in the calculation of risk. These uncertainties include a lack of medium- and species-specific benchmarks and toxicity data for some of the COPECs. Extrapolation of toxicity data among species and limited data on the bioavailability of COPECs in each medium are factors that contribute to significant uncertainty in the use of comparisons to published toxicity studies.

3. Basis for Response Action

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.

The baseline human health and ecological risk assessments revealed that potential exposure to compounds of concern in soil, sediment, groundwater, surface water, and soil gas by current and future residents, future site workers and construction workers, current and future waders via ingestion, dermal contact, and inhalation may present an unacceptable human health risk greater than a cumulative risk of 10-4 or an unacceptable ecological risk in surface water due to an exceedance of promulgated water quality criteria.

Therefore, the media to be the focus of the remedial action are soil, sediment, groundwater, and surface water.

H. REMEDIATION OBJECTIVES

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, response 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 the Blackburn and Union Privileges Superfund Site are listed in Table H-1.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

1. 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 (compliance with ARARs); 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.

2. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP) 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.

With respect to groundwater response action, the RI/FS developed a limited number of remedial alternatives that attain site specific remediation levels within different time frames using different technologies; and a no action alternative.

As discussed in Section 3 of the FS, soil, sediment 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. 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. 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. Each alternative was then evaluated in detail in Section 5 of the FS.

J. DESCRIPTION OF ALTERNATIVES

1. Introduction

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

This section presents the formulation and description of a range of Site-wide remedial action alternatives. In assembling alternatives, general response actions and process options retained from Section 3.0 of the FS are combined to form alternatives for the Site as a whole. The alternatives described in this section represent various conceptual approaches to addressing Site contaminants, which are technically effective, implementable, and cost-effective.

These alternatives are subject to detailed analysis in Section 5 of the FS and Section K of the ROD. Tables 11A through 11D of the FS summarize the assembled alternatives by area of the Site. In some instances, these remedial areas overlap because they were compiled to address RAOs on a matrix-by-matrix basis. These areas are depicted on Figure 22 of the FS and include:

- The On-Site Groundwater and Former Mill Tailrace Remediation Surface Water Area (SW) - Groundwater and Surface Water;
- The East of South Street Remediation Area (SO) – Soil;
- The Area of Containment Remediation Area (AOC)– Soil; and
- Lewis Pond/Neponset River, Neponset River, Former Mill Tailrace Remediation Area (SSW) – Sediment / Soil.

In some instances, remedial alternatives may contain duplicative process options (e.g., maintenance of fencing in the AOC for both the groundwater and contaminated soil remedies, or preparation of land use restrictions for the Site) because it is not known which alternative will be selected as a final remedy.

Tables 12A through 12D of the FS present an analysis of potentially applicable ARARs and To Be Considered (TBCs) guidances for each remedial alternative.

Tables 3B, 4B, 5, 6B, and 7 of the FS present a summary of PRGs for each matrix that are protective of human health and/or meet ARARs.

Several of the active remedial alternatives presented in this Section contemplate remediation within a wetland or floodplain. Those active remedial alternatives that involve significant activities/impact to wetlands and floodplains contain provisions to address these considerations (e.g., wetlands restoration or replacement of lost flood storage capacity).

The zoning for each area of the Site requiring remediation is summarized below:

Area Requiring Remediation	Current Zoning
The On-Site Groundwater and Former Mill Tailrace Surface Water Remediation Area (SW)	Limited Manufacturing / Residential
East of South Street Remediation Area (SO)	Limited Manufacturing
Area of Containment Remediation Area (AOC)	Limited Manufacturing; however, a land use restriction currently precludes development on, or disturbance of the AOC
Lewis Pond/Neponset River, Neponset River, Former Mill Tailrace Remediation Area (SSW)	Residential

As discussed in Section F of this ROD, currently the East of South Street Area is located within Walpole's Limited Manufacturing (LM) zoning district[19]; which permits both industrial and limited uses by children (but not residential use); therefore, current and possible future exposure scenarios include the Site worker, construction worker, and trespasser, as well as a municipal or commercial worker, groundskeepers engaged in landscaping activities, and children attending libraries, schools, and daycare facilities.

The Town of Walpole may in the future consider precluding redevelopment of the LM-zoned portions of the Site for use as a daycare facility or school. Therefore, in order to allow for future flexibility in the selection of a remedy at this Site, a second set of PRGs was developed assuming the Town changed the allowed uses in the LM zoning district to preclude uses by children. With such a restriction, the current and possible future exposure scenarios include Site worker, construction worker, and trespasser. Accordingly, remedial alternatives evaluated for this portion of the Site will also consider these two potential redevelopment alternatives.

19 While a portion of lot 33-121 is located within Walpole's Residential zoning district, its size, configuration, extent of wetland and limited access make future residential use unlikely. Therefore, residential use is not a reasonably foreseeable future use in this portion of the Site.

The Management of migration alternatives address contaminants that have migrated into and are now moving with the groundwater and the surface water from the original source of contamination. At the Site, contaminants have migrated from former disposal and industrial operations at the Site to downstream areas. The MM alternatives analyzed for the Site include:

The On-Site Groundwater and Former Mill Tailrace Remediation Surface Water Area (SW)

SW-1: No Action;
SW-2: Limited Action; and
SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater.

A more complete, detailed presentation of each alternative is found in Section 4 of the FS.

2. Description of Groundwater and Surface Water Remedial Alternatives (SW Alternatives)

As presented on Table 8 of the FS, the RAOs for groundwater and surface water in the SW area include:

- Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed MCLs or result in a cumulative excess cancer risk greater than 1E-4, non-carcinogenic HI greater than 1, a PBL greater than 5%, or where pH conditions are elevated, and meet ARARs;
- Prevent migration of contaminated groundwater beyond the compliance boundaries for the SO and AOC waste management areas.
- Prevent dermal contact by a future construction worker with groundwater having elevated pH conditions, and meet ARARs;
- Prevent dermal contact by a current and future wader with surface water having elevated pH conditions, and meet ARARs; and
- Surface water concentrations shall meet ARARs.

The recommended groundwater PRGs are listed on Table 4B of the FS.

As described in the RI Addendum Report, the spatial distribution and concentrations of groundwater COCs appear to be at "steady state" (i.e., concentrations are relatively consistent with respect to time), or are decreasing. Groundwater from the area of the AOC discharges to the Former Mill Tailrace and the nearby Neponset River. Groundwater with elevated COC concentrations does not apparently migrate south or west of the Neponset River.

As summarized in Section 2.2.1.2 of the FS, concentrations of surface water COCs exceed their respective PRGs in the Former Mill Tailrace. As described above, the Former Mill Tailrace appears to be a key discharge zone for contaminated Site groundwater. Hence, remedial alternatives considered below include preventing exposure to surface water in the Former Mill Tailrace by a future human receptor, or intercepting the discharge of contaminated groundwater to the Former Mill Tailrace which is causing COCs to exceed their respective PRGs.

The SW Alternatives developed for this FS are designated as:

SW-1: No Action;
SW-2: Limited Action; and
SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater.

Descriptions of these SW alternatives are provided in the following sub-sections.

Alternative SW-1: No Action

Alternative SW-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP. This alternative is proposed as a means of identifying problems posed by the Site if no remedial actions are implemented. "No Action," as used in this FS, means no additional actions to maintain or improve current conditions at the Site or to limit human or ecological exposure to Site contaminants, except for statutorily required Five-Year Reviews of the protectiveness of the remedy. Because no remedial measures would be implemented as part of this alternative, the only costs associated with SW-1 are the costs to conduct Five-Year Reviews (see Table 13A of the FS).

Alternative SW-2: Limited Action

Alternative SW-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health. This alternative does not involve active treatment of groundwater or surface water.

The SW-2 alternative includes establishing a compliance boundary around the SO and AOC waste management areas (see Figure 27A of the FS), within which land use restrictions would prevent use/exposure to contaminated groundwater. In addition, for the area around the Mill Tailrace, the alternative implements land use restrictions that would require a soil/groundwater management plan for potential construction-related activities within this area.

In addition, this alternative would include installing a fence around the Former Mill Tailrace to preclude access to a wader or fisher in this portion of the Site. This alternative also includes maintaining and repairing the newly constructed fence surrounding the Former Mill Tailrace.

Annual groundwater and surface water monitoring at approximately 22 monitoring well locations and five surface water locations established during the RI is also a proposed component of this alternative.

In addition to collection of groundwater and surface water samples, groundwater and surface water elevations will be measured at all monitoring wells and surface water staff gauge locations installed during the RI (e.g., 65 monitoring wells and well points, and 13 surface water staff gauges). The results from the groundwater and surface water sampling and analysis, and the elevation measurements would be summarized in a monitoring report, which would be submitted to federal and state regulators annually.

Quarterly Site inspections would be performed to verify the integrity of the newly installed fencing surrounding the Former Mill Tailrace, and hence limit potential human health risks due to exposure to high pH surface water. In addition, yearly monitoring and reporting of compliance with institutional controls and Five Year Reviews of site conditions and risks are included in this alternative.

Site groundwater conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). Concentrations of groundwater and surface water COCs are expected to exceed PRGs within the groundwater compliance boundary for the SO and AOC waste management areas for greater than 100 years (refer to Section 6.2.1.3 of the RI Report for a discussion of the persistence of the groundwater pH plume).

Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater

This is the selected remedy. See a detailed description of the alternative in Section L of this ROD.

3. Description of East of South Street Remedial Alternatives (SO Alternatives)

The East of South Street Remedial Area is depicted on Figure 28A of the FS. The RAOs for soil and soil vapor in the East of South Street Remedial Area (SO) include:

- Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative excess cancer risk > 1E-04 or non-carcinogenic HI > 1, and meet ARARs;
- Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs; and

- Prevent inhalation of indoor air, impacted by contaminated soil vapor, having COC concentrations which result in a cumulative excess cancer risk >1E-04 or non-carcinogenic HI>1, and meet ARARs.

As presented on Table 3B of the FS, two sets of PRGs were developed for the SO remedial alternatives. Similarly, remedial alternatives presented in Table 11B of the FS contemplate two redevelopment scenarios: currently allowed use (future daycare child) and more restricted site use (future site worker). In addition, while RAOs address preventing inhalation of indoor air from contaminated soil vapor, PRGs are established only for soil as elevated concentrations of soil vapor COCs are presumed to be a direct result of elevated COC concentrations in soil.

The SO remedial alternatives evaluated in the FS are designated as:

SO-1: No Action;
SO-2: Limited Action;
SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos (exceeding the asbestos PRG);
SO-4: Limited Excavation;
SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils; and
SO-6: Comprehensive Excavation and Off-Site Disposal.

Detailed descriptions of these SO alternatives are provided in the following sub-sections.

Alternative SO-1: No Action

Alternative SO-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no remedial actions are implemented to address soil or soil vapor contamination. "No Action" as used in this Section when referring to soil and soil vapor, means no measures are proposed to address soil and soil vapor contamination. Statutorily-required Five-Year Reviews of the protectiveness of the remedy would be conducted. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with SO-1, except for the cost of Five-Year Reviews (see Table 13B of the FS).

Alternative SO-2: Limited Action

Alternative SO-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health by limiting exposure to contaminants. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. This alternative does not involve active treatment/removal of contaminants. An itemized cost estimate for alternative SO-2 is presented in Appendix D-2a of the FS. A summary of costs for this alternative is presented in Table 13B of the FS.

The SO-2 alternative includes establishing institutional controls to preclude development of the site for uses that include child-type exposures currently allowed under the Town of Walpole's zoning by-laws. This action involves preparation of a land use restriction for properties in this area of the Site. The land use restriction would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the land use restriction would preclude redevelopment of the Site for uses that result in exposures to children such as a daycare facility or school (the current allowed use). A component of this land use restriction would also include requirements of adhering to the guidelines of a groundwater and soil management plan (contaminated groundwater is addressed through the SW alternatives), which would be established for activities that could cause exposures to COCs, for instance from construction-related activities.

This alternative includes measures to maintain and repair the existing pavement in those areas where soil COC concentrations exceed their respective PRGs (e.g., the SO Area #1 and SO Area #2 - refer to Figure 28A of the FS).

In addition, this alternative includes installing approximately 2,800 linear feet of fencing around the East of South Street Area.

This alternative includes installation of four soil vapor implants in the vicinity of the SB-09 soil boring where elevated TCE concentrations in soil and soil vapor were observed, and collection of soil vapor samples from these implants on an annual basis.

Quarterly Site inspections would be performed to verify the integrity of asphalt and fencing. In addition, there would be yearly compliance monitoring and reporting on institutional controls. A review of Site conditions and risks would be performed at five-year intervals and these conditions would be documented in a report.

Site soil and soil vapor conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). A calculation has not been attempted of the natural attenuation rate of TCE in soil and soil vapor as limited data are available for this type of assessment. However, for costing purposes, it is assumed that TCE concentrations in soil would exceed PRGs for approximately 30 years. Since degradation of asbestos is not expected, it is assumed that asbestos concentrations in soil would remain relatively unchanged for greater than 100 years.

During remedial design, additional testing will be conducted to determine if soil exhibiting hazardous waste characteristics will remain in place. If so, the remedy would not be protective and the remedy would need to be amended.

Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soil Containing Asbestos

Alternative SO-3 includes measures to protect human health by eliminating exposure to a future Site worker from TCE-contaminated indoor air, and to maintain the existing pavement in areas where asbestos concentrations in soil are greater than the asbestos PRG. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. Alternative SO-3 includes all of the measures proposed under SO-2 (except for installing and maintaining a fence and installing and maintaining an asphalt cap over TCE-impacted soil), in addition to those further described below. For brevity, the SO-2 remedial measures are not repeated in this section.

Section 4.2.3 of the FS describes the conceptual approach and assumptions associated with installation of a horizontal barrier and sub-slab depressurization system for a hypothetical future building to mitigate potential indoor air risks from TCE-impacted soil vapor. Asbestos in soil is addressed by maintaining the asphalt over the asbestos-impacted soils in a manner consistent with the SO-2 alternative.

The estimated area of TCE at concentrations in soil above PRGs is depicted on Figure 28A of the FS. For costing purposes for the vapor control system, it is assumed that the system would be sufficient for an approximately 5,000 ft^2 building The estimate only includes costs for the installation of a horizontal barrier and sub-slab depressurization system.

During remedial design, additional testing will be conducted to determine if soil exhibiting hazardous waste characteristics will remain in place. If so, the protectiveness of the remedy would need to be reassessed

Operation of the sub-slab depressurization system would likely result in a faster clean-up of TCE-impacted soils relative to the 30 year clean-up timeframe estimated for natural breakdown of TCE in the SO-2 alternative, since removal of TCE mass would likely be accomplished by extraction of contaminated soil vapor from the subsurface via the SSD. However, limited data are available to predict this clean-up timeframe. Therefore, it is assumed that clean-up of TCE to soil PRGs would be accomplished in approximately 10 years. Since degradation of asbestos is not expected, it is assumed that asbestos concentrations in soil would remain relatively unchanged for greater than 100 years.

Alternative SO-4: Limited Excavation

Those areas where soil COC concentrations exceed their PRGs under the Site worker redevelopment scenario are the SO Area #1 (area with TCE-impacted soil) and SO Area #2 (area with asbestos-impacted soil), which are depicted on Figure 24. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. Alternative SO-4, the Limited Excavation alternative, includes excavation of soils that exceed Site worker PRGs. As depicted on Figure 28A of the FS, those areas that would be excavated are the TCE- and asbestos-impacted soils. Alternative SO-4 includes establishment of institutional controls that prohibit development of the site for child-intensive uses (the current allowed use), and requires compliance with a groundwater and soil management plan if the site is to be disturbed, as well as those measures further described below.

As described in Section 2 of the FS, it is estimated that approximately 400 cubic yards of soil exceed the TCE site worker soil PRG, and 60 cubic yards of soil have concentrations greater than or equal to the asbestos PRG. This alternative includes excavating these soils, collecting confirmatory samples to verify that soils with concentrations greater than PRGs have been removed, and backfilling these excavations with clean soil.

During remedial design, additional testing will be conducted to determine if soil exceeding hazardous waste characteristics is present on-site. If so, the remedy would need to be modified to include excavation of all soil exhibiting hazardous waste characteristics from the site.

It is estimated that the time necessary to complete the SO-4 alternative would be less than one month from initiation of excavation activities.

Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils

Those areas where soil COC concentrations exceed their PRGs under the currently allowed use scenario include ESS Area #1 (TCE-impacted soil), ESS Area #2 (asbestos-impacted soil), and ESS Areas #3 and #4 (PAH- and/or arsenic-impacted soil) and are depicted on Figure 24 of the FS. Alternative SO-5, the Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils alternative, includes excavation of the same TCE- and asbestos-impacted soils that were removed in the SO-4 alternative and long-term monitoring. For brevity, the SO-4 excavation and off-Site disposal activities are not repeated herein. In addition, SO-5 includes excavation of PAH- and arsenic-impacted soils and soil exhibiting hazardous waste characteristics to depths of one ft bgs over most of the area and two ft bgs in the railroad right of way.

As indicated above, soils excavated in the SO-4 alternative would also be excavated in the SO-5 alternative; therefore, for brevity, a summary of excavation of the TCE- and asbestos-impacted soils are not repeated herein.

Under the current allowed use scenario, it is assumed that a child is exposed only to the upper 1 foot of soil. Hence, removal of contaminated soils that exceed daycare-age child PRGs would primarily entail only excavation of one foot of soil. Subsequent to completing the excavation, clean fill soils would be placed and compacted in the excavations. Where the excavation is completed in areas that are paved, repaving these areas with like material subsequent to backfilling the excavations would be included. Review of available data shows that in the unpaved area requiring excavation (the railroad right of way), evidence of deeper soil (> 2 ft bgs) contamination is not apparent. Therefore, it is more cost-effective to remove the soil in this area to 2 ft bgs and backfill with clean fill rather than covering remaining contaminated soils with a vegetated cap and maintain it afterwards.

In addition to the confirmatory soil sampling described in the SO-4 alternative, soil samples would be collected from 0 to 1 ft bgs from around the perimeter of the contaminated soil excavation(s) to confirm that all soils that exceed daycare-age child PRGs are removed.

This alternative includes measures to maintain and repair the newly installed asphalt covers in those areas where contaminated soil remains.

It is estimated that the time necessary to complete the SO-5 alternative (absent the long-term maintenance requirements) would be approximately one month from initiation of excavation activities.

Alternative SO-6: Comprehensive Excavation and Off-Site Disposal

This is the selected remedy. Please see a detailed description of the alternative in Section L for more information.

4. Description of Area of Containment Remedial Alternatives (AOC Alternatives)

The AOC is depicted on Figure 29 of the FS. The RAOs for soils in the AOC include:

- Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs;
- Prevent exposure to currently covered soils in the AOC that would result in unacceptable levels of risk to a future human receptor; and

- Prevent exposure to currently covered soil in the AOC that would result in an unacceptable level of risk to an ecological receptor.

As described in Section 2 of the FS, since there is presumptive risk in the AOC, neither COCs, nor "typical" PRGs were developed for this area of the Site. Rather, the RAOs are based on maintaining the protectiveness of the existing remedy that was constructed during the previous CERCLA removal action.

The AOC remedial alternatives evaluated in the FS are designated as:

AOC-1: No Action;
AOC-2: Limited Action;
AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls; and
AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls.

Detailed descriptions of these AOC alternatives are provided in the following sub-sections.

Alternative AOC-1: No Action

Alternative AOC-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no additional remedial actions are implemented, beyond the present AOC cover over contaminated soils constructed during the CERCLA removal action. "No Action" as used in this Section means no measures are proposed to maintain or monitor the current remedy in the AOC. Statutorily-required Five-Year Reviews would still need to be conducted under this alternative. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with AOC-1, other than the cost of conducting Five-Year Reviews.

Alternative AOC-2: Limited Action

Alternative AOC-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health and ecological receptors by maintaining and monitoring the existing AOC cover to limit exposure to contaminants. This alternative does not involve active treatment/removal of contaminants.

A deed restriction for the AOC that precludes development of this portion of the Site was established during the 1992 Removal Action. This alternative includes evaluating this deed restriction to confirm that it contains adequate provisions to protect human health and ecological receptors. In addition, it is assumed that the land use restriction that would become finalized as part of this alternative would include provisions for a soil management plan. The land use restriction would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the land use restriction would preclude redevelopment of the Site in the area of the AOC cover, restrictions on exposure to contaminated soils under buildings, and protection of the Neponset River culvert. A component of this land use restriction would also include requirements of adhering to the guidelines of a soil management plan, which would be established for non-restricted activities (e.g., maintenance of the aluminum culvert).

This alternative includes measures to maintain and repair the soil- and asphalt-covered portions of the AOC.

Quarterly Site inspections would be performed to verify the integrity of asphalt and soil covers, and fencing. Annual inspections of the culvert also are included in this alternative. There would be yearly monitoring and reporting of compliance with institutional controls. In addition, a review of Site conditions and risks would be performed at five-year intervals, and these conditions would be documented in a report.

Site soil conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). Concentrations of soil COCs are expected to exceed PRGs for greater than 100 years.

Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, and Institutional Controls

This is the selected alternative. Please refer to detailed description of the alternative in Section L for more detail.

Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls

Alternative AOC-4 includes excavation of contaminated soils located above the groundwater table in the soil and asphalt covered portions of the AOC (including the Settling Basin #2 Containment Cell) and off-Site disposal of these soils. This alternative would include removal of the aluminum culvert that contains the Neponset River in the AOC, and restoring/stabilizing the riverbank of the Neponset River. This alternative also includes institutional controls and access restrictions, to protect human and ecological receptors from exposure to contaminants below the water table. These measures are generally consistent with those measures included in AOC-2. For brevity, the AOC-2 remedial measures (monitoring, operation and maintenance, and institutional controls) are incorporated in this section.

Figure 29 of the FS depicts those areas of the AOC that would require remedial action. Prior to excavation, the Neponset River would be diverted from its current course through the Site to limit the potential for contaminated sediments to enter the river during a portion of this excavation effort, and to more easily allow the culvert to be removed from the AOC.

Once the river diversion system is in place and operating, the soil cap of the AOC would be stripped off, tested to see if it meets standards for reuse, and, if clean, stockpiled for subsequent use as backfill material. Contaminated soils in the AOC would be excavated to depths no greater than the groundwater table. Subsequent to completing the excavation, clean fill soils would be placed in the excavation using new clean fill and the stockpiled existing soil cap. The site would be graded to elevations approximately equivalent to pre-Removal Action conditions, except where the culvert is currently located and where contaminated soils and groundwater remain below the groundwater table. In these areas, a sufficient soil cover will be installed to be protective of human health and the environment. Where the excavation is completed in areas that are paved, the areas will be repaved with like material subsequent to backfilling the excavations. Where the excavation is completed in areas that are unpaved, soils would be covered with a vegetated cap (e.g., grass).

Subsequent to removal of the culvert, the banks of the excavation and the bottom of Neponset River, would be stabilized with suitable river bottom materials, likely consisting of gravel, cobbles, and other material sized to resist erosion. The reconstructed riverbanks would be stabilized with appropriately designed vegetation or other slope stabilization techniques (e.g., riprap) to resist erosion. The approximate grades of the backfilled excavation and the stabilized Neponset River would be consistent with grades prior to the 1992 Removal Action.

It is estimated that the time necessary to complete the AOC-4 alternative would be approximately 6 to 12 months from initiation of excavation activities. Since contaminated soils would remain on-Site under this alternative, for costing purposes, it is assumed that monitoring and maintenance of the soil and asphalt cover and institutional controls would be required for 100 years.

5. Description of Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond Sediment Remedial Alternatives (SSW Alternatives)

The areas requiring remediation in the Former Mill Tailrace, the Neponset River Floodplain, and Lewis Pond are depicted on Figure 30 of the FS. The RAOs for sediment/soil include:

- Prevent ingestion of sediment/soil by a future resident/construction worker with lead concentrations resulting in PBL 5%, and meet ARARs; and

- Prevent inhalation of asbestos fibers from sediment/soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.

PRGs for these sediments and soils are presented on Tables 5 and 3B of the FS, respectively.

The SSW remedial alternatives as described in the FS are designated as:

SSW-1: No Action;
SSW-2: Limited Action;
SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment;
SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment; and
SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River, the Former Mill Tailrace, and Lewis Pond.

Prior to initiating remedial action on asbestos- and lead-impacted soil/sediment, further assessment of the distribution of contaminants will be conducted to determine where asbestos and/or lead are present in soil/sediment at concentrations that warrant remedial action.

Detailed descriptions of these SSW alternatives are provided in the following sub-sections.

Alternative SSW-1: No Action

Alternative SSW-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no remedial actions are implemented to address the above-described sediment/soil contamination. "No Action" as used in this Section means no measures are proposed to address sediment/soil contamination at the Former Mill Tailrace, the Neponset River Floodplain, and Lewis Pond. Statutorily-required Five-Year Reviews would be conducted to assess the protectiveness of the remedy. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with SSW-1 other than the costs for conducting the Five-Year Reviews.

Alternative SSW-2: Limited Action

Alternative SSW-2, the Limited Action alternative, consists of long-term monitoring, institutional controls and limited access restrictions, to protect human health by limiting exposure to contaminants. This alternative does not involve active treatment/removal of contaminants.

The SSW-2 alternative includes establishing institutional controls to preclude disturbance of areas that have soil or sediment COC concentrations greater than PRGs. The areas to be subject to the institutional controls are zoned residential. This action involves preparation of land use restrictions for properties in this area of the Site. The land use restrictions would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the land use restrictions would preclude disturbance of soils or sediments except under specified conditions. A component of this land use restriction would also include requirements of adhering to the guidelines of a soil/sediment management plan, which would be established for specific activities (e.g., maintenance of the Lewis Pond dam).

This alternative includes installing approximately 3,350 lineal feet of fencing around those areas that are impacted at the approximate locations depicted on Figure 30 of the FS. Quarterly Site inspections would be performed to verify the integrity of the fencing. There would be at least yearly monitoring and reporting on compliance with institutional controls. In addition, a review of Site conditions and risks would be performed at five-year intervals and these conditions would be documented in a report.

At least yearly monitoring would determine if contaminants are migrating or are decreasing in the soil/sediments. If monitoring determines that characteristic hazardous wastes are present, ARARs need to be complied with. Site soil and sediment conditions would likely remain relatively unchanged. Concentrations of soil and sediment COCs are expected to exceed PRGs for greater than 100 years. Statutorily-required Five-Year Reviews would be conducted to assess the protectiveness of the remedy.

Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment

Alternative SSW-3 involves excavation and off-Site disposal of the sediment/soils exceeding PRGs along and adjacent to the Neponset River, and dredging/excavating of sediments located in the Former Mill Tailrace. In addition, an aqueous cap would be maintained over contaminated sediments in Lewis Pond by controlling the water levels at the Lewis Pond Dam at West Street.

The key components of this alternative include excavation and dredging of sediment/soils, maintaining an aqueous cap on sediments located in Lewis Pond, long-term monitoring, and institutional controls. These components are discussed in the following subsections.

The table below summarizes the approximate volumes of sediment/soil in those areas that would be excavated/dredged as part of the SSW-3 remedial alternative. These areas are depicted on Figure 26 of the FS.

Sediment /Soil Area Designation	COC(s) with Concentrations Higher than PRGs	Assumed Depth of Sediment /Soil COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Former Mill Tailrace	Asbestos	1	1,200	50
Neponset River	Asbestos	1	4,400	200
Neponset River	Asbestos/Lead	1	17,000	600

To confirm the limits of sediment/soil excavation/dredging and assess textural/geotechnical properties of the sediment/soil, a pre-excavation/dredging sampling and analysis program is proposed as part of this alternative.

Excavated sediments will be dewatered prior to being sent off-site for disposal. Following excavation and dredging, confirmatory sampling and analysis will be conducted. Following excavation of contaminated soil and sediments and confirmatory sampling, clean backfill material and a vegetated cover (i.e., grass, wetland vegetation) would be placed to approximately the pre-excavation grades. If the bank or bottom of the Neponset River is disturbed it will be restored.

Dredging activities to address sediment contamination would occur within the wetland area of the Former Mill Tailrace. Therefore, restoration of wetlands where sediment dredging would occur is a proposed component of this alternative. If the bank or bottom of the Neponset River is disturbed it also will be restored to protect both wetland and floodplain resources.

The second component of the SSW-3 alternative includes maintaining an aqueous cap on sediments located in Lewis Pond to prevent asbestos from becoming airborne, and hence prevent potential human health risks. The areas that would need to be covered by water in this alternative are described in the table below and are depicted on Figure 30 of the FS.

Sediment Area Designation	COC(s) with Concentrations Higher than PRGs	Approximate Areal Extent (ft^2)
Lewis Pond Area #1	Asbestos	22,000
Lewis Pond Area #2	Asbestos	15,000
Lewis Pond Area #3	Asbestos	9,400

In order for the aqueous cap to be effective at adequately limiting asbestos from becoming airborne, the water level at the West Street Dam (see Figure 30 of the FS) needs to be maintained at an elevation sufficient to cover impacted sediments, or to allow for sufficient sediment moisture content to substantially limit asbestos from becoming airborne.

To confirm the limits of impacted sediment, a sampling and analysis program is proposed as part of this alternative. The sample locations would be surveyed, and a sediment sampling report would be prepared.

In addition, a topographic survey of the Lewis Pond area would be conducted to evaluate the water level elevation that would be necessary to maintain an aqueous cap over impacted sediments, or to allow for sufficient soil moisture to limit asbestos from becoming airborne.

A pre-design study of the existing West Street Dam would also be conducted as part of this alternative to evaluate the adequacy of the dam to maintain the required water level in Lewis Pond as determined by the sediment sampling and topographic survey.

The existing West Street Dam is a 7.7 foot-high (with flashboards installed), 35 foot-long run-of-the-river type structure, with its spillway extending across the entire length of the dam. The foundation walls of the existing former mill building form the right and left dam abutments. An Operation and Maintenance Plan and Manual, and Emergency Action Plan would be prepared for the ongoing operation of the dam. Furthermore, minor repairs would need to be made to the concrete and mortared stone portions of the dam, and to the wooden gate/flashboard structure. Additional modifications of the dam may be required

This action involves preparation of land use restrictions to preclude removal of the West Street Dam. A component of this land use restriction would include requirements of adhering to the guidelines of a sediment management plan, which would be established for potential activities in aqueous capped portions of the Site which are located in residential areas.

Access restrictions such as fencing will be necessary to restrict long-term access to the water's edge by abutters.

Quarterly inspections of the aqueous capped areas would be conducted to verify proper operation of the remedy. The dam would be inspected and minor repairs performed on an annual basis. Monitoring of the wetlands would also occur to assess plant hardiness and mortality.

At least yearly monitoring would determine if contaminants are migrating or are decreasing in the soil/sediments. Monitoring would also determine if characteristic hazardous wastes are present in Lewis Pond sediments. If so, the alternative would need to comply with hazardous waste

ARARs. There would also be yearly monitoring and reporting on compliance with institutional controls.

The SSW-3 alternative also includes a review of Site conditions and risks at five-year intervals and documentation of these conditions in a report.

It is estimated that the time necessary to complete the SSW-3 alternative (absent the long-term maintenance and monitoring requirements) would be approximately 3 to 4 months from initiation of construction activities. Concentrations of asbestos in Lewis Pond sediment are expected to remain relatively unchanged beneath those areas covered by an aqueous cap for greater than 100 years

Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment

Alternative SSW-4 involves excavation and off-Site disposal of the sediments/soils located along the Neponset River, and dredging of sediments located in the Former Mill Tailrace (see Figure 30 of the FS). In addition, an engineered subaqueous cap would be installed over contaminated sediments in Lewis Pond. Long-term monitoring and institutional controls will also be required.

The key components of this alternative include excavation and dredging of soils/sediment, and installing an engineered subaqueous cap on sediments located in Lewis Pond. The excavation and dredging component of this alternative is identical to the excavation and dredging activities for SSW-3 discussed in Section 4.4.3.1 of the FS; therefore, those components of the alternative will not be discussed again herein. Rather, the reader is referred to Section 4.4.3.1 of the FS for a description of the excavation and dredging component of this alternative. The second component of the SSW-4 alternative involves installing and maintaining an engineered subaqueous cap to isolate Lewis Pond sediments.

As indicated above, the second component of the SSW-4 alternative includes installing and maintaining an engineered subaqueous cap on sediments located in Lewis Pond to prevent exposures by human receptors to sediment with contaminant concentrations greater than the PRGs. The areas that would be capped as part of the SSW-4 alternative are depicted on Figure 30 of the FS.

To confirm the limits of impacted sediment, a sampling and analysis program is proposed as part of this alternative.

As discussed further below, while this alternative contemplates installing an engineered cap over areas with contaminant concentrations greater than the PRGs, further evaluation of the type of capping material that would be necessary to prevent exposure to human receptors should be conducted prior to implementing this remedy. Therefore, a pre-design study of potential capping materials would be conducted. This study would also include an assessment of potential cover materials that could be installed over the top of the engineered cap.

An engineered cap is proposed for capping of sediments in Lewis Pond. As depicted on Figure 30 of the FS, some areas that require capping are located beneath the pond; whereas, other areas are located in "wetland" type environments. In either case, the same capping material is proposed.

Sediment sampling to identify where any characteristic hazardous waste is present in Lewis Pond sediments would have to be conducted to determine the specifications of the cap. Prior to initiation of construction activities, silt curtains would be installed to control downstream sediment migration during construction. Prior to capping, those areas that are vegetated would be "grubbed and cleared." Installation of the cap would include placement of a double-layered fabric "envelope" in the area to be capped. Subsequently, a cement mixture would be pumped into this fabric "envelope." Woven "filter points" in the fabric "envelope," allow relief of hydrostatic uplift pressure from underlying groundwater. In areas where capping would occur in "wetland" type environments, a soil and vegetated cover would be placed over the top of the concrete portion of the cap (if possible-as determined by pre-design studies). Pre-design studies performed as part of the wetlands evaluation would assess what type of cover material would be installed over the concrete portion of the cap. A basic schematic of the proposed engineered cap is presented on Figure 31 of the FS. Lost flood storage capacity and wetland resources altered by the cap would require mitigation within the waterway.

This action involves preparation of land use restrictions to preclude non-essential disturbance of the engineered cap and underlying sediments with asbestos concentrations greater than the PRG and, potentially, hazardous waste. A component of this land use restriction would include requirements of adhering to the guidelines of a sediment management plan, which would be established for potential essential construction-related activities (e.g., maintenance of the West Street Dam) in capped portions of the Site.

The SSW-4 alternative also includes a review of Site conditions and risks at five-year intervals and documentation of these conditions in a report.

It is estimated that the time necessary to complete the SSW-4 alternative (absent the long-term monitoring and maintenance requirements) would be approximately two to four months from initiation of construction activities. Concentrations of asbestos in Lewis Pond sediment are expected to remain relatively unchanged beneath those areas covered by a cap for greater than 100 years.

Alternative SSW-5: Excavation/Dredging of Neponset River Floodplain Soil, Sediment in Neponset River, the Former Mill Tailrace, and Lewis Pond

This is the selected remedy. Please see a detailed description of the remedy in Section L of the ROD for more information.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

1. Introduction

Section 121(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 remedial alternatives assembled and described in Section 4.0 of the FS and in Section J of this ROD are analyzed in detail in this section. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

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

a. **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.

b. **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.

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

c. **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. This criterion consists of two components:

- Magnitude of residual risk – This component addresses the residual risk associated with treatment residuals or untreated media remaining at the Site at the conclusion of remedial activities (e.g., after soil containment and/or treatment are complete).

- Adequacy and reliability of controls – This component addresses the adequacy, suitability, and long-term reliability of physical and/or institutional controls, if any, which are used to provide continuous protection from residuals or untreated media that remain at the Site.

d. **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. This evaluation focuses on the following specific factors:

- The treatment process(es) utilized and the materials they would treat;
- The amount of hazardous materials (if present) or contaminated media that would be destroyed or treated;
- The degree of anticipated reduction in toxicity, mobility, and/or volume;
- The degree to which the treatment would be permanent and irreversible;
- The type and quantity of treatment residuals that would remain; and
- Whether the alternative would satisfy the statutory preference for treatment as a primary element of the alternative.

e. **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. The following factors are addressed as appropriate:

- Protection of the community during remedial actions – Potential risks resulting from implementation of the alternative are considered, such as dust from excavation, or truck traffic due to transportation of contaminated media to off-Site facilities.

- Protection of workers during remedial actions – Potential risks to workers resulting from implementation of the remedial actions are considered, such as contact with hazardous materials, and the effectiveness and reliability of protective measures that would be required.

- Environmental impacts during remedial actions – Risks to the environment resulting from implementation are considered, such as erosion and sediment transport, and the effectiveness and reliability of mitigation measures that would be available.

- Time until achievement of remedial action objectives – Estimates of the time required to achieve the intended remedial objective for the Site as a whole, or individual media categories or Site areas are considered.

f. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option. The evaluation of implementability addresses the following factors:

- Technical feasibility – The feasibility of a remedial technology is considered in terms of construction and operation difficulties and unknowns, reliability, ease of undertaking additional remedial action, if any may be required, and monitoring considerations.

- Administrative feasibility – Administrative issues, such as ability to achieve permit standards for construction and operation are considered.

- Availability of services and materials – The availability of services and materials required to implement an alternative, such as off-Site treatment/disposal facilities or personnel/equipment for on-Site treatment are considered.

g. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs. The cost estimates attempt to achieve an accuracy of +50 percent to –30 percent and include the following components:

- Capital Costs – Consist of 'direct' and 'indirect' capital costs. Direct costs may include equipment, materials, labor, transportation and disposal. Indirect costs may include engineering, startup and shakedown, and contingencies.

- Annual O&M Costs – Consist of post-construction costs necessary to maintain the on-going effectiveness of the remedial action, and may include labor, materials (e.g., replacement parts, treatment chemicals), treatment residuals treatment/disposal, energy/utilities, compliance monitoring, administration, and insurance.

- Periodic Costs – Include costs for five-year reviews, treatment system decommissioning/disposal at completion of remedial activities, monitoring well abandonment at completion of monitoring activities, and other costs, which are not considered capital or annual O&M.

- Present Value Analysis – Costs are evaluated on the basis of a single value that represents the amount of money that, if invested in the base or current year and disbursed as needed, would be sufficient to fund expenditures associated with the alternative over its lifetime. In calculating the present worth of the alternatives, a discount rate of 7 percent is used in accordance with Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.3-20.

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:

h. **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.

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

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 K-1, K-2, K-3, and K-4 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.

2. Individual Analysis of the SW Alternatives

An individual analysis of SW alternatives is presented in Table K-1 of the ROD.

Table K-1a presents a qualitative summary of the results of the comparative analysis of SW alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to Table K-1a for a "big picture" understanding of a comparison of the SW alternatives.

Table K-1a: Comparative Analysis Summary of SW Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SW-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SW-2	Limited Action	**N**	**N**	**P**	**N**	**Y**	**P**	**M**
SW-3	Groundwater Collection and Treatment	**Y**	**Y**	**Y**	**P**	**Y**	**P**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.

- "**Y**" Meets Criterion
  "**P**" Partially Meets Criterion
  "**N**" Does Not Meet Criterion
  "**L**" Low Cost
  "**M**" Medium Cost
  "**H**" High Cost

Overall Protection of Human Health and the Environment

Alternative SW-1 is not protective of human health or the environment, as no measures would be implemented to preclude access/exposure to Site groundwater, or surface water in the Former Mill Tailrace. There also would be no measures to protect human health or the environment from exposure to contaminated groundwater within the SO and AOC waste management areas.

Alternative SW-2 is protective of human health as it relies entirely upon long-term monitoring, institutional controls, and fencing to preclude access/exposure to contaminated groundwater and surface water. Surface water institutional controls would include prohibiting wading in the Former Mill Tailrace by land use restriction, and access would be restricted by installing and maintaining a fence around this area. Groundwater institutional controls would also establish compliance boundaries around the SO and AOC waste management areas. Within these boundaries groundwater use restrictions would prevent exposure to contaminated groundwater.

Furthermore, long-term monitoring would ensure contaminated groundwater was not migrating beyond the compliance boundaries. However, SW-2 includes no measures that are protective of the environment. Under this alternative, water quality (particularly pH) in the Mill Tailrace would still exceed regulatory standards for protecting aquatic life.

Alternative SW-3 relies upon capturing contaminated groundwater upgradient of the Former Mill Tailrace via a groundwater collection trench. Captured groundwater would be treated and discharged to the Former Mill Tailrace. Hence, potential human health risks from exposure to high pH surface water in the Former Mill Tailrace are addressed by eliminating the source of contamination. Ecological protection standards would also be achieved by intercepting and treating the contaminated groundwater before it discharges into the Mill Tailrace, since removing the source of contamination will restore water quality for ecological receptors. As with alternative SW-2, groundwater institutional controls would also establish compliance boundaries around the SO and AOC waste management areas. Within these boundaries, groundwater use restrictions would prevent exposure to contaminated groundwater. There would be at least yearly monitoring of compliance with the institutional controls. Furthermore, long-term groundwater monitoring would ensure contaminated groundwater was not migrating beyond the compliance boundaries and surface water will be monitored to assess the effectiveness of the remedy. The permanence and reliability of controls to prevent human health risks is further discussed in Section 5.3.6 of the FS. Alternative SW-3 is the only alternative that is protective of both human health and the environment.

Compliance with ARARs

Alternative SW-1 would not achieve chemical-specific ARARs, as exceedances of state and federal surface water quality standards would remain in the Former Mill Tailrace. Alternative SW-1 has no location- or action-specific ARARs.

Alternative SW-2 would not achieve chemical-specific ARARs pertaining to state and federal surface water quality standards within the Former Mill Tailrace, since the source of contaminated groundwater into the Tailrace would not be addressed. Groundwater chemical-specific standards within the compliance boundaries for the SO and AOC waste management areas would be achieved by institutional controls and long-term monitoring.

Alternative SW-2 would not achieve location-specific ARARs pertaining to protecting wetland and floodplain resources since it would permit contaminated groundwater to discharge into surface waters, wetland, and floodplain. The remedial actions proposed under SW-2, institutional controls and long-term monitoring, can be conducted in compliance with action-specific ARARs.

Alternative SW-3 meets surface water standards established by the chemical-specific ARARs by remediation of groundwater that would cause exceedances of ARARs in the Former Mill Tailrace. In SW-3, migration of contaminated groundwater to the Former Mill Tailrace is prevented by groundwater extraction and treatment. Groundwater chemical-specific standards within the compliance boundaries for the SO and AOC waste management areas would be achieved by institutional controls and long-term monitoring.

The remedial actions to be carried out under alternative SW-3, including installation and maintenance of monitoring wells and the groundwater collection trench at the Former Mill Tailrace, would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs listed on Table 12A of the FS and Appendix D of this ROD, including coordination with appropriate regulatory agencies, where necessary. Alternative SW-3 would involve construction and maintenance activities in wetlands, floodplains, and/or surface water bodies in the Former Mill Tailrace area and/or the compensatory wetland area. These activities would be completed in a manner that addresses potential impacts to wetlands, floodplains, surface water bodies and potential historic resources. Under applicable wetland standards, this alternative is the least damaging practicable alternative to protecting wetland resources since it will remediate contaminated groundwater which is altering wetland resources and will restore any wetland resources that are altered over the short-term during the implementation of the remedy.

Alternative SW-3 will meet all action-specific ARARs, both those pertaining to the installation, operation, and maintenance of the groundwater collection trench and treatment system at the Former Mill Tailrace and those pertaining to the establishment of institutional controls and long-term monitoring to address the contaminated groundwater within the SO and AOC waste management areas.

Long-Term Effectiveness and Permanence

Alternative SW-1 would provide no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.

Alternatives SW-2 and SW-3 both rely on institutional controls to remove human health groundwater risks by precluding exposure to contaminated groundwater within the compliance boundaries of the SO and AOC waste management areas. Furthermore, long-term monitoring ensures groundwater contamination does not migrate beyond the compliance boundaries. When properly established and implemented, institutional controls, with long-term monitoring, would provide adequate, permanent, and reliable measures for long-term and effective permanence of the groundwater remedy, particularly when combined with yearly institutional control compliance monitoring, quarterly inspections, and Five-Year Reviews. However, alternative

SW-2 does not achieve surface water RAOs since it does not address remediation of contaminated groundwater which is degrading surface waters within the Former Mill Tailrace.

The groundwater collection and treatment system in alternative SW-3 is estimated to achieve surface water RAOs in less than one month from system startup, or approximately two to four months from initiation of construction activities for the groundwater collection and treatment system.

SW-3 requires long-term (potentially greater than 100 years) operation and maintenance of both the groundwater collection and treatment system and the groundwater monitoring system for the SO and AOC waste management areas. Institutional controls will need to be maintained for the life of the remedy.

Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SW-1 and SW-2 provide no reduction of toxicity, mobility, or volume through treatment, as no active remedial measures to reduce the mass of contamination would be implemented.

Alternative SW-3 partially meets this criterion, as approximately 5.3×10^8 gallons of contaminated groundwater that currently discharges into the Former Mill Tailrace would be collected and treated over a period of greater than 100 years to prevent its degradation of surface water quality. The operation of the groundwater collection and treatment system would produce treatment residuals (e.g., wastewater treatment sludge, spent granular activated carbon [GAC]) that would require off-Site treatment/disposal. Alternative SW-3 would not treat the remaining contaminated groundwater within the compliance zones of the SO and AOC waste management areas.

Short-Term Effectiveness

The implementation of alternatives SW-1 and SW-2 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions. Risks to workers performing monitoring, well repair/installation, fence repair, quarterly inspections, and Five-Year Reviews as part of SW-2 can be controlled and mitigated with proper health and safety measures.

Alternative SW-3 involves a degree of construction/excavation/backfilling activities. These activities may potentially generate fugitive dust, which could contain asbestos. These emissions would be controlled by engineering controls such as wetting. Workers may also be exposed to high pH groundwater. Risks to workers can be controlled and mitigated with proper health and safety measures.

Implementation of SW-3 would reduce groundwater flow to the Former Mill Tailrace, which contains surface water and wetlands. However, discharge of treated groundwater to the Former Mill Tailrace would directly provide additional surface water flow to this area, so short-term impacts from remedy installation should be minimized.

Alternative SW-1 would require greater than 100 years to achieve groundwater and surface water RAOs. Alternative SW-2 would also not achieve surface water RAOs for more than 100 years. Furthermore, groundwater contamination within the compliance zones of the SO and AOC waste management areas would remain for greater than 100 years.

Alternative SW-3 would achieve surface water RAOs in a relatively short timeframe (less than two to four months) from implementation of the alternative. The controls (groundwater collection and treatment system) associated with alternative SW-3 would likely need to be operated for more than 100 years to prevent surface water RAOs from being exceeded. Groundwater contamination within the compliance zones of the SO and AOC waste management areas would remain for greater than 100 years.

Implementability

Alternative SW-1 involves no remedial actions, other than conducting Five-Year Reviews; therefore, this alternative is easily implemented and additional actions or monitoring could be readily undertaken.

The proposed technologies for alternatives SW-2 and SW-3 are generally easily constructed, and are proven and reliable. In general, additional actions could be readily undertaken, and the effectiveness of the alternatives could be easily monitored through groundwater or surface water monitoring, institutional control compliance monitoring, quarterly inspections, and Five-Year Reviews. Personnel, equipment, and materials are generally available for all of these technologies, and the technologies are well established. For alternative SW-3, the availability of potential off-site treatment and/or disposal facilities for asbestos-containing soil/sediment (i.e., generated as part of groundwater extraction trench excavation for SW-3) in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment.

The SW-3 alternative is generally reliable, as it would be completed and operated with proven reliable methods.

Administrative tasks associated with SW-2 and SW-3 would involve coordination with various regulatory authorities to provide for the protection of wetland and aquatic resources, and limit negative impacts to the extent practicable. The establishment of groundwater institutional controls to address the groundwater contamination within the areas of the SO and AOC waste management areas, as well as continued access to the Site for the SW-2 and SW-3 alternatives require the cooperation of affected property owners. Depending on the precise nature of the institutional controls implemented, regulatory action, such as to record land use restrictions under State and local standards or enactment of local by-laws, may also be required.

Cost

The costs for the SW alternatives are summarized in Table 13A of the FS and Table K-5 of this ROD. Alternative SW-1 would have limited costs associated with conducting Five-Year Reviews.

Alternative SW-2 would have limited costs associated with establishing and maintaining institutional controls and long-term monitoring, as well as Five-Year Reviews.

Alternative SW-3 has higher overall, capital, and O&M costs as compared to SW-1 and SW-2. This is due in large part to the construction of a relatively complex groundwater collection and treatment system, and on-going operation and maintenance costs associated with the groundwater collection and treatment system contemplated as part of SW-3.

It should be noted that depending on how the SW, SO, AOC, SSW alternatives are combined to form comprehensive Site-wide alternatives, there may be some redundancy in tasks/costs (generally relatively minor - e.g., excavation of the Former Mill Tailrace, fencing, institutional controls, Site inspections, etc.) that would result in the cost for the implementation of the combined alternatives being slightly less than the sum of alternatives individually.

3. Individual Analysis of the SO Alternatives

An individual analysis of SO alternatives is presented in Table 14B of the FS and in Table K-2 of this ROD, below.

Table K-2a presents a qualitative summary of the results of the comparative analysis of SO alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to Table K-2a for a "big picture" understanding of a comparison of the SO alternatives.

Table K-2a: Comparative Analysis Summary of SO Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SO-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SO-2	Limited Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**M**
SO-3	Vapor Mitigation and Soil Cap	**N**	**N**	**N**	**P**	**Y**	**Y**	**M**
SO-4	Limited Excavation	**N**	**N**	**N**	**P**	**Y**	**Y**	**L**
SO-5	Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**
SO-6	Comprehensive Excavation and Off-Site Disposal	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.

2) "**Y**" Meets Criterion
"**P**" Partially Meets Criterion
"**N**" Does Not Meet Criterion
"**L**" Low Cost
"**M**" Medium Cost
"**H**" High Cost

Overall Protection of Human Health and the Environment

As described in Section G of the ROD, there are no "actionable" ecological risks at the Site; therefore, an assessment of protection of the environment is unnecessary for the SO alternatives. In addition, there are no "actionable" human health risks to current receptors in this portion of the Site; therefore, remedial measures proposed as part of the SO alternatives are aimed at preventing risk to hypothetical future receptors from exposure to contaminated soil and soil vapors. Human health risks from contaminated groundwater under the area are addressed under the SW alternatives.

Alternative SO-1 is not protective of human health, because no measures would be taken to prevent ingestion/dermal contact with soil that has COC concentrations greater than PRGs, or inhalation of indoor air impacted by unacceptable levels of TCE from soil/soil vapor.

Alternatives SO-2 through SO-6 all rely upon institutional controls and long-term monitoring as part of the remedial alternative; however, the protectiveness level of the institutional controls varies with each alternative. The Table K-3a summarizes the type of institutional control that would be implemented for the SO-2 through SO-6 alternatives.

Table K-3a: Summary of Key Components of Institutional Controls for SO-2 Through SO-6 Alternatives						
Alternative Designation	**Requires Maintenance of Fencing and Prevents Future Development in Area of TCE Impacts**	**Requires Maintenance of Existing Asphalt or Soil Cover**	**Prohibit "Daycare Age Child" Development" (Current Allowed Use)**	**Prohibit Residential Use**	**Requires Compliance with a Soil Management Plan**	**Requires Maintenance of Newly Installed Asphalt or Soil Cover**
SO-2: Limited Action	X	X	X	X	X	
SO-3: Vapor Intrusion Mitigation and Covering of Soils Contaminated with Asbestos and PAHs		X	X	X	X	
SO-4: Limited Excavation			X	X	X	
SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils				X	X	X
SO 6: Comprehensive Excavation and Off-Site Disposal				X	X	X

Common to alternatives SO-2 through SO-6 are long-term monitoring and institutional controls precluding residential development, and requiring compliance with a soil management plan.

Alternatives SO-2, SO-3, and SO-4 are not protective of the current allowed use for the SO area, which includes use for child daycare or school facilities. Alternatives SO-2, SO-3, and SO-4 only would be protective of a construction worker in the SO area. Furthermore, alternative SO-2 relies solely on access restrictions and does not result in any contamination being removed from the site. Alternative SO-3 actively removes soil vapor risks, but does not address soil contamination, except through access restrictions and monitoring. Alternative SO-4 is somewhat more protective since some contaminated soils would be removed, however soils contaminated with hazardous waste may be left on site.

Alternative SO-5 would be protective for the current allowed uses of the site if replacement cover material can prevent access to subsurface, contaminated soil.

The remedial measures implemented as part of SO-6 would provide the greatest degree of protection to human health, and would allow the least restrictive form of institutional control of the six alternatives, as excavation of soils with COCs greater than PRGs would be performed. Alternative SO-6 would require long-term monitoring and maintenance of institutional controls.

Compliance with ARARs

Alternative SO-1 will not achieve chemical-specific ARARs, since risks posed by site contaminants will not be addressed. There are no location- or action-specific ARARs for this alternative.

Alternative SO-2 does not meet chemical-specific ARARs since currently permitted uses (including childcare facilities) would be subject to unacceptable risk levels. The alternative would meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Furthermore, to the extent that contaminated soils exhibiting hazardous waste characteristics are present, the institutional controls alone called for in alternative SO-2 do not meet relevant and appropriate action-specific ARARs pertaining to the management of hazardous waste.

Alternatives SO-3 and SO-4 do not meet chemical-specific ARARs since currently permitted uses (including childcare facilities) would be subject to unacceptable risk levels. Alternatives SO-3 and SO-4 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. To the extent the limited excavations and maintenance of the existing cover in alternatives SO-3 and SO-4 do not remove all contaminated soils exhibiting hazardous waste characteristics on site, the alternative will not meet action-specific ARARs pertaining to the management of hazardous waste. Additional action-specific standards pertaining to monitoring, excavation and disposal of non-hazardous wastes, including asbestos contaminated material, will be met.

Alternative SO-5 will meet all chemical-specific ARARs since currently permitted uses (including childcare facilities) would not be subject to unacceptable risk levels. SO-5 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Alternative SO-5 would be designed to meet action-specific ARARs pertaining to the management of contaminated soils exceeding hazardous waste characteristics if either all hazardous waste is removed with the excavation or if the cover meets relevant and protective standards under the ARARs. Additional action-specific standards pertaining monitoring, excavation and disposal of non-hazardous wastes, including asbestos contaminated material, will be met. During remedial design, additional testing will be conducted to determine if contaminated soil exceeding hazardous waste characteristics will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards.

Alternative SO-6 will meet all chemical-specific ARARs since currently permitted uses (including childcare facilities) would not be subject to unacceptable risk levels. SO-6 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Alternative SO-6 will meet all action-specific ARARs for the management of hazardous, asbestos, and non-hazardous waste since all contaminated soil exceeding PRGs will be excavated and disposed of off-site.

Long-Term Effectiveness and Permanence

Alternative SO-1 would provide no risk reduction from baseline conditions for hypothetical future receptors under this alternative. Therefore, this alternative is neither effective, nor permanent.

Alternative SO-2 offers the least long-term effectiveness and permanence of the action alternatives, as it relies upon institutional controls and maintenance of the existing asphalt cover or soil cover, and newly installed fence to protect future receptors.

Alternative SO-3 would address asbestos- and TCE-impacted soil or soil vapor by: maintenance of the asphalt cover over asbestos-impacted soils, and installation and operation of a horizontal barrier and sub-slab depressurization system beneath any future building constructed in the area of TCE-impacted soil, all of which are well-proven and reliable technologies. These potential risks would be addressed immediately upon implementation of these measures. However, in order to maintain long-term effectiveness and permanence of the remedy, the sub-slab depressurization system would need to be operated potentially for up to approximately ten years, and the maintenance of the asphalt cover would be required for greater than 100 years, hence this alternative is deemed less effective and permanent than alternatives SO-4, SO-5 and SO-6.

Alternatives SO-2, SO-3, and SO-4 each would only partially achieve long-term effectiveness and permanence since contaminated soils would remain in place that would continue to pose an unacceptable risk for current uses of the site.

Alternatives SO-5 and SO-6 would achieve the highest degree of long-term effectiveness and permanence, as risks would be addressed by excavation with off-Site disposal and installation and maintenance of a cover over contaminated soils left in place. Excavation is a well-proven and highly reliable means of addressing soil contamination. Alternative SO-6 is more effective and permanent than alternative SO-5, since more material exceeding PRGs will be removed from the site. The SO-5 and SO-6 alternatives would each be completed in approximately one to two months. SO-5 would require on-going maintenance of the asphalt or soil cover for greater than 100 years. SO-6 would require long-term maintenance of institutional controls so that inaccessible contaminated soils and contaminated soil below PRGs, but still exceeding residential risk levels, will be properly managed.

Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SO-1 and SO-2 provide no reduction of toxicity, mobility, or volume through treatment, as no active remedial measures to reduce the mass of soil contamination would be implemented.

Alternative SO-3 partially meets this criterion, as contaminated soil vapor would be collected to prevent migration of TCE into indoor air (it is estimated that approximately 10 pounds of TCE would be removed over the anticipated 10-year operational timeframe of the sub-slab depressurization system). However, asbestos-impacted soils would remain in place under the existing asphalt cover, and PAH-, lead-, and arsenic-impacted soils would not be treated as part of the remedy.

Alternative SO-4, SO-5 and SO-6 potentially would reduce the toxicity, mobility, and volume of contaminants on-Site if stabilization of contaminated soil is required before it is disposed of off-Site. The amount of soil stabilized varies between the alternative depending on the quantity of soil to be excavated and the requirements of the off-site disposal facility. Alternative SO-4 would potentially involve the stabilization of approximately 130 cubic yards of TCE-, asbestos, and/or lead-impacted soil. Alternative SO-5 would potentially involve the stabilization of approximately 2,030 cubic yards of TCE-, asbestos-, PAH-, lead-, and/or arsenic-impacted soil. Alternative SO-6 would potentially involve the stabilization of approximately 2,800 cubic yards of TCE-, asbestos-, PAH-, lead-, and/or arsenic-impacted soil. The degree to which alternatives SO-4, SO-5 and SO-6 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated soil stabilized on site prior to off-site disposal.

Short-Term Effectiveness

The implementation of alternative SO-1 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions.

Risks to workers performing monitoring, soil vapor implant installation, soil vapor sampling, fence repair, quarterly inspections, and 5-year reviews as part of SO-2 can be controlled and mitigated with proper health and safety measures.

Alternatives SO-3, SO-4, SO-5, and SO-6 involve varying degrees of construction/ excavation/ backfilling activities. These activities may potentially generate fugitive dust and/or vapor emissions. These emissions would be controlled by engineering controls such as wetting, particularly if asbestos-impacted soils were excavated, as proposed in alternatives SO-4, SO-5, and SO-6. In addition, transporting soil in covered roll-off containers or trucks, and shipment of partially wet soil to the off-Site disposal facility could also be implemented. Risks to workers performing construction, soil excavation/backfilling, monitoring, soil vapor implant installation, sub-slab depressurization system maintenance, quarterly inspections, and 5-year reviews as part of SO-3, SO-4, SO-5 and/or SO-6 can be controlled and mitigated with proper health and safety measures. Alternative SO-3 would involve venting exhaust from the sub-slab depressurization system to the atmosphere. The community and workers would be protected from this exhaust by venting it above the normal breathing zone (as is typical of venting when total VOC concentrations are expected to be relatively low).

Measures implemented as part of the SO-3, SO-4, SO-5, and SO-6 alternatives are not expected to engender adverse ecological or environmental impacts, Any work within or adjacent to protected environmental resources, including wetlands, will be conducted in a manner to prevent impairment of the resources.

Implementability

Alternative SO-1 would involve no remedial actions other than Five-Year Reviews; therefore, the alternative is easily implemented.

Alternative SO-2 would involve limited remedial actions, including implementing and monitoring institutional controls and long-term monitoring of contaminant levels which should be easily implemented. If necessary, additional actions or monitoring could be readily undertaken.

The proposed technologies for alternatives SO-3, SO-4, SO-5, and SO-6 are generally easily constructed and are proven reliable. There are several facilities that could accept the quantities of TCE-, PAH-, lead-, and/or arsenic-impacted soils that would require off-site disposal under these alternatives. The availability of potential off-site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. In addition, for all of these four alternatives implementing and monitoring institutional controls and long-term monitoring of contaminant levels should be easily implemented. The personnel, materials, and technologies that would be implemented as part of these alternatives are generally available.

Additional actions could be readily undertaken for alternatives SO-4, SO-5, and SO-6; however, additional action to address TCE-impacted soil under the SO-3 alternative could be difficult (if necessary) if any newly constructed building were to be constructed over these soils.

Confirmatory soil sampling for the SO-4, SO-5, and SO-6 alternatives, soil vapor and indoor air sampling as part of the SO-3 alternative, and long-term monitoring, quarterly inspections and Five-Year Reviews for SO-2 through SO-6, would allow for assessment of the adequacy of these remedial alternatives.

Cost

The costs for the SO alternatives are summarized in Table 13B of the FS and Table K-6 of this ROD. The only cost of alternative SO-1 is the cost to conduct Five-Year Reviews.

Alternative SO-4 has lower capital costs, and hence lower total costs than alternatives SO-2, SO-3, SO-5, and SO-6.

Alternative SO-5 is more expensive than SO-4 due to higher capital costs resulting from the additional soils that would be excavated and disposed off-Site, the installation of a soil and asphalt cover as proposed in the SO-5 alternative, and the higher O&M costs associated with maintenance of the soil and asphalt covers. Similarly, SO-6 is the highest cost alternative since it removes the most contaminated soil. However, this additional cost is partially offset, since soil and asphalt covers requiring O&M costs are assumed to be unnecessary due to the removal of additional contaminated soil.

4. Individual Analysis of the AOC Alternatives

An individual analysis of AOC alternatives is presented in Table 14C of the FS and Table K-3 of this ROD.

Table K-4a presents a qualitative summary of the results of the comparative analysis of AOC alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a "big picture" understanding of a comparison of the AOC alternatives.

Table K-4a: Comparative Analysis Summary of AOC Alternatives

Alternative Designation	Abbreviated Description of Remedial Alternative	Threshold Criteria		Balancing Criteria				
		Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reductio n of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
AOC-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
AOC-2	Limited Action	**P**	**P**	**P**	**N**	**Y**	**Y**	**L**
AOC-3	Maintain Cover on AOC, Excavate Settling Basin #2 Containment Cell	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**M**
AOC-4	Excavate AOC and Settling Basin #2 Containment Cell	**Y**	**Y**	**Y**	**P**	**N**	**P**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.

2) "**Y**" Meets Criterion
"**P**" Partially Meets Criterion
"**N**" Does Not Meet Criterion
"**L**" Low Cost
"**M**" Medium Cost
"**H**" High Cost

Overall Protection of Human Health and the Environment

While there is not risk to current human or ecological receptors from contaminated materials in the AOC due to the soil and asphalt cover, Neponset River culvert, and institutional controls, it is acknowledged that in the absence of maintaining the soil and asphalt covers/Neponset River culvert and maintenance of current institutional controls, risk to human health and ecological receptors would likely be predicted. Therefore, alternative AOC-1 is not protective of human health or the environment because no measures would be taken to preclude exposure to contaminated materials in the AOC.

Alternatives AOC-2 and AOC-3 rely upon institutional controls and the existing soil and asphalt cover/Neponset River culvert to preclude exposure to contaminated materials by human or ecological receptors. Alternative AOC-2 includes establishment of institutional controls that require maintenance of the soil and asphalt covers, soil management standards for areas under the buildings adjacent to the covered areas, maintenance of the culvert, and maintenance of the fence surrounding the AOC. Alternative AOC-3 includes these same institutional controls and maintenance obligations, plus excavation and off-site disposal of contaminated materials in the Settling Basin #2 Containment Cell. Both alternatives AOC-2 and AOC-3 would require long-term monitoring of contaminated materials left in place.

Alternative AOC-4 provides protection of human health and the environment by excavation of contaminated materials, soil management standards for areas under the buildings adjacent to the covered areas, removal of the culvert, backfilling the excavations (including creating a sufficient cap/cover over contaminated materials below the water table), and re-establishing the Neponset River bank. These measures also would include the establishment of institutional controls to prevent disturbing contaminated materials beneath the water table. Long-term monitoring of contaminated materials left in place would be required.

Contaminated groundwater beneath the AOC waste management area is to be addressed under the SW alternatives.

Compliance with ARARs

Alternative AOC-1 will not achieve chemical-specific ARARs, since long-term risks would not be addressed through any remedial action under this alternative.

Alternative AOC-2 may comply with chemical-, action-, and location-specific ARARs, as long as any material exhibiting hazardous waste characteristics within the Settling Basin #2 Containment Cell can be addressed in compliance with all applicable and relevant and appropriate standards.

Alternatives AOC-3 and AOC-4 would comply with chemical-, action-, and location-specific ARARs. However, in the case of AOC-4, significant effort would be required to comply with the substantive requirements of the location-specific ARARs, such as preventing/limiting impacts to wetlands, surface water bodies, floodplains, *etc.* Similarly, significant effort would be required to comply with the substantive requirements of the action-specific ARARs for AOC-4 such as: CWA standards associated with discharge of water to a surface water body (during diversion of the Neponset River); closure and erosion protection related to maintaining the cap (which would be installed after excavation); and hazardous waste standards in the event that hazardous waste would be generated. In addition, extensive measures would be necessary to appropriately handle the substantial amount of asbestos-contained media that would be removed as part of this alternative, which would require careful attention in order to limit inhalation of fugitive dust containing asbestos by workers and members of the community.

Long-Term Effectiveness and Permanence

Alternative AOC-1 would provide no risk reduction from baseline conditions. Therefore, this alternative is neither effective, nor permanent.

The AOC-2 alternative would rely maintenance of the existing cover and culvert, and on institutional controls to prevent potential risks. Contaminated materials contained within the soil and asphalt cover portions of the AOC would remain on-Site for greater than 100 years. However, when properly established and implemented, long-term maintenance and institutional controls provide adequate, and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and Five-Year Reviews.

AOC-3 would include excavation of the Settling Basin #2 Containment Cell, long-term maintenance of the cover and Neponset River culvert, and implementation of institutional controls to preclude disturbance of the soil and asphalt covers within the AOC. AOC-3 would also as well as establish soil management procedures for the potential disturbance of soils under buildings adjacent to the covers. Excavation and off-site disposal of the contaminated materials located in the Settling Basin #2 Containment Cell is a highly reliable means for addressing such materials from the Site. However, throughout the rest of the AOC area contaminated material would remain in place above and below the water table. It may take approximately two to four months to excavate the Settling Basin #2 Containment Cell. Contaminated materials in the soil- and asphalt-covered portions of the AOC would remain on-Site for greater than 100 years. However, when properly established and implemented, long-term maintenance and institutional controls provide adequate and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and Five-Year Reviews.

Alternative AOC-4 would provide the highest degree of protection and the least residual risk of the AOC alternatives, as contaminated materials above the water table in the AOC would be excavated and disposed off-Site. Excavation and off-site disposal is a highly reliable means for removing contaminated materials from the Site. However, contaminated material would remain below the water table. It is anticipated that this alternative would take approximately six months to 12 months to complete. Contaminated materials below the water table and under buildings would remain for greater than 100 years. However, when properly established and implemented, long-term maintenance and institutional controls provide adequate and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and Five-Year Reviews.

Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives AOC-1 and AOC-2 provide no reduction of toxicity, mobility, or volume through treatment as no active remedial measures to reduce the mass of contamination would be implemented.

Alternatives AOC-3 and AOC-4 potentially would reduce the toxicity, mobility, and volume of contaminants on-site through stabilization of contaminated material before it is disposed of off-site, if required. The amount of material stabilized varies between the alternative depending on the quantity of material to be excavated, the level of contaminants in the material, and the requirements of the off-site disposal facility. Alternative AOC-3 would potentially involve the stabilization of approximately 1,900 cubic yards of contaminated material. Alternative AOC-4 would potentially involve the stabilization of approximately 19,000 cubic yards of contaminated material. The degree to which alternatives AOC-3 and AOC-4 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated material stabilized on site prior to off-site disposal.

Short-Term Effectiveness

The implementation of alternative AOC-1 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions, since the only action under this alternative, conducting Five-Year Reviews, should not pose any risks.

Alternative AOC-2 is also not anticipated to pose additional risks or impacts to the community or the environment, since remedial actions are limited to long-term maintenance of the existing cover and Neponset River culvert, and establishing and maintaining institutional controls and long-term monitoring. Risks to workers performing fence repair, soil and asphalt cover and culvert maintenance, long-term monitoring, quarterly inspections, and Five-Year Reviews as part of AOC-2 could be controlled and mitigated with proper health and safety measures.

The AOC-3 alternative would involve excavation of approximately 2,500 cubic yards (equivalent to approximately 110 truckloads) of material from the Settling Basin #2 Containment Cell. The volume and therefore the potential for short-term impacts are substantially less than the volume of soil that would be removed as part of the AOC-4 alternative. Measures that would be implemented as part of this alternative are not expected to engender significant adverse environmental impacts. It is anticipated that the AOC-3 alternative would take approximately two to four months to complete.

The AOC-4 excavation (approximately 39,000 cubic yards of soil) would require a high degree of care in order to protect members of the community and workers from inhalation of asbestos fibers and high pH material which may be encountered in the AOC area. While engineering controls such as excavating and stabilizing asbestos-contaminated materials "in the wet," transporting material in covered roll-off containers or trucks, and shipment of partially wet materials to the off-site disposal facility could be implemented, the community could still be affected by the excavation effort due to increased risk from additional traffic; potential failure of engineering controls to limit fugitive dust during excavation or to maintain the uninterrupted flow of the Neponset River during culvert removal;, and, in particular, transport of approximately 3,000 truckloads of contaminated materials on local roads. Given that the river would be temporarily re-routed, and the culvert that currently contains the approximately 400 cubic feet flow of the Neponset River would be removed, the aquatic environment would be disturbed/impacted. However, the river bank and bottom would be re-established after removal of the AOC soils and the aluminum culvert. It is anticipated that AOC-4 would take approximately six to 12 months to complete and have potential significant short-term impacts on site workers and the surrounding community, because of the reactivity of high pH material at depth and the greater potential for airborne emissions due to excavation and transport of a larger volume of material containing asbestos than other alternatives.

Implementability

Alternative AOC-1 involves only conducting Five-Year Reviews; therefore, the alternative would be easily implemented and additional actions or monitoring could be readily undertaken. Alternative AOC-2 would require long-term maintenance of the covers and culvert and the establishment and implementation of broader institutional controls than currently exist for the AOC (including establishing soil management standards for the area under the buildings adjacent to the covered areas). Long-term monitoring, quarterly inspections, and Five-Year Reviews would be completed as part of AOC-2 to assess the integrity of the institutional controls, soil- and asphalt-covered portions of the AOC, the culvert beneath the AOC, and to ensure that contaminated soils under the buildings are properly managed.

The proposed technologies for alternatives AOC-3 and AOC-4 are standard activities that are routinely implemented and proven reliable that could be effectively implemented during construction to assess the ongoing protectiveness of the remedy. In the case of AOC-3, long-term maintenance and monitoring, quarterly inspections, and Five-Year Reviews would allow for on-going monitoring of the protectiveness of the remedy. However, the magnitude of the AOC-4 alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated material, removal of 400-feet of aluminum culvert, diversion of the Neponset River, *etc.*) would pose challenges to completing this alternative in a timely manner (*e.g.*, in a single construction season), and coordination of a construction effort of this magnitude is considerable. Long-term maintenance of the remedy, and establishing and enforcing institutional controls for alternatives AOC-3 and AOC-4 would be readily implementable.

Additional future actions, if necessary, could be readily undertaken following completion of the AOC-3 alternative. Following river and riverbank restoration and backfilling of the excavations under the AOC-4 alternative, subsequent additional deeper excavations, if necessary, would require substantial effort.

The personnel, materials, and availability of technologies that would be implemented as part of these alternatives are generally available for alternatives AOC-3 and AOC-4. However, the AOC-4 remedial alternative would require substantial coordination to provide adequately trained personnel and appropriate equipment and materials to implement this alternative.

The availability of off-site treatment and/or disposal facilities in Massachusetts for asbestos-contaminated materials that would be excavated in the AOC-3 and AOC-4 alternatives is somewhat limited, particularly considering the volume of materials that would be excavated under the AOC-4 alternative. However, there are currently treatment/disposal facilities that can accept this volume of asbestos-contaminated materials in the greater New England area.

The establishment of institutional controls and continued access to the Site for the AOC-2, AOC-3, and AOC-4 alternatives require the cooperation of affected property owners and, possibly, enforcement by regulators.

Given the magnitude of AOC-4 (e.g., excavation of approximately 39,000 cubic yards of soil, removal of 400 feet of aluminum culvert, etc.) the administrative implications associated with implementing this alternative would be substantial. Implementation of AOC-4 would require extensive coordination with regulatory agencies to address impacts to the Neponset River and/or wetland and floodplain areas on and off-site, and to access to affected properties. Cooperation with surrounding property owners and local health authorities would be necessary to protect members of the community from inhalation of asbestos fibers and other contaminants. In addition, ongoing traffic control would be necessary given the amount of construction-related traffic that would occur in and around the Site.

Cost

The costs for the AOC alternatives are summarized in Table 13C of the FS and Table K-7 of the ROD. Alternative AOC-1 only has the limited cost of conducting Five-Year Reviews.

Alternatives AOC-2 and AOC-3 have relatively the same O&M and periodic costs. Alternative AOC-4 has lower O&M and periodic costs, since most waste will be removed (therefore less O&M) and the Neponset River culvert does not have to be maintained under alternative AOC-4. The primary differences in cost among the three alternatives can be attributed to differences in capital costs.

Alternative AOC-2 has lower capital costs than alternative AOC-3. The cost of alternative AOC-3 is higher than alternative AOC-2 because of the excavation and off-site disposal of contaminated material in the Settling Basin #2 Containment Cell.

The cost of AOC-4 is substantially higher than both AOC-2 and AOC-3 due to the larger volume of excavation and off-site disposal effort and the day-lighting of the Neponset River associated with AOC-4. However, even if AOC-4 were implemented, long-term maintenance and institutional controls would be required to preclude potential exposure by future receptors to contaminated materials beneath the water table and under the buildings.

5. Individual Analysis of the SSW Alternatives

An individual analysis of SSW alternatives is presented in Table 14D of the FS and Table K-4 of the ROD.

Table K-5a presents a qualitative summary of the results of the comparative analysis of SSW alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a "big picture" understanding of a comparison of the SSW alternatives.

K-5a: Comparative Analysis Summary of SSW Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reductio n of Toxicity, Mobility, and Volume through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SSW-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SSW-2	Limited Action	**N**	**N**	**P**	**N**	**Y**	**N**	**L**
SSW-3	Excavate/Dredge Soil/Sediment From Neponset River Floodplain, and Former Mill Tailrace, Aqueous Cap on Lewis Pond Sediment	**N**	**N**	**P**	**P**	**Y**	**P**	**M**
SSW-4	Excavate/Dredge Soil/Sediment From Neponset River Floodplain, and Former Mill Tailrace, Engineered Cap on Lewis Pond Sediment	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**M**
SSW-5	Excavate/Dredge Soil/Sediment	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.

2) "**Y**" Meets Criterion
"**P**" Partially Meets Criterion
"**N**" Does Not Meet Criterion
"**L**" Low Cost
"**M**" Medium Cost
"**H**" High Cost

Overall Protection of Human Health and the Environment

Alternative SSW-1 is not protective of human health, because no measures would be taken to prevent exposure to contaminated sediment or soil.

Alternative SSW-2 would rely entirely upon institutional controls and fencing to preclude access to contaminated sediment and soil along Lewis Pond, the Neponset River, and the Mill Tailrace. Therefore, SSW-2 is assumed to offer less protection of human health than SSW-3, SSW-4, or SSW-5.

Alternatives SSW-3, SSW-4, and SSW-5 provide protection of human health by excavation/dredging of contaminated sediment and soil along the Neponset River and Mill Tailrace. Alternative SSW-3 would be less protective at Lewis Pond since it relies on only the existing pond to act as an aqueous cap to prevent exposure to contaminated sediments and the potential for exposure by trespassers would continue to exist. Alternative SSW-4 would be more protective, as long as the engineered cap can protect against exposure or migration of all contaminants about risk or regulatory levels present in the Lewis Pond sediments. Alternative SSW-5 is the most protective alternative since it will permanently remove all contaminated sediment above risk or regulatory levels within Lewis Pond.

Compliance with ARARs

Alternative SSW-1 will not achieve chemical-specific ARARS.

Alternative SSW-2 will not achieve chemical-specific ARARs, since it may not adequately address risks posed by asbestos-contaminated soils and sediments. While it will meet location-specific ARARs, it may not meet action-specific ARARs pertaining to hazardous waste if soils/sediments that exhibit hazardous waste characteristics are present.

Alternative SSW-3 will meet chemical-, location-, and action-specific ARARs along the Mill Tailrace and Neponset River. However, the aqueous cap proposed for Lewis Pond will not meet chemical-, location-, or action-specific standards if sediments that exhibit hazardous waste characteristics are present in the Lewis Pond. The aqueous cap may be insufficient to prevent asbestos from migrating either to shore or downstream of Lewis Pond, where it may pose a risk of exposure to residents or trespassers.

Alternative SSW-4, also meets all chemical-, location-, and action-specific ARARs along the Mill Tailrace and Neponset River. The engineered, subaqueous cap proposed for Lewis Pond may meet chemical-, location- and action-specific standards if it can be constructed and maintained to prevent the migration of asbestos and contaminated sediment exhibiting hazardous waste characteristics from the capped area. Furthermore, the cap must be designed in a manner that lost flood storage meets floodplain protection standards. During remedial design, additional testing will be conducted to determine if sediments exhibiting hazardous waste characteristics will remain in place. If so, the cap over these characteristic sediments will be designed to meet relevant and appropriate hazardous waste standards.

Alternative SSW-5 will meet all chemical-, location-, and action-specific ARARs since it will excavate/dredge all contaminated sediment/soil from the Mill Tailrace, Neponset River, and Lewis Pond.

Long-Term Effectiveness and Permanence

Alternative SSW-1 would provide no risk reduction from baseline conditions. Therefore, this alternative is neither effective, nor permanent.

Alternative SSW-2 relies wholly upon institutional controls, and installation and maintenance of fencing to provide protection of human health. However, institutional controls can be difficult to implement on residential properties; therefore, SSW-2 is considered less effective and permanent than SSW-3, SSW-4, or SSW-5.

In alternative SSW-3, the West Street Dam would be operated to maintain an aqueous cap over asbestos-impacted sediments in Lewis Pond; however, the long-term effectiveness of this alternative is dependent upon continued control of water levels by operation of the West Street Dam under an institutional control. Pre-design studies would be necessary to assess if these measures are adequate to prevent asbestos fibers from becoming airborne. Upgrades to the West Street Dam and excavation/dredging along the Neponset River and the Former Mill Tailrace could be completed within approximately three to four months. However, asbestos and potentially contaminated sediments exhibiting hazardous waste characteristics would remain beneath the aqueous cap in Lewis Pond for greater than 100 years. An aqueous cap is insufficient to isolate and cap contaminated sediments exhibiting hazardous waste characteristics and therefore is not effective or permanent.

The SSW-3 and SSW-4 alternatives would address contaminated soil or sediment along the Neponset River and the Former Mill Tailrace by excavation/ dredging with off-Site disposal. Excavation and dredging are well-proven and highly reliable means of addressing soil/sediment contamination, particularly when combined with confirmatory soil/sediment sampling.

Alternative SSW-4 may be reliable with regard to addressing asbestos-impacted sediments in Lewis Pond, as an engineered concrete, subaqueous cap would be established to preclude access to these sediments. However, the subaqueous cap would also have to be designed, installed, and maintained to prevent the release of contaminated sediments that exhibit hazardous waste characteristics, if present. The SSW-4 alternative could be completed within approximately two to four months. Institutional controls would be required to ensure that no interference with the cap is takes place over time. Nonetheless, contaminated sediment would remain beneath the subaqueous cap for greater than 100 years; therefore, long-term monitoring, institutional controls, quarterly inspections and Five-Year Reviews would be required.

Alternative SSW-5 would afford the highest degree of long-term effectiveness and permanence, as soils and sediments with COC concentrations greater than PRGs would be addressed by excavation/dredging with off-site disposal. Excavation and dredging are well-proven and highly reliable means of addressing soil/sediment contamination, particularly when combined with confirmatory soil/sediment sampling. It is anticipated SSW-5 could be completed in approximately two to four months.

Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SSW-1 and SSW-2 provide no reduction of toxicity, mobility, or volume through treatment, as no active remedial measures to reduce the mass of sediment/soil contamination would be implemented.

Alternatives SSW-3, SSW-4, and SSW-5 would potentially reduce the toxicity, mobility, and volume of contaminants on-site through stabilization of contaminated soil/sediment before it is disposed of off-site, if required. The amount of soil/sediment stabilized varies between the alternatives depending on the quantity of soil/sediment to be excavated, the contaminant levels in the soil/sediment, and the requirements of the off-site disposal facility. Alternatives SSW-3 and SSW-4 would potentially involve the stabilization of approximately 850 cubic yards of contaminated soil/sediment. Alternative SSW-5 would potentially involve the stabilization of approximately 4,450 cubic yards of contaminated soil/sediment. The degree to which alternatives SSW-3, SSW-4, and SSW-5 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated soil stabilized on site prior to off-site disposal.

Short-Term Effectiveness

The implementation of alternatives SSW-1 and SSW-2 are not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions. Risks to workers performing fence installation and repair, long-term monitoring, quarterly inspections, and Five-Year Reviews as part of alternative SSW-2 can be controlled and mitigated with proper health and safety measures.

The SSW-3, SSW-4, and SSW-5 alternatives would involve excavation/dredging and various construction activities (SSW-5 to a greater degree than SSW-3 or SSW-4). These activities may potentially generate fugitive dust containing asbestos fibers. In order to protect workers and members of the community, these emissions would be controlled by engineering controls such as wetting. In addition, transporting soil/sediment in covered roll-off containers or trucks, and shipment of partially wet soil/sediment to the off-site disposal facility could also be implemented. Risks to workers performing activities associated with SSW-3, SSW-4, or SSW-5 can be controlled and mitigated with proper health and safety measures.

Short-term environmental impacts from SSW-3 would likely be less than from SSW-4 or SSW-5 since it will only maintain the current inundated status of Lewis Pond. All three alternatives involve destruction/disturbance of approximately 1,200 square feet of wetlands and floodplain in the Former Mill Tailrace and along the Neponset River due to excavation/dredging of soil/sediment; however, the disturbed or destroyed wetlands/floodplain would be mitigated/restored as part of this alternative. Since the water level that would be maintained in Lewis Pond as part of the SSW-3 alternative is generally consistent with typical water levels historically observed in Lewis Pond, no significant environmental impacts to wetland or aquatic resources in and around Lewis Pond would be likely. SSW-4 and SSW-5 would involve destruction/disturbance of approximately 47,600 square feet of wetland, floodplain, and aquatic resources in the Former Mill Tailrace, Neponset River, and Lewis Pond; however, the disturbed or destroyed wetlands and floodplain would be mitigated/restored as part of these alternatives.

Implementability

Alternative SSW-1 involves no remedial action other than conducting Five-Year Reviews and, therefore, is readily implementable.

Alternative SSW-2 involves limited remedial actions (long-term monitoring and the establishment and enforcement of institutional controls); therefore, the alternative can be easily implemented and additional actions or monitoring could be readily undertaken. However, the feasibility of maintaining and enforcing institutional controls on residential properties, as is proposed for alternative SSW-2, may be difficult.

The proposed dredging/excavation technologies for the Mill Tailrace and Neponset River under alternatives SSW-3, SSW-4, and SSW-5 are generally easily implemented and are proven reliable. Confirmatory soil/sediment sampling, quarterly inspections, and Five-Year Reviews would allow for appropriate monitoring of the protectiveness of the remedy. However, the reliability of maintaining the Lewis Pond water level under SSW-3 to prevent air-borne transport and potential inhalation of asbestos fibers and the release of sediment exhibiting hazardous waste characteristics from Lewis Pond would require further evaluation as a pre-design measure. The personnel, materials, and availability of technologies that would be implemented as part of these alternatives are generally available.

Additional actions could be readily undertaken for alternatives SSW-3 and SSW-5; however, additional action, if necessary, for the SSW-4 alterative to address asbestos-impacted sediment in Lewis Pond could be difficult due to the presence of the engineered isolation cap constructed over these sediments as part of this alternative. Replacing lost flood storage capacity from the cap in Lewis Pond may also be difficult.

The availability of potential off-site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/ disposal facilities that can accept this volume of asbestos-containing soil/sediment in the greater New England.

The establishment of institutional controls and continued access to the Site for the SSW-2, SSW-3, and SSW-4 alternatives require the cooperation of affected property owners, in the case of land use restrictions, and some types of institutional controls, such as local ordinances, may require regulatory enforcement. However, as described above, the feasibility of maintaining and enforcing institutional controls on residential properties, as is proposed for alternative SSW-2, is questionable. Alternatives SSW-3, SSW-4, and SSW-5 would require coordination with regulatory agencies to address potential impacts to wetland, floodplain, or aquatic resources. In particular, alternatives SSW-4 and SSW-5 would require disturbance or destruction of approximately 47,600 square feet of wetland within Lewis Pond, which would be re-established.

Alternatives SSW-4 and SSW-5 would require access to, and cooperation with the owner of, the West Street Dam during construction and dredging/excavation activities, and potentially during inspections/maintenance activities associated with the engineered isolation cap installed as part of SSW-4. SSW-3 would require long-term access to, and cooperation with the owner of, the West Street Dam to control surface water elevations for the long-term life of the remedy, which is expected to exceed 100 years.

Cost

The costs for the SSW alternatives are summarized in Table 13D of the FS and Table K-8 of the ROD.

Alternative SSW-1 only has the limited cost of conducting Five-Year Reviews. Alternative SSW-2 additionally has O&M costs associated with fence maintenance.

Costs for alternatives SSW-3 and SSW-4 are higher than SSW-2 due to the excavation of soil and sediment from the Former Mill Tailrace and Neponset River floodplain, as well as establishment of aqueous and subaqueous caps in Lewis Pond. Both alternatives (SSW-3 and SSW-4) are similar in cost, with SSW-4 having a higher capital cost due to the subaqueous cap, but SSW-3 having higher O&M costs for maintenance of the dam.

Alternative SSW-5 has the highest cost due to excavation of the largest volume of soil and sediment.

6. State Acceptance

The State has expressed its support for the preferred alternatives presented in the Proposed Plan and concurs with the selected remedy outlined in this ROD. See Appendix A for the state concurrence letter.

7. Community Acceptance:

On May 29, 2008 and June 5, 2008, EPA published a notice and brief analysis of the draft Proposed Plan in the Walpole Times newspaper. This notice was also distributed to the mailing list. The final proposed plan was made available to the public records repositories on June 18, 2008 and sent to the mailing list. On June 9, 2008, EPA held an informational meeting to discuss the results of the Remedial Investigation and the cleanup alternatives presented in the draft Feasibility Study and to present the Agency's draft Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA, MassDEP and the PRPs answered questions from the public. On June 18, 2008, EPA made the administrative record available for public review at the information repositories at EPA's offices in Boston and at the Walpole Public Library, 65 Common Street, Walpole, MA. From June 18, 2008 to July 18, 2008, 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 18, 2008. On July 14, 2008, the Agency held a public meeting and hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of the hearing comments and the Agency's response to comments are included in the Responsiveness Summary, which is part of this Record of Decision.

EPA received extensive written and oral comments from community during this process.

Some commenters supported components of EPA's proposed remedy. Some commenters requested that EPA select AOC-4, instead of AOC-3 because of concerns regarding the long-term storage of contaminants at the Site. Others were concerned with the final disposition of the abandoned mill buildings at the Site. Nearby residents had concerns regarding aesthetic and safety concerns relating to the project. PRPs objections centered on the proposed selection of active groundwater remediation for shallow groundwater on-site, as well as soil remediation of the East of South Street Area.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a comprehensive remedy which utilizes source control and management of migration components to address the principal Site risks. The major components of the remedy include excavation and dredging of contaminated soils and sediments and off-site disposal of these materials; extraction and treatment of groundwater from a portion of the site and discharge of treated effluent to the Former Mill Tailrace; long-term monitoring of groundwater, surface water, and soils; operation and maintenance of the Area of Containment and other remedial measures; institutional controls; and, periodic five-year reviews of the remedy.

2. Description of Remedial Components

The selected remedy is consistent with EPA's preferred alternative outlined in the June 2008 Proposed Plan, with one change based on comments regarding the Settling Basin #2 Containment Cell in the AOC area, and is consistent with a combination of Alternatives SW-3, SO-6, AOC-3, and SSW-5 outlined in the June 2008 Feasibility Study. Following is a detailed description of each of the selected Remedial Alternatives:

Groundwater Collection with Ex-Situ Treatment of Groundwater

EPA's selected remedy to address elevated contaminant concentrations in surface water in the Former Mill Tailrace due to the discharge of contaminated groundwater to this area of the Site includes measures to manage the migration of groundwater that under ambient conditions would normally discharge to the surface water of the Neponset River and, in particular, the Former Mill Tailrace. Collected groundwater will be treated on-Site in an ex-situ groundwater treatment system. Treated groundwater will be discharged to the Former Mill Tailrace.

To address the overall plume of contaminated groundwater, the selected remedy establishes a compliance boundary around the SO and AOC waste management areas (depicted in Figure L-1). A monitoring well network will be established during Remedial Design to identify the wells that will be used to monitor the remedy's performance at this compliance boundary and to ensure that the plume remains contained within this area. Table L-1A lists the "Points of Compliance Monitoring Locations" to be used to measure compliance with the Table L-2 Groundwater Performance Standards.

To control groundwater discharge towards the Former Mill Tailrace, groundwater collection efforts will be focused on the vicinity of the western boundary of the AOC near monitoring well SH-05S. Vertical hydraulic gradients are upward in this area of the Site (i.e., groundwater is traveling from deeper portions of the subsurface to shallower portions of the subsurface) and elevated concentrations of groundwater contaminants are located primarily within the shallow saturated zone in this portion of the Site; this means that groundwater collection efforts can be focused on capturing shallow groundwater. The depths to groundwater in this portion of the Site are relatively shallow, so the depth of the well(s) and/or trench(es) in this area of the site are expected to be relatively shallow (e.g., less than approximately 15 ft bgs).

Capture of the plume of contaminated groundwater that discharges to the Former Mill Tailrace under ambient conditions can be accomplished by two potential alternatives, a recovery well(s), and an interceptor trench(s). While the specific collection method will be determined during Remedial Design, it appears that an interceptor trench may be more readily implementable. In this case, a approximately 200-ft long groundwater interceptor trench would be constructed at the approximate location depicted on Figure L-1. A preliminary schematic of the basic aspects of the design of the trench is presented in Figure L-2. The trench would be installed such that it penetrates the entire thickness of the ice contact sand/sand and gravel unit, such that it is keyed into the glacial till unit. For costing purposes, a trench depth of approximately 15 ft was assumed. An HDPE flow barrier would be installed along the downgradient wall of the trench. The flow barrier would extend from the southern terminus of the trench to the culvert that contains the Neponset River through the AOC. It is assumed that the flow barrier extending south from the collection trench would be constructed of sheet piling.

Following excavation to design grade and stabilization of the trench walls, a perforated drainage pipe would be installed in the bottom of the trench excavation and pitched to drain towards a pump chamber. With the drainage pipe and the low permeability barrier in place, the trench would be backfilled with a material with a higher hydraulic conductivity than the surrounding existing material, such as pea gravel wrapped in filter fabric. The relatively higher permeability of the trench backfill would provide a preferential groundwater flow path down to the drainage pipe while the system is operating. Above the seasonal high water elevation, the trench backfill would consist of a lower permeability material to limit the infiltration of rainwater into the trench, which would dilute the extracted groundwater and increase treatment costs. The ground surface above the trench would be graded to direct surface drainage away from the trench to also help reduce direct infiltration. The pump chamber would be situated at the lowest point of the extraction trench. An extraction pump would be installed in the chamber to pump fluids entering the trench to the influent tank of the groundwater treatment system. While operating, the pump would draw the liquid level in the chamber down sufficiently to induce a lateral flow of groundwater through the perforated drainage pipe in the trench into the chamber.

The preliminary assessment of potential groundwater flow rate into the trench ranges from 1 to 7 gallons per minute (gpm). In the Feasibility Study, it was conservatively assumed that groundwater would be removed from the trench at a flow rate of approximately 10 gpm. Groundwater will be pumped underground to an on-Site, ex-situ groundwater treatment system.

The purpose of the groundwater treatment system would be to reduce contaminant concentrations in the extracted groundwater to allow discharge to the Former Mill Tailrace. The discharge of the groundwater treatment system will meet the Cleanup Levels for surface water, listed in Tables L-4a and L-4b.

Pre-design investigations focused on assessing capture methods, potential extraction rates, and necessary treatment operations, may be required as part of design of the extraction and treatment system. In general, groundwater treatment will consist of:

- pH adjustment to reduce the pH of influent groundwater;
- greensand filtration to reduce some metals concentrations (e.g., iron) in order to prolong ion exchange resin life;
- Liquid granular activated carbon filtration to reduce VOC and SVOC concentrations; and
- Ion exchange resin treatment to reduce metals concentrations.

In addition, backwash and filter press mechanisms will be included to prolong filter media/resin life and/or to dewater sludge to reduce volumes of groundwater treatment wastes. A process flow diagram with further description of the groundwater treatment system is presented on Figure L-3. The selected remedy also includes operation, maintenance, and monitoring of the groundwater collection and treatment system; see *Long Term Monitoring and Five-Year Reviews* Section below.

The planned collection and treatment system serves primarily as a containment measure to intercept shallow groundwater before reaching its primary discharge location in the Former Mill Tailrace. A schematic of the proposed outfall for treated groundwater is presented in Figure 4.

The groundwater collection, treatment, and discharge system is not intended to act as, and would not be practicable as, a remedy for deeper contaminated groundwater beneath the AOC. The contamination in the deep aquifer is understood to be stationary within the groundwater compliance boundary.

Excavation and Off-Site Disposal of Contaminated Soils East of South Street

To address unacceptable risks from exposure to contaminated soils in the portion of the site east of South Street, this portion of the selected remedy includes excavation and off-site disposal of soils exceeding Cleanup Levels listed in Table L-1 (see *Cleanup Levels* section below). The approximate areas requiring excavation under the currently allowed use scenario -- include SO

Areas #1, 2, 3, and 4 as depicted in Figure L-5. The FS estimated the volume of soil exceeding cleanup levels to be approximately 8200 cubic yards.

Confirmation sampling will be conducted to ensure that cleanup levels have been met throughout the area. Excavated areas will be replaced with clean fill to return to original grade (and original surface conditions). Excavated soils would be characterized for waste disposal purposes, including conducting TCLP analyses to determine whether the soils need to be handled as hazardous waste under RCRA. In the event that the results of waste characterization indicate that the soils would be deemed hazardous, EPA may allow limited on-site treatment (e.g., mixing with suitable stabilization agent(s)) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste. It is estimated that the time necessary to complete this portion of the remedy (absent the long-term maintenance requirements) would be approximately two months from initiation of excavation activities. During excavation activities, appropriate air and dust monitoring will be required to ensure that there are no impacts to neighboring residents.

To address any residual risks from site soils, institutional controls will be established to prevent unrestricted residential use and require a "soil management plan" that would need to be followed in the future if currently inaccessible soils below existing buildings or other soils potentially exceeding Cleanup Levels are to be exposed (e.g., as part of a future redevelopment project). See *Institutional Controls* Section below for additional details.

Excavation and Off-Site Disposal of Materials in the Settling Basin #2 Containment Cell, and Maintenance of AOC Covers and the Neponset River Culvert West of South Street

For the portion of the site west of South Street, the selected remedy consists of measures, generally institutional controls and access restrictions, to protect human and ecological receptors by limiting exposure to contaminants within the AOC. The AOC is depicted in Figure L-6. As described under Alternative AOC-4 in Section K, this portion of the remedy eliminates potential human health or ecological risks from the contaminated soils in the Settling Basin #2 Containment Cell by excavation and off-Site disposal of these materials. After receiving comments concerning this component of the remedy, the remedy has been modified to permit the option of leaving the cell waste in place (as described in Alternative AOC-2) if testing shows the soil does not exhibit hazardous waste characteristics. See Section M for additional details concerning this modification.

As described previously, the soil and asphalt covers on the AOC were constructed as part of a Removal Action in 1992. The selected remedy calls for the continued inspection, maintenance, and monitoring of those covers. Overall maintenance will include periodic repair or replacement of asphalt and soil cover materials as well as the perimeter fence, when needed. Regular site inspections will be required to be performed to verify the integrity of asphalt and soil covers, and fencing. In addition, since the Neponset River culvert running through the site, under the AOC, serves as the bottom of a portion of the AOC, annual inspections, and repair as necessary, of the culvert will also be required. Financial assurances will be required to ensure long-term funding for monitoring, as well as operation and maintenance of the remedy as a whole.

In addition, it is estimated that approximately 2,500 cubic yards of material are located in the Settling Basin #2 Containment Cell. As part of the selected remedy, these materials may be excavated, depending on whether or not they exhibit hazardous waste characteristics. As described in the *Pre-Design Studies* section below, testing will be conducted to make this determination and an evaluation will be conducted for EPA to determine whether allowing these materials to remain in place would comply with ARARs. If EPA determines that Settling Basin #2 Containment Cell can remain in place, the area will be subject to similar operation, maintenance, and monitoring requirements to the AOC (as described under Alternative AOC-3). Should excavation be required, excavation of these materials and the HDPE liner that currently contains these materials will be conducted and these materials will be shipped to an appropriate off-site disposal facility. Subsequent to excavation, this area will be backfilled and the area will be graded and restored.

Excavation of Contaminated Soils and Sediment from the Former Mill Tailrace, Neponset River, including Riverbanks, Floodplain Soil, and Lewis Pond

This portion of the selected remedy involves excavation of soil on residential properties along the Neponset River between the Former Mill Tailrace and Lewis Pond, and dredging/excavation of the sediment in the Former Mill Tailrace and Lewis Pond. These areas are depicted in Figure L-7. The Cleanup Level for asbestos in sediment is listed in Table L-3. The Cleanup Level for lead in residential soil is listed in Table L-1. The FS estimated that there are 4,500 cubic yards of soil and sediment contaminated with asbestos and/or lead above Cleanup Levels.

Some of the areas that require remediation are in locations that would require construction of a temporary roadway or roadways in order to gain access. A conceptual layout of potential locations of the temporary roads is depicted on Figure L-8. Following completion of excavation/dredging activities, these roads will be removed and the areas restored to their original condition.

Prior to initiating dredging/excavating activities in the Lewis Pond Areas or the Former Mill Tailrace, turbidity curtains would be positioned to limit sediments from migrating downstream during dredging activities. These turbidity curtains would be periodically replaced and/or repositioned as necessary during the dredging process. It is anticipated that sediment dredging will be completed by mechanical means (e.g., clamshell excavator or similar equipment). Floodplain areas or other near-shore areas slated for cleanup would likely be excavated using traditional earthwork equipment (e.g. excavator or loader). Excavated materials will likely require dewatering prior to off-site disposal. Water generated from these operations may require treatment prior to discharge and/or require off-site treatment and disposal. Specific details as to removal methodology and materials handling will be determined during Remedial Design. Following excavation and dredging, confirmatory sampling will be conducted to ensure that Cleanup Levels are met.

Excavated/dredged materials will be characterized for waste disposal purposes, including conducting TCLP analyses to determine whether the soils need to be handled as hazardous waste under RCRA. In the event that the results of waste characterization indicate that the soils would be deemed hazardous, EPA may allow limited on-site treatment (e.g., mixing with suitable stabilization agent(s)) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste.

Dredging activities to address sediment contamination will occur within wetland areas. Restoration of wetlands impacted by the remedy will therefore be required. Restoration of wetlands within the sediment dredging areas would be accomplished by determining what wetland resources should be restored to the waterway and then conducting post-dredging grading, importing wetland soils, planting wetlands vegetation, and modifying surface water flow patterns so that the restored area receives adequate water, as required. The success of wetland restoration would then be monitored and maintained as part of a long-term monitoring program. The flood storage capacity of the waterway will not be reduced and may be improved from the dredging activities. During remedial activities appropriate measures will be taken to prevent risks from downstream flooding (i.e. management of water levels in Lewis Pond at the West Street dam). Prior to the initiation of dredging, the West Street dam will be managed, to the extent practicable, so that water levels do not drop to a level that will expose contaminated sediments.

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 an EPA approved technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences or a Record of Decision Amendment, as appropriate.

Remedial Design and Pre-Design Studies

A number of additional investigations may be necessary to provide additional detailed information required to implement the selected remedy. Pre-design studies may include:

- Pre-design investigations focused on saturated zone hydrogeologic properties and groundwater treatability may be necessary to design the groundwater collection and treatment system, including:
    - Saturated zone pumping test(s) to obtain data (e.g., hydraulic conductivity, specific yield, specific capacity, extent of groundwater capture) relevant to selection of

extraction well or trench design parameters, such as the number of wells/trenches, their locations/depths, and the pumping rates necessary to achieve remedy objectives.

- Groundwater treatability testing to characterize extracted groundwater quality, evaluate the effectiveness of the proposed treatment processes, and assist in the final selection and sizing of treatment equipment.

- Review of effluent discharge options to determine whether options other than surface water discharge are more preferable (e.g., injection/infiltration of treated groundwater into the subsurface).

- Pre-design investigations to further delineate the aerial and vertical extent of soils and sediments exceeding the various Cleanup Levels will be conducted. At that time, additional testing will also be conducted to determine if these soils/sediments (as well as the materials in Settling Basin #2 Containment Cell) would be considered hazardous waste. In the event that the results of waste characterization indicate that the soils/sediments would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils/sediments non-hazardous on-Site to allow their disposal off-Site as non-hazardous waste and allow for potential cost savings. In addition, borings from the Settling Basin #2 area may also be used to determine the physical characteristics of the Portland cement-stabilized soils that were placed in the Settling Basin #2 Containment Cell (e.g., are they hard/concrete-like material).

- Pre-design studies will be conducted to assess the potential for contaminant transport downstream of Lewis Pond, and sampling, as necessary, in the Neponset River upstream of the Stetson Pond dam.

- To supplement the analysis outlined in Appendix F to this ROD, pre-design studies will include an re-evaluation of flood modeling to confirm the previous finding that the AOC/culvert can withstand a 100 year flood event. The stability of the culvert will be re-evaluated with regard to other modes of potential failure.

- In addition, the September 1992 "Long-Term Inspection and Maintenance Plan, South Street Site, Walpole Massachusetts" will be re-evaluated as to its adequacy and the findings incorporated into the O&M activities at the Site under this ROD.

The specific details of the design and implementation of the selected remedy outlined in this ROD will be finalized during the Remedial Design phase, and will depend on the results of the various pre-design investigations outlined above.

Institutional Controls

In order to protect human health by controlling potential exposures to contaminated soils, sediments, and groundwater, the selected remedy relies on the use of Institutional Controls such as limitations on land and groundwater uses and activities. Institutional Controls are also necessary for the protection of the selected remedy. Details, including the form and implementation costs of the institutional controls, will be resolved during the pre-design and remedial design phase in coordination with the parties performing the Remedial Action, impacted landowners, and local officials. MassDEP participation with the Institutional Controls will be in accordance with Commonwealth of Massachusetts policies, guidance and regulations.

Risks from exposure to contaminated groundwater will be controlled through the implementation of institutional controls (in addition to the treatment of the limited volume of shallow groundwater discharging into the Former Mill Tailrace). In areas where groundwater contamination exceeds the Performance Standards outlined in Table L-2, groundwater use restrictions will be required for drinking water, industrial process water, or other purposes. It is anticipated that groundwater use restrictions will need to be placed on all properties lying inside of the Groundwater Compliance Boundary shown in Figure L-1.

Risks from exposure to surface (0' - 3' below ground surface) and sub-surface (3' – 15' below ground surface) soils in the areas of the site east and west of South Street will be controlled through the implementation of institutional controls after an evaluation of the adequacy of any existing institutional controls on those parcels. Land use restrictions will be required to restrict excavations without adequate worker health and safety precautions (e.g. engineering controls, personal protective equipment (PPE), monitoring, etc.) to minimize or prevent direct contact with contaminated soil during removal activities, and restrict potential on-site and off-site spread of contamination. Specifically, the land use restrictions would preclude redevelopment of the Site in the area of cover(s) without regulatory approval, impose restrictions on exposure to contaminated soils under buildings, and require protection of the Neponset River culvert. It is expected that these Institutional Controls will require the submittal of, and adherence to, a "Soil Management Plan" approved by EPA, after a reasonable opportunity for review and comment by MassDEP, to govern any future excavations, including redevelopment activities. Furthermore, on properties where soils are remediated to Cleanup Standards that are not based on unrestricted (e.g., residential) use, it will also be necessary to restrict land use so that these properties cannot be developed for residential purposes or other uses that would be at risk, under CERCLA, from remnant contamination at the Site.

Institutional Controls will also be required to ensure that any remedial components constructed or maintained as part of the selected remedy, such as the AOC, monitoring wells, or groundwater remediation components, are not disturbed or otherwise compromised by any other use or activity. An AOC land use restriction that precludes development of this portion of the Site and disturbance of the cover on the AOC was established during the 1992 Removal Action. A "Notification and Grant of Use Restrictions and Easement" was granted by the landowners to W.R. Grace and Co. – Connecticut. This restriction will be evaluated to determine whether it contains adequate provisions to protect human health and ecological receptors under CERCLA. If necessary, this document will be updated or replaced to meet current requirements under this ROD.

Compliance with institutional controls will be monitored and reported to regulators at least yearly. Compliance reports will be incorporated into the Five-Year Reviews.

Long-Term Monitoring and Five-Year Reviews

Long-term monitoring of groundwater, surface water, and sediments will be required in order to evaluate contaminant status and migration.

Currently, monitoring and maintenance of the AOC cover and Neponset River culvert are addressed under a September 1992 "Long-Term Inspection and Maintenance Plan, South Street Site, Walpole, Massachusetts," which is required under the Second Administrative Order for Removal Action issued to the landowners and W.R. Grace & Co. – Connecticut. The Plan will be re-evaluated to ensure it is still protective as a pre-design study under this ROD.

Groundwater and surface water monitoring is included to ensure that the remedy is functioning as intended and to ensure that contaminated groundwater remains within the compliance boundary and to ensure that there are no exceedances of performance standards at or beyond the groundwater compliance point(s). Existing monitoring wells and/or new groundwater monitoring wells will be installed to evaluate contaminant trends and human health and ecological risks or hazards. Details of groundwater monitoring will be resolved during design and the preparation of a long-term monitoring plan. The plan's monitoring scope and frequency could change over time. Monitoring will also be performed to evaluate the overall performance of the selected remedy.

Since wastes will be left in place as part of the selected remedy, the NCP requires periodic reviews of the remedy. A comprehensive review will be conducted at least every five years to evaluate the protectiveness of the remedy. The purpose of this Five-year Review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment. The Five-year Review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedy or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and institutional controls and conducting additional studies and investigations. The Five-Year Reviews will include an assessment of potential new source control and groundwater extraction and treatment technologies that could be effective in reducing the length of time needed to meet the groundwater cleanup levels.

The selected remedy also includes long-term operation, inspections, and maintenance of any systems put in place as part of the remedy, including covers over wastes left in place and the groundwater treatment system to be constructed as part of this remedy. Long-term inspections and monitoring will also be required to ensure that institutional controls remain effective and are being enforced, and, long-term monitoring of groundwater, surface water, sediments and biota may be necessary to evaluate the effectiveness and re-colonization of biota in the dredged area, as well as the effectiveness of any re-vegetation, wetland restoration, or wetland replication area.

Financial assurances will be required to ensure long-term funding for monitoring, as well as operation and maintenance of the remedy as a whole.

The June 2008 Feasibility Study and Proposed Plan evaluated monitoring requirements for each alternative to compare costs. However, it is likely that the long-term monitoring requirements of each component of the selected remedy may be consolidated under one Operations and Maintenance Plan and/or Long-Term Monitoring Plan for the Remedial Action per this ROD.

3. Summary of the Estimated Remedy Costs

The total estimated cost of the selected remedy is approximately $13 million. Summary tables of the major capital and annual O&M cost elements for each component of the selected remedy are shown in Tables L-5 through L-8. The discount rate used for calculating total present worth costs was 7%. The time frame estimated in the FS over which O&M expenditures are anticipated is 100 years for the groundwater, AOC, and SO components of the work. All of these remedial components, including institutional controls, are anticipated to be in place at least that long.

The information in these cost estimate summary tables are 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. The mechanism chosen to document the change depends on the magnitude of the proposed change, consistent with EPA guidance for developing decision documents. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

4. Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy include:

- *To mitigate human health risks to potential receptors from potable and domestic uses of groundwater On-Site and Off-Facility as well as from dermal contact with groundwater and surface water in the Former Mill Tailrace and the Neponset River.* This will be achieved by collecting and treating shallow groundwater to protect surface water, preventing groundwater use with institutional controls within the groundwater compliance boundary, and monitoring to confirm that contaminated groundwater does not move beyond the groundwater compliance boundary. Once the groundwater collection, treatment, and discharge system is installed, it is expected that it will take less than a month to achieve the cleanup goals for clean surface water. Long-term monitoring of the system and institutional controls will follow.

- *To mitigate human health risks to potential receptors from direct contact with contaminated soil as well as inhalation of fugitive dust and indoor air from the East of South Street Remedial Area.* This will be achieved by excavation and off-site disposal of contaminated soil exceeding cleanup goals, preventing unrestricted residential land use with institutional controls, and establishing a soil management plan for inaccessible soil below existing buildings and for contaminated soils below the depth of excavation. It is expected to take approximately two months from initiation of excavation activities to achieve this goal. Long-term maintenance and monitoring will follow.

- *To mitigate human health risks to potential receptors from direct contact with contaminated soil as well as inhalation of fugitive dust from soil in Area of Containment West of South Street.* This will be achieved by maintaining the existing AOC soil and asphalt covers, excavating and disposing off-site contaminated material within the Settling Basin #2 Containment Cell or leaving it covered in place if the material does not exhibit hazardous waste characteristics, and restricting site redevelopment on the cover and exposure to contaminated soil under buildings with land use restrictions and a soil management plan as institutional controls. It would take two to four months to finish the excavation. Long-term monitoring and maintenance of the soil and asphalt covers will follow.

- *To mitigate human health risks to potential receptors from direct contact with contaminated sediment as well as inhalation of airborne fibers from exposed sediment in the Former Mill Tailrace and Lewis Pond and contaminated Neponset River floodplain soil.* This will be achieved by excavating contaminated Neponset River floodplain soil, dredging and excavating contaminated sediment in the Former Mill Tailrace and Lewis Pond. It would take four to six months from initiation of excavation and dredging activities to achieve this goal. Confirmatory sampling and analysis as well as wetland restoration and monitoring within the sediment dredging areas will follow.

The main expected outcome of the selected remedy is that the site will no longer present an unacceptable risk to current and future residents, future site workers, and current and future waders that are exposed to groundwater, surface water, soil, and sediment. Approximately 50 to 100 years are estimated as the amount of time necessary to monitor the selected remedy.

The selected remedy will also provide environmental and ecological benefits such as the restoration of the wetlands within the sediment dredging areas of the Former Mill Tailrace and Lewis Pond. It is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts such as potential increased property values and enhanced human uses of ecological resources at the Site.

Performance Standards and Cleanup Levels

Groundwater Performance Standards

Based on the results of the Baseline Human Health Risk Assessment, groundwater and surface water have high alkalinity (pH), metals (arsenic and lead), VOCs, and PAHs at levels which pose unacceptable risks to future residents via ingestion, dermal contact, and inhalation.

Groundwater performance standards have been established in groundwater for all chemicals of concern identified in the Baseline Risk Assessment found to pose an unacceptable risk to public health or to exceed an ARAR. Interim performance standards have been set based on the ARARs (*e.g.*, MCLs and more stringent State groundwater remediation standards) as available.

Because the aquifer under the Site is classified as GW-1, which is a potable source of drinking water, MCLs, established under the Safe Drinking Water Act, are ARARs. In the absence of an MCLG, an MCL, a proposed MCLG, a proposed MCL, a more stringent State standard or other suitable criteria to be considered (i.e., health advisory, state guideline), an interim cleanup level was derived for carbazole having carcinogenic potential (Class B2) based on a 10^{-6} excess cancer risk level considering future ingestion of ground water and inhalation of VOCs from domestic water usage. Since a value described by any of the above methods was not capable of being detected with good precision and accuracy, the practical quantification limit was used as appropriate for interim groundwater performance standards for benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

In the absence of the above standards and criteria, performance standards for 2-methylnaphthalene, 4-methylphenol, naphthalene, nickel, vanadium, and zinc (Classes D and E) were established based on a level that represents an acceptable exposure level to which the human population (including sensitive subgroups) may be exposed without adverse effect during a lifetime or part of a lifetime, and incorporating an adequate margin of safety (hazard quotient = 1) considering future ingestion of ground water and inhalation of VOCs from domestic water usage. Manganese does not have a federal or state MCL, yet it has a federally-established lifetime health advisory of 300 $\mu g/L$. It is possible that naturally-occurring levels of manganese in the aquifer may be in excess of this lifetime health advisory level. Therefore, as part of remedial design, naturally-occurring levels of manganese in the aquifer will be further investigated. In the event that naturally-occurring levels are determined to exceed the health advisory, consideration will be given to the naturally-occurring concentrations of manganese in the aquifer in identifying an appropriate higher groundwater performance standard.

Table L-2 summarizes the Performance standards for carcinogenic and non-carcinogenic chemicals of concern identified in groundwater. Groundwater performance standards must be met at wells outside the groundwater compliance boundary shown in Figure L-1.

EPA has estimated that the Groundwater Performance Standards in Table L-2 are currently being met outside of the groundwater compliance boundary, while they will be exceeded within the groundwater compliance boundary for at least 100 years. Institutional controls will be utilized to ensure protectiveness within the compliance boundary.

Soil Cleanup Levels

Based on the results of the Baseline Human Health Risk Assessment, surface soil, subsurface soil, and soil gas were identified as media requiring the development of cleanup levels for East of South Street On-Facility, West of South Street On-Facility, Old Railroad, and along the Neponset River. The contaminants found in these media that are at levels posing unacceptable risks to the future daycare child and Site worker via ingestion, dermal contact, and inhalation are trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, asbestos, and lead.

The East of South Street area of the Site is currently located within the Town of Walpole's Limited Manufacturing (LM) zoning district, which permits both industrial and limited uses by children (such as schools and daycare, but not residential use). The Town's 2005 report *Reuse and Redevelopment Planning Alternatives* recommends the Town consider acquiring some of the on-facility industrial properties and designating them for municipal uses, commercial offices, light industrial uses, or age-restricted housing. Therefore, current and possible future exposure scenarios include the Site worker, construction worker, and trespasser, as well as a municipal or commercial worker, groundskeeper engaged in landscaping activities, and a child attending libraries, schools, and daycare facilities. Unrestricted future residential use is not considered to be a reasonably anticipated future use in the LM zoning district.

In order to allow for future flexibility in implementation of the remedy at this Site in the event the Town of Walpole changes the allowed uses in the LM zoning district to preclude uses by children, in the Feasibility Study cleanup levels were developed for soils in the East of South Street Area based on the current allowed use (future young child attending daycare) and the more restricted site use (current/future site worker) considering direct contact exposures and inhalation of indoor air. The cleanup level for trichloroethene based on inhalation of indoor air for site worker is selected as the most conservative value since it is lower than the calculated level for a daycare child. Accordingly, remedial alternatives evaluated for this portion of the Site in the Feasibility Study also consider these two potential redevelopment alternatives. For selecting the remedy for this ROD, however, only alternatives that addressed risks posed to current allowed uses for the Site were considered protective.

For the East of South Street On-Facility, West of South Street On-Facility, the Old Railroad and the Neponset River shoreline, soil cleanup levels for compounds of concern in surface or subsurface soil exhibiting an unacceptable cancer risk and/or hazard index have been established such that they are protective of human health. Soil cleanup levels for benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, which are suspect carcinogenic chemicals of concern (Class B2), have been set at a 10^{-6} excess cancer risk level considering a future daycare child's exposures to these contaminants via incidental ingestion, dermal contact, and inhalation. Lead and any other contaminants exhibiting hazardous waste characteristics will also be removed from these areas. Since the cleanup values described above are below background values for benzo(a)pyrene and arsenic, background values were used as appropriate for soil cleanup levels for these contaminants.

Some asbestos was found at levels above the cleanup level in soil on the industrial portion of the Site and within the floodplain of the Neponset River between the Site and Lewis Pond and could pose unacceptable risk due to inhalation of airborne fibers from disturbed soil. A soil cleanup level for asbestos was selected to be:

> "less than 1% in soil; would not contribute to a cumulative soil incremental lifetime cancer risk exceeding 10^{-4} "

Cumulative risk at the selected soil cleanup levels for other contaminants was summed to the asbestos soil risk for the child attending daycare to determine the magnitude of the residual soil risk once the action is completed. Since the cumulative risk of risks from other contaminants at the selected soil cleanup levels summed to the asbestos soil risk does not exceed the EPA risk range of 10^{-6} to 10^{-4}, the selected soil cleanup levels are protective of exposures for the most sensitive receptor for locations where asbestos is present in soil at non-detect levels and therefore, not identified for remedial action.

A cleanup level for arsenic in soils having non-carcinogenic effects was also derived for the same exposure pathways and corresponds to an acceptable exposure level to which the human population, including sensitive subgroups, may be exposed to without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1). Since a cleanup value described above is below a background value, a background value was used as appropriate for the arsenic soil cleanup level.

Property along the Neponset River has residential use under current and future scenarios with soil lead requiring clean up. Risk-based soil cleanup level of 400 mg/kg for lead was calculated using the Integrated Exposure Uptake Biokinetic (IEUBK) Model for a child resident, who is considered the most sensitive receptor. This value and the method used to calculate the lead cleanup level are consistent with USEPA guidance (USEPA Region 1 November 1996 Risk Update; USEPA 2003 "Superfund Lead-Contaminated Residential Sites Handbook," OSWER 9285.7-50).

Table L-1 summarizes the cleanup levels for carcinogenic and non-carcinogenic chemicals of concern in soils protective of direct contact with soils. They will be applied to the areas of the Site as described to a maximum depth of the groundwater table. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

Sediment Cleanup Levels

Asbestos was found at levels above the cleanup level in sediment along the Former Mill Tailrace, Neponset River and in Lewis Pond sediment. A sediment cleanup level for asbestos was selected to be:

> " less than 1% in sediment; would not contribute to a cumulative sediment incremental lifetime cancer risk exceeding 10^{-4} via dust inhalation pathway"

This cleanup level must be met at the completion of the remedial action, attain EPA's risk management goal for remedial actions, and have been determined by EPA to be protective.

Lead and any other contaminants in sediment exhibiting hazardous waste characteristics will also be removed.

Table L-3 summarizes the Cleanup Level for asbestos in sediment protective of direct contact with sediment and inhalation of dust from exposed sediment.

Surface Water Cleanup Levels

There is no current guidance on how to evaluate human health risk from exposure to high or low pH in surface water. However, based on the results of the Baseline Human Health Risk Assessment, elevated pH is listed as a contaminant of concern for recreational wader exposed to surface water via direct contact because evaluated pH levels exceeded pH screening criteria. For pH in surface water, the cleanup level has been set at the pH criterion for the Massachusetts Surface Water Quality Regulations for Class B waters in Massachusetts in 314 CMR § 4, specifically a range between 6.5 and 8.3, in order to protect the designated uses, including but not limited to, protection of aquatic species and contact and non-contact recreation.

Table L-4a summarizes the Cleanup Level range for pH in surface water.

Surface water cleanup levels for aluminum, copper, and lead were also set at the NRWQC at the Former Mill Tailrace to be protective of freshwater aquatic life. The Massachusetts Surface Water Quality Regulations were also used to set pH criterion for surface water in this area. Table L-4b summarizes Cleanup Levels for pH and metals in surface water.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Blackburn and Union Privileges Superfund 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 removal, treatment, engineering controls and institutional controls. More specifically soil excavation/sediment dredging and off-site disposal; groundwater collection, treatment and discharge; long-term monitoring; and institutional controls will serve to eliminate existing and potential risks posed by the Site.

The selected remedy will reduce potential human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for incremental carcinogenic risk and such that the non-carcinogenic hazard is below a level of concern. It will reduce potential human health risk levels to meet CERCLA risk-based and ARARs criteria. The remedy is protective of the environment since it will achieve regulatory standards within Site waterways and maintain protective containment of all contaminants that will remain on-site. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

2. The Selected Remedy Complies With ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. Appendix D of this ROD and Tables 12A-3, 12B-5, 12C-2/3, 12D-5 of the FS identifies all of the federal and state ARARs and TBCs that pertain to the selected remedy for each of the four areas of the Site. The tables: (1) identify the precise statutory and/or regulatory requirement that is the ARAR and provide its appropriate legal citation, (2) state whether it is applicable or relevant and appropriate, and (3) briefly explain how the remedial action will comply with the ARAR. A further discussion of why these requirements are applicable or relevant and appropriate may be found in the FS Report in Sections 5.3.2 (SW), 5.5.2 (SO), 5.7.2 (AOC), and 5.9.2 (SSW). No CERCLA waivers are proposed for any ARARs that pertain to the remedy.

In making the determination that the remedy complies with ARARs, EPA has made the following specific finding pertaining to impacts to Floodplain and Wetlands:

> Since a portion of the Blackburn & Union Privileges Superfund site is located within a 100 year floodplain and there are wetlands on site, Section 404 of the Clean Water Act and Protection of Wetlands regulations (that codify standards under Executive Order 11990) and Floodplain Management regulations (that codify standards under Executive Order 11988) require a determination that federal actions involving dredging and filling or activities in wetlands and floodplains minimize the destruction, loss or degradation of wetlands and floodplains and to preserve and enhance the natural and beneficial values of wetlands and floodplains. Through its analysis of the alternatives, EPA has determined that because significant, high level contamination exists in the wetland and floodplain areas of the site, there is no practicable alternative to conducting work in these areas.
>
> The data collected for the Remedial Investigation and the results of the Human Health Risk Assessment support this determination. Once EPA determines that there is no practical alternative to conducting work in wetlands and floodplains, EPA is then required to minimize potential harm or avoid adverse effects to the extent practicable. Best management practices will be used throughout the site to minimize adverse impacts on wetland and floodplain resources, including wildlife and its habitat. Damage to these resources will be mitigated through erosion control measures and proper re-grading and revegetation of the impacted area with indigenous species. Following excavation activities, wetlands will be restored or replicated consistent with the requirements of the federal and state wetlands protection laws. Any lost flood storage capacity from remedial activities within the 100-year floodplain will be restored.

In the Proposed Plan, EPA specifically solicited public comment concerning its determination that the remedy chosen is the least damaging practicable alterative for protecting wetland and floodplain resources.

3. The Selected Remedy is Cost-Effective

In EPA'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.

From this evaluation, EPA has determined that Alternatives SW-3, AOC-3/2, SO-6, and SSW-5 are cost effective as they meet both threshold criteria and are reasonable given the relationship between the overall effectiveness afforded by other alternatives and costs compared to other available options. The detailed cost estimates for the components of the selected alternatives are shown in Tables L-5 through L-8.

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

The Agency identified those alternatives that attain ARARs and that are protective of human health and the environment, and 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 one of the identified alternatives provides 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 <u>emphasized</u> long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and <u>considered</u> the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The selected remedy provides the best balance among the other soil alternatives evaluated in that it provides for off-site disposal of some material (Alternatives SSW-5 and SO-6) as well as on-site disposal of other contaminated soils (AOC-3), all without sacrificing protectiveness. For the AOC area, where Site waste is already under protective containment, weighing removal of more material off-site or adding more treatment against the degree of added protection such measures would provide, lead to the conclusion that Alternative AOC-3 is the most practicable alternative.

The relatively immobile nature (except for the shallow groundwater that discharges to surface waters in the Former Mill Tailrace) and limited size of the contaminated groundwater zone at the Site, lent itself to the monitoring and institutional control remedy in Alternative SW-3. Removal of the source of the groundwater contamination is not practicable and action is not required since there was no current threat to groundwater outside of the waste management area compliance boundary for the SO and AOC waste management areas.

5. The Selected Remedy Only Partially Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

Collection and treatment of shallow groundwater which is degrading surface waters in the Former Mill Tailrace satisfies the preference for treatment which permanently reduces the toxicity, mobility, or volume of hazardous substances at the Site. Stabilization of some materials will be assessed in the pre-design phase, prior to off-site disposal. As discussed in subsection M.4, above, the majority of contaminated soil, sediment and groundwater is being addressed either through removal and off-site disposal or containment. Within the areas of the Site the type and disposition of the contamination present does not practicably lend itself to treatment. Contaminant levels as such that pre-treatment (other than potentially some stabilization) is not required before contaminants may be disposed of off-site.

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.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA presented for public comment a Proposed Plan which described EPA's remedy for the Site on June 18, 2008. The source control portion of the preferred alternative included excavation and disposal off-site of contaminants exceeding Site cleanup levels in soil in the area West of South Street and for soil and sediment within the Former Mill Tailrace, Neponset River, and Lewis Pond. Furthermore, contaminated material East of South Street within the AO area is to be addressed through engineering controls, limited excavation and removal off-site, long-term monitoring and institutional controls. The management of migration portion of the preferred alternative included the extraction, treatment, and discharge of shallow groundwater on-site, the monitoring of the remaining areas of contaminated groundwater within the SO and AOC areas to ensure no migration is occurring from the Site, and the imposition of institutional controls.

After a request for an extension to the public comment period, EPA closed public comment on August 18, 2008 (after sixty (60) days). EPA reviewed all written and verbal comments submitted during the public comment period and has responded to the comments in Part 3 of this ROD, the Responsiveness Summary.

EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary, except for one change to the remedy in the AOC area. As described in the Proposed Plan, the contents of the Settling Basin #2 Containment Cell was to be excavated and disposed off-site. EPA's has modified this component of the remedy to permit the contaminated material in the cell to be tested for hazardous waste characteristics. If the material contains wastes that exceed hazardous waste criteria the cell will be excavated and disposed of off-site, as described in the Proposed Plan. If the material does not exceed hazardous waste criteria, it may either be excavated and disposed of off-site (alternative AOC 3) or left in place (upon restoration of the cover) and subject to long-term maintenance, monitoring and institutional controls (alternative AOC 2). This alternative requires maintenance of the existing covers and fencing around the Site, a soil management plan for contaminated soils under foundations or which may be disturbed by maintenance or other approved activities, long-term monitoring, and institutional controls. EPA has determined that the AOC 2 alternative is protective and meets CERCLA standards.

EPA believes that this change as a result of the public comment is not significant enough to warrant another comment period.

O. STATE ROLE

The Massachusetts Department of Environmental Protection reviewed the various alternatives and has indicated its support for the selected remedy. 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 Blackburn and Union Privileges Superfund Site. A copy of the declaration of concurrence is attached as Appendix A.

PART 3: THE RESPONSIVENESS SUMMARY

There has been extensive community participation during the Remedial Investigation/ Feasibility Study process for the Blackburn and Union Privileges Superfund Site. A more detailed summary of community coordination and involvement is outlined in Section C of Part 2 of the ROD, Community Participation.

EPA published notices of availability of the draft Proposed Plan and Administrative Record in the Walpole Times on May 29, 2008 and June 5, 2008 and released the final Proposed Plan to the public on June 18, 2008. EPA also held a public information session on June 9, 2008 at the Walpole Town Hall in Walpole, Massachusetts, and a Public Hearing on July 14, 2008, also at the same location. A transcript was created for the July 14, 2008 hearing and has been made part of the Administrative Record for this Record of Decision. Based upon a request by the Potentially Responsible Party (PRP) group, the Public Comment Period was extended until August 18, 2008. In addition to the oral comments, a number of written comments were provided on the Proposed Plan. Outlined below is a summary of comments received from the public and other interested parties during the public comment period and EPA's response to those comments. Similar comments have been summarized and grouped together into separate sections, listed below. The full text of all written and oral comments received during the comment period has been included in the Administrative Record.

Section I: Comments Received from the Public

Comment #1:
Some commenters supported the preferred alternatives.

EPA Response: EPA appreciates the commenters' efforts in reviewing the remedy presented in the Proposed Plan and their support for EPA's remedy selection.

Comment #2:
Many commenters from the community indicated a preference for AOC-4 over AOC-3, because AOC-4 removed the Neponset River culvert and the contaminated material within the AOC. Specific concerns related to:

- Inspection and maintenance and potential replacement of the culvert and how it would be accomplished over the long term;
- The long term integrity of the culvert and the AOC cover and its expected lifespan;
- The aesthetics of the AOC-3 alternative;
- Potential failure of the culvert due to river flows in severe hydrologic events, abrasion and contaminants; potential failure due to traffic flow and seismic events
- Who would be responsible for maintaining and replacing the culvert and AOC cover in the future.

EPA Response: EPA's consultant, Metcalf and Eddy evaluated potential failure mechanisms of the AOC and culvert, the potential for repair following minor or major damage, the effect of contaminants on the long term viability of the culvert, extreme weather events, the potential for increased traffic loadings, and seismic events. M&E indicated that all of these potential events were not of concern or could be dealt with without removing the materials already placed at the AOC. Furthermore, M&E indicated that the culvert should last 'at least 50 years without requiring major repairs'. See Appendix F of the ROD.

Section L of the ROD includes text states:

> "An AOC land use restriction between the landowner Grantor and the PRPs who conducted the 1992 CERCLA removal action (installing the culvert and cover) preclude development of this portion of the Site and disturbance of the culvert and cover. As part of the selected remedy, this restriction will be evaluated to determine whether it contains adequate provisions to protect human health and ecological receptors over the long-term life of the remedy. If necessary, land use restrictions will be updated or replaced to meet current requirements."

The institutional control already in place also cites requirements under the 1993 removal action which require that inspections of the culvert be made on an annual basis to ensure that it is still functioning as designed.

The responsibility for performing the construction and long-term maintenance of the remedy will either be borne by responsible parties, or by EPA under a Superfund fund lead action.

Comment #3:
A number of commenters indicated that AOC-4 is preferable to AOC-3, despite the additional capital expense involved. A commenter indicated his opinion that: "Spending the extra 12 million now to remove the culvert is a long term savings in light of potential costs down the road". Another commenter indicated that by providing long-term protection, the culvert provides much less short term protection. Further, the commenter indicated that AOC-4 should be selected because it has greater permanence, in the commenter's opinion.

EPA Response: The comparison of alternatives in Part 2, Section K of this ROD discusses how that the long-term protectiveness of the AOC-3 alternative is comparable to that of the AOC-4 alternative at a substantially lower cost. Alternative AOC-4 was determined to be less protective in the short-term than alternative AOC 3, because it would require, the excavation of large amounts of contaminated material (approximately 39,000 cubic yards according to the FS) which would create the potential for short-term impacts on the local community. The information in Appendix F to the ROD (memo from Metcalf and Eddy) indicates that the culvert component of AOC-3 also has a high degree of permanence when combined with active inspection, operation and maintenance activities (see EPA response to Comment #2).

EPA believes that AOC-3 bests meets the balancing test of the NCP criteria for making a remedy decision, outlined in the Feasibility Study and in Part 2, Section K of this ROD. Based on the administrative record for this ROD, the AOC-3 remedy, including maintaining the culvert, has been found to be protective and cost-effective over the long-term.

The culvert through the AOC area is a component of the remedy and needs to be maintained for as long as the remedy is in place. The long-term cost for maintenance of the remedy, which is significantly less than the cost for alternative AOC-4, is identified in Part 2, Section L of this ROD. Furthermore, as outlined in Appendix F of the ROD, EPA's oversight contractor indicates that that the AOC culvert and cover is sound for the long term with appropriate inspection, operation and maintenance. As discussed in Part 2, Section L of this ROD, financial assurances will be required to ensure that there is long-term funding to conduct all required operation, maintenance, and monitoring of the entire remedy, including the culvert.

Comment #4:
A commenter asked whether money would be set aside for the replacement of the culvert if AOC-3 was selected and what party(s) would be responsible for the expense.

EPA Response: As part of the remedy described in Part 2, Section L of this ROD, sufficient financial assurances will be required to maintain the long-term operation, maintenance, and monitoring of the culvert and the remedy as a whole.

Comment #5:
A commenter asked if greater potential short-term impacts identified for AOC-4 in the proposed plan could be addressed, monitored, and eliminated so that AOC-4 could be selected instead of AOC-3.

EPA Response: AOC-3 was selected over AOC-4 in the Record of Decision because of the detailed analysis in the Feasibility Study, as well as the further assessment of the long-term stability of the culvert evaluated in Appendix F. In particular, AOC-3 was found to meet the threshold criteria, achieved permanence, had much lower potential for short-term impacts, and was much more cost effective. It was identified that AOC-4 posed short term impacts due to potential asbestos release into the air during excavation, as well as issue with developing hazardous material excavation techniques for high pH materials. While both of the issues potentially could be addressed, conducting such a remedial action could require significant mitigation methods to prevent any release of contaminants that would create a risk to human health and the environment. The potential co-location of the high pH material and the asbestos contaminated soils could present very significant challenges. Alternative AOC-3 maintains the current stable containment of the contamination that has been in effect since the cover/culvert was installed in 1992-3.

Comment #6:
Another commenter asked if the short-term impacts inherent in AOC-4 will have to be faced under AOC-3 if the culvert requires repair or failure in the future requiring excavation of the AOC at that juncture. Furthermore, the commenter requested information regarding the potential cost of the repair/replacement.

EPA Response: Please see Appendix F for more information on potential repair scenarios. As described in Part 2, Section L of this ROD, the remedy for the AOC area meets all ARARs for the long-term containment of contaminants on-site. As previously stated in EPA's Response to Comment #4, the remedy includes the requirement that there be a financial assurance mechanism established that will ensure long-term funding for operating, maintaining, and monitoring the culvert, as well as the remedy as a whole.

Comment #7:
Several commenters indicated that the culvert should be inspected by digging out the soils around it and potentially repairing it. The commenters felt that such repairs would be unnecessary if the culvert was removed and the Neponset River daylighted either at the site or nearby which would be more aesthetically pleasing.

EPA Response: Based in part on the information contained in Appendix F of the Record of Decision as well as the FS, EPA concluded that the AOC and culvert will contain the contaminated soils over the long-term, satisfying the NCP's long-term permanence criterion. This analysis describes that inspections and any necessary repairs can effectively be conducted without disturbing the overlying waste material and cover. Instead, Metcalf and Eddy recommended that the inspections of the culvert be conducted visually from the inside.

Daylighting the Neponset River is in itself not necessary to achieve the remedial action objectives of the remedy. The overall remedy will significantly improve the environmental quality of the Neponset River and its resources in the area.

Comment #8:
A commenter indicated that AOC-4 should be chosen over AOC-3 because the difference between the alternatives is 12 million dollars which is small compared to the entire annual Superfund budget.

EPA Response: The total cost of the alternative remedies in comparison to the entire Superfund annual budget is not a factor in the criteria used to select the remedy. The relative cost-effectiveness of the alternatives that meet the threshold criteria is one of the bases for the selection of AOC-3. As previously stated, AOC-3 was determined to be more cost effective than AOC-4 and a better alternative based on EPA's nine criteria.

Comment #9:
Several commenters inquired about what the aesthetic qualities of the on-facility portion of the site would be after the cleanup was complete, with specific concerns regarding tree cover.

EPA Response: The aesthetics of the completed project will be one of the topics to be discussed during the remedial design. During this process it will be determined whether any components of the remedial action (excavation and removal of contaminants, installation of the shallow groundwater collection trench) will require the removal of existing trees from the Site. EPA will involve the community in the process of developing the design of the project and subsequent restoration.

Comment #10:
A commenter asked what condition the Neponset River would be left in after cleanup, and the potential funding through various government levels for river restoration.

EPA Response: The Record of Decision requires that wetlands, waterways, and floodplains disturbed by the remedy be restored after removal of contaminated sediments and soil. The scope of restoration will be developed during remedial design. The ROD also includes measures to ensure that the remedy is protective of both human health and the environment. Potential enhancements to natural resources on-site and up and downstream of the Site are not addressed by this remedy, but could be addressed under other Federal or State authorities.

Comment #11:
A commenter inquired as to the ownership of downstream areas of the Neponset River, floodplain, and Lewis Pond.

EPA Response: The majority of Lewis Pond is owned by Historic Realty Trust, LP according to records at the Walpole Assessor's office. The river front between the on-facility parcels and Lewis Pond is owned by a variety of residential and commercial landowners.

Comment #12:
A commenter expressed concern about the issue of sediments containing asbestos coming into contact with the atmosphere during some parts of the year leading to potential problems.

EPA Response: EPA has sampled the shoreline of Lewis Pond and has found that levels of asbestos were below Cleanup Levels. Asbestos levels remain above Cleanup Levels within Lewis Pond and they remain a concern until the dredging remedy is implemented, particularly in regards to potential trespassers or others who might become exposed to contaminated pond sediments. Prior to the initiation of dredging, the West Street dam will be managed, to the extent practicable, so that water levels do not drop to a level that will expose contaminated sediments. Furthermore, the ROD includes provisions for a public outreach program to ensure the public is aware that wading in Lewis Pond could expose the wader to Site contamination. Pre-design sampling will delineate the extent of sediments and soils exceeding Cleanup Levels in more detail.

Comment #13:

A commenter expressed concern with the hydraulic capacity of the bridge crossing the Neponset River at Main Street. The concern related to the tendency of the area ahead of the bridge to flood.

EPA Response: The remedy will be designed and constructed in a matter that will not decrease flood storage capacity in the area of concern.

Comment #14:
A commenter expressed the concern that all the sediment in the Neponset River exceeding Cleanup Levels be addressed and that low-flows may expose asbestos to the atmosphere.

EPA Response: The areas identified as requiring remediation in the Neponset River floodplain and sediment are known depositional areas of Lewis Pond and the Neponset River. Pre-design sampling will delineate the extent of sediments and soils exceeding Cleanup Levels in more detail. In addition, EPA has requested that the dam owner at Lewis Pond maintain the water level to cover contaminated sediments during the interim period until remediation is complete.

Comment #15:
A commenter expressed concern over the condition of the Kendall Mills (West Street or Lewis Pond) dam.

EPA Response: The Kendall Mills Dam (Lewis Pond dam) is the subject of an extensive report which is included in Appendix A to the Feasibility Study. The condition of the structure is discussed in that document. It is expected that the dam can be maintained and operated during the interim period to maintain water levels in Lewis Pond until remediation is complete. If not, other measures will be required to be evaluated to maintain the protectiveness of the remedy.

Comment #16:
A commenter noted that Union Pond had historically changed in shape and may have been filled at various times in the past. The commenter wanted to know what areas of the Pond were sampled and what was found.

EPA Response: The extent of sampling of Union Pond (or Former Mill Pond) is outlined in the RI/FS. Union Pond was drained after the dam at South Street was destroyed in 1958 according to the ERDA Report (SHA,2000b). RI/FS sampling of the area did not indicate any levels of contaminants exceeding Cleanup Levels.

Comment #17:
Many commenters expressed concerns regarding the Old Mill Building on South Street. Among the concerns expressed were:

- Whether EPA has jurisdiction over demolition of the former mill building at the Site to address potential contamination of the structure;
- What risks exist to the community because of potential for fire, vandalism, or structural failure of the building;
- What financial risks will exist to the Town due to the continued presence of the building;
- The building is visually unappealing and an impediment to redevelopment;
- Shouldn't the responsible parties be require to have an emergency contingency plan that would contain a complete risk assessment, warning, evacuation and sheltering plan, a clean up plan that would also clean, replace, reimburse occupants and owners and require insurance against such an event?
- What will be the final disposition of the Cosmec buildings---they should be demolished as well.

EPA Response: Under Section 104(a)(3)(B) of CERCLA, 42 U.S.C. § 9604(a)(3)(B), EPA is precluded from taking a response action for a release or threat of release of products solely within a building. During investigations of the Site, there was no evidence observed that any contaminants were being released from the buildings to the outside environment. Building roofs appeared intact, walls were stabile and windows and doorways were secured. Therefore, EPA determined it did not have jurisdiction under CERCLA to address any of the buildings or their contents as part of this remedy for the Site. However there is potential that the condition of the unoccupied buildings may deteriorate over time, so EPA continues to reserve its authority to conduct future investigations to determine if the buildings and their contents may pose a threat of release of CERCLA-regulated contaminants to the outside environment. The results of such investigation could lead the Agency to take a further response action under CERLCA, but this would be established under a separate decision document.

Comment #18:
Several commenters expressed concerns about the potential for short term impacts on the nearby neighborhood, especially to residents in nearby structures.

EPA Response: EPA will require an extensive air monitoring program to be instituted at the time the cleanup is performed to ensure the safety of workers and nearby residents. The comprehensive monitoring program for the Site will also include elements to ensure that ground water, surface water, soils and sediments and water do not pose a short-term threat of release. Specific measures to address safety issues will be developed in the Remedial Design process, during which EPA will involve the community.

Comment #19:
A commenter asked about the length of time to begin construction and how long it would last.

EPA Response: The remedial design and negotiations with the PRPs to implement the remedy are anticipated to take approximately two years. Construction of the remedy is anticipated to take one to two construction seasons. The hours of operation of the construction phase of the project will be worked out during remedial design and subject to community involvement and input.

Comment #20:
A commenter noted that: "Pages 17 and 20 of the Proposed Plan indicate that the preferred alternatives for groundwater and surfaces water and for sediments and floodplain soil only "partially meets" the criterion of reducing mobility toxicity and volume. For ground and surface water it also that the preferred alternatives partially meets the criterion of being implementable. In what ways do these alternatives only "partially" meet these criteria?"

EPA Response: The remedy for these areas only partially meets the criterion for treatment because not all of the contamination that is present will be treated under the remedy. For groundwater, only the shallow groundwater discharging to the Former Mill Tailrace will be treated, remaining contaminated groundwater (due to implementability issues) will not be treated, but instead monitored and institutional controls implemented to prevent exposure. For soils and sediments, only the portion of the excavated sediment and soil that requires pre-treatment before off-site disposal would be treated. The remaining excavated soil and sediment will be disposed off-site without treatment. Contaminated soils in the AOC area and in inaccessible areas will be left on-site, but subject the use restrictions that will prevent exposure.

Comment #21:
A commenter who owns land that is identified for cleanup in the Proposed Plan asked whether landowners would be compensated for the loss in value of his/her property by either EPA or the Potentially Responsible Parties.

EPA Response: CERCLA does not include any provision for compensating landowners for potential reduced value of property within or adjacent to Superfund sites.

Comment #22:
Comments were received from private landowners whose property has been identified for cleanup in the Proposed Plan, expressing concern that their property be cleaned with minimal disturbance of the remainder of their property, and the cleanup work be properly documented in a certification of compliance. Commenters also wanted EPA to ensure frequent communications with the landowners, that contractors work be overseen carefully, and that the work be as aesthetically pleasing as possible.

EPA Response: EPA will oversee all cleanup activities. Community outreach will be performed by EPA throughout the design process to ensure the landowners are aware of the provisions of the cleanup plans and specifications. While betterments to private property cannot be made under Superfund, the property can be restored to as close to the prior condition as possible as part of the remedial action. EPA will ensure that there is effective outreach during design, and communication and oversight during construction.

Comment #23:
A landowner adjacent to lot 33-130 expressed concern over the possible presence of brake liners on that property that may have originated at the Site.

EPA Response: The presence of additional areas of contamination that may pose a risk to human health and the environment under CERCLA and that were not identified within the ROD will be further investigated. The results of such investigations could lead the Agency to take further response actions under CERLCA, but this would be established under a separate decision document.

Comment #24:
A residential landowner asked that EPA perform additional testing to more carefully define the affected area, and minimize unnecessary disturbance of other areas of their property.

EPA Response: *The Selected Remedy section of the ROD (Section L) includes pre-*design studies to further refine the areas to be remediated.

Comment #25:
A commenter inquired about the Site access during construction and what the potential hours of operation would be for the construction activities.

EPA Response: Some access corridors may need to be established in residential areas to gain access to the Neponset River floodplain and Lewis Pond. These corridors will be identified during Remedial Design. Details of access arrangements to the on-facility area of the Site on South Street will also need to be established during design as well. Hours of operation as well as precise sequencing of construction activities will also be addressed as part of the remedial design process. EPA will work carefully with the community to ensure that input is collected from nearby residents and addressed in the design and construction.

Comment #26:
A commenter inquired as to what monitoring will take place at each location of the cleanup, who would be responsible for evaluating the results and when the monitoring would be performed.

EPA Response: In the near term, pre-design data will be collected to assist in the design of the project. One of the primary goals of the cleanup is to document that the Cleanup

Levels listed in Section L of the ROD are met for all the properties impacted by contamination at the Site. The details of the monitoring program to ensure cleanup is in conformance with the ROD standards will be one of the subjects of the remedial design. Over the long term, EPA will conduct Five-Year Reviews to assess if the completed remedy remains protective of human health and the environment, based on continued monitoring data collected during operation and maintenance of the remedy.

Comment #27:
A parent within close proximity to the South Street location expressed concern about the safety of their children presently and during the project, as well as in the future after the cleanup. Concern was expressed about potential access by children to the abandoned mill on South Street and resulting physical hazards. Access will be restricted during implementation of the remedy. After the remedy us completed, all contaminants that pose a risk of child exposure will be either removed or contained.

EPA Response: The former mill building on South Street is currently fenced off to prevent access by trespassers. The issue of the building demolition is addressed in EPA's response to Comment #17. EPA will work with the landowner to ensure that the building is secured over the long-term.

Comment #28:
The Town of Walpole inquired as to the data supporting the delineation of soil to be removed within the railroad right of way under the selected alternative, SO-6.

EPA Response: Soil sample analytical results were compared to cleanup goals established for the site. Preliminary excavation limits typically extend to a distance halfway between the last location to exceed a cleanup goal and the next location below a cleanup goal. Pre-design investigations will likely include further sampling in this area to refine the extent of soil removal necessary to achieve remedial action objectives. See Appendix C-1 of the Feasibility Study for further details on the extent of cleanup.

Comment #29:
A Commenter asked about the probability that in time groundwater contamination will migrate off site and noted that in some areas groundwater was as high as pH of 14

EPA Response: The current high pH contaminant plume at the site (see Figures 18 through 20 of the FS) are considered to be in a steady-state (well-established and not changing noticeably) condition. In deep groundwater, contamination has not been documented to levels exceeding Cleanup Levels established in the ROD outside of the groundwater compliance boundary. Contaminant migration appears to be occurring in the shallow groundwater, where it is discharging to the Former Mill Tailrace and causing an exceedance of water quality criteria. The remedy will capture this shallow groundwater prior to its discharge to the tailrace. Deeper groundwater will continue to be monitored to ensure that the contaminant plume is not exceeding Cleanup Levels in the future beyond the groundwater compliance boundary for the SO and AOC waste management areas.

Comment #30:
A commenter asked for more information on the potential for soil contamination at the old mill building at the Kendall Mills dam (West St Dam) and if any investigation was performed between that dam and Stetson Pond, the next impoundment downstream.

EPA Response: Sampling data analyzed for this ROD has identified the location of soil, sediment, and groundwater contamination present at the Site that poses a risk to human health and the environment under CERCLA. Uncontaminated properties would not be subject to CERCLA action. However, further site assessments may be called upon to determine whether a property within or adjacent to the Site does not contain any CERCLA waste (see Comment #23).

To confirm the full extent of contaminants within the waterway, Section L of the ROD calls for an assessment of the potential for contaminant transport downstream of Lewis Pond during the pre-design effort. See EPA response to Comment #24.

Comment #31:
A commenter remarked that "only short term actions are being proposed" and that the project should meet the threshold criteria of protecting human health and the environment. The commenter asked that future changes in climate, hydrology, and other long-term factors be considered.

EPA Response: The selected remedy incorporates, remediation of soils, dredging of sediment, treatment of shallow groundwater, institutional controls, and long-term monitoring, operation and maintenance of the remedy. These actions were proposed and selected based on foreseeable circumstances. Five-Year Reviews of the project (post remediation) will assess the long-term protectiveness and need for potential further actions going forward as new conditions present themselves that may affect the protectiveness of the remedy.

Comment #32:
A commenter asked if the actions of the former manufacturing operations at the Site, the potential for fire debris at the Site, and potential contamination at off-site locations other than those discussed in the documents, were considered during the RI/FS process.

EPA Response: The Existing Data Review and Analysis Report (SHA, 2000b) contains a summary of the prior activities that took place at the Site that formed that basis for the investigation of the Blackburn and Union Privileges Site. The report is contained within the Administrative Record. No other off-site properties were investigated.

Comment #33:
A commenter asked if federal Superfund funding could be used to supplement Potentially Responsible Party funding to help the project.

EPA Response: The funding of the project will be the addressed once the remedy is formally selected. To preserve federal resources for other Superfund cleanups around the country, the priority is to identify responsible parties to fund and implement the remedy, with appropriate oversight by EPA.

Comment #34:
A commenter asked why EPA was proposing to leave any contaminated material in place at the Site.

EPA Response: CERCLA actions are taken based upon the National Contingency Plan, which allows EPA to select a remedial action which leaves contamination in place under certain circumstances. Waste can be managed in place, while maintaining the protectiveness of the remedy and allowing controlled reuse of the Site. Please note that EPA is required to assess any remedy in Five-Year Reviews when waste in left in place to ensure that the remedy remains protective going forward.

Comment #35:
A commenter inquired as to the threats to local neighbors, both short and long term, will be present during the implementation of the remedy, what threats to local neighbors, both short and long term, will be present before the action is taken, and what threats to local neighbors, both short and long term, will be present after the EPA cleanup.

EPA Response: The short term threats to the community are to be monitored and controlled until the remedy is completed. Community input will be gathered as part of the remedial design process. EPA will work with the Town and community members to attempt to incorporate community concerns into the design as it progresses.

Comment #36:
A commenter asked if liability for cleanup costs would be an issue for property owners.

EPA Response: Under CERCLA, landowners of property who did not dispose of hazardous substances on their property or who have not caused a release or threat of release of hazardous substances are provided defenses from liability under the statute. See Sections 107(b)(3) and 101(35)(A) of CERCLA, 42 U.S.C. §§ 9607(b)(3) and 9601(35)(A) for the specific standards addressing landowner liability.

Section II: Comments Received from the Potentially Responsible Parties (PRPs)

Comment #37:
A commenter for the landowner PRPs requested that EPA order the Town of Walpole and the landowner PRPs to jointly record a deed restriction on the East side of South Street such that certain activities not be permitted. The commenter's stated goal was that EPA not require the remediation of those properties.

EPA Response: The remedy for the SO area calls for removal of contaminated soil so as to permit current allowed uses of the Site (based on local zoning), rather than leaving more contamination on-site that would require use restrictions (prevent activities involving children). EPA's analysis under the NCP criteria determined that the removal of soil to address the risks to current allowed uses on the property was the most protective and cost effective alternative.

Comment #38:
A landowner PRP requested that the written cleanup plan provide enough latitude such that if additional acceptable proposals are offered, that there will not be the requisite for new hearings with the consequent delays, but could be approved administratively by EPA.

EPA Response: Changes to the selected remedy may be effected in one of many ways through the process of Remedial Design and Action; a ROD amendment is required for a fundamental changes in the ROD; while an Explanation of Significant Differences, or "ESD" is called for when the differences in the Remedial Action significantly change but do not fundamentally alter the remedy selected in the ROD with respect to scope, performance, or cost. Some design decisions will be based upon the results of pre-design studies called for in the ROD, and do not require any changes to the remedy.

Comment #39:
The owner of the on-facility area of the Site requested EPA release the non-contiguous, non-contaminated property at South and Common Streets, indicating that such would allow the sale proceeds to be paid to the Town of Walpole for outstanding real estate taxes.

EPA Response: EPA has not put any restrictions on property on the Site, to date. The landowner has put use restrictions on portions of the AOC area.

Comment #40:
USEPA failed to complete the feasibility study prior to issuance of the Proposed Plan; USEPA must formally complete the FS before proposing remedial action alternatives for the Site.

EPA Response: The commenter is mistaken that the Proposed Plan was released prior to the release of the Feasibility Study. EPA included its final draft of the Feasibility Study as part of the Administrative Record which was made available at the information repositories at EPA's office in Boston and at the Walpole Public Library on June 18, 2008. This release was at the start of the public comment period for the Proposed Plan. As part of its community relations efforts, EPA did share a draft Proposed Plan (which was identified as a draft) with participants of a June 9 public meeting (see Part 2, Section C of this ROD) and solicited comments on the draft document. EPA stated at the public meeting that the administrative record, including the Feasibility Study and the final Proposed Plan would be available in the document repositories the next week. The final Proposed Plan was released on June 18, 2008, at the start of the public comment period.

Comment #41:
USEPA Region I should not have eliminated from consideration in its FS Report a proposed remedial alternative for the Former Mill Tailrace area included in the draft FS Report prepared by Sanborn, Head & Associates on behalf of Tyco and Grace and submitted to USEPA on October 19, 2007.

EPA Response: EPA did review the proposal from the PRPs to include an alternative for the Former Mill Tailrace area that would have filled in the waterway and the adjacent wetlands to address shallow groundwater contamination from the Site (mitigating the loss through the creation of replacement wetlands/waterways elsewhere). This plan was screened out upon EPA's review of the proposal and not included in the FS because it failed to meet the Remedial Action Objective of the remedy to meet water quality standards in the Former Mill Tailrace to address risks to human health and the environment.

a. USEPA's Alternative SW-3 is not practicable under the Clean Water Act

EPA Response: Alternative SW-3 as described in Part 2, Section L of this ROD, restores the degraded water quality in the Former Mill Tailrace and its adjoining wetlands, while leaving them primarily intact (some alteration of wetlands will likely occur from the implementation of the shallow groundwater treatment system). Under federal wetlands mitigation criteria, restoration of degraded wetland resources is preferred over replacement of lost wetland resources elsewhere. In the FS, which utilized information provided by the PRPs, and Part 2, Section K of this ROD it was identified that alternative SW-3 was technically feasible (although it would involve long-term treatment of the shallow groundwater discharging into the Former Mill Tailrace). Therefore, EPA was able to determine that alternative SW-3 was the least damaging practicable alternative to protecting wetland resources, both from site contamination and physical disturbance.

b. USEPA's Alternative SW-3 is Not a Feasible Groundwater or Surface Water Remedy

i. The distribution of contamination at the Site renders groundwater extraction and treatment infeasible.

EPA Response: Long-term treatment of contaminated shallow groundwater is feasible as analyzed in the FS and presented in this ROD. As described in Part 2, Section H, the Remedial Objectives require the remedy to meet surface water quality standards in the Former Mill Tailrace that pose risks to human health and the environment. To achieve this, alternative SW-3 intercepts, collects, and treats the contaminated shallow groundwater that is degrading the waterway's water quality. The need for long-term treatment does not solely determine whether a remedy is feasible or not (for example, under the NCP there is a preference for treatment alternatives, even if they may cost more and take more time than non-treatment alternatives).

ii. The Contaminants of Concern (COCs) have chemical and physical properties that are not amenable to natural attenuation.

EPA Response: As discussed above, the long-term treatment of the contaminated shallow groundwater is a feasible means to prevent contaminated groundwater (exhibiting a high pH and containing other Site COCs) from being discharged into the Former Mill Tailrace, even though the remedy does not propose active groundwater source control measures within the AOC waste management area. The FS estimated that effective control of pH levels in shallow groundwater will allow Former Mill Tailrace water quality to achieve Cleanup Levels within a short period of time, perhaps a period of less than a month; therefore COCs level will be reduced so that they no longer pose a risk to human health and the environment.

iii. USEPA's proposed remedy is inconsistent with remedies selected at other Superfund sites.

EPA Response: Although the commenter noted that different approaches may have been used at other Superfund sites, under the NCP each Superfund site is evaluated based on its own site-specific conditions. The evaluation of site conditions and contaminants levels at this Site indicated it was feasible to quickly reach Cleanup Levels in the Former Mill Tailrace by collecting and treating the contaminated shallow groundwater discharging into the waterway. As described in the FS and in Part 2, Section K, alternative SW-3 best meets the NCP remedy criteria, particularly for the protection of human health and the environment, compliance with ARARs, and the preference for treatment of contamination.

Comment # 42:
USEPA should select SO-4, because it complies with the NCP and is the most cost-effective remedial alternative.

EPA Response: EPA evaluated all of the SO alternatives in the FS, based on all of the NCP criteria, not just cost. As described in the FS and Part 2, Section K of the ROD, alternative SO-6 was determined to be more protective than alternative SO-4, since it called for the removal and off-site disposal of all contaminants that would pose a risk under CERCLA to the current allowed activities and uses of the site. Under the Town of Walpole's zoning for the area (LM – Light Manufacturing), site uses that permit children on-site are currently allowed. Alternative SO-6 would remove all contaminated soil that would pose a risk to children being on-site occupying a school, library, day-care or other such use. Alternative SO-4 would leave contaminants on-site that would pose a risk to children and would only be protective if the use of the Site were curtailed to prevent child use. Since this would restrict the present allowed use for the site, alternative SO-6, rather than SO-4, was determined to be the alternative that best met all of the NCP criteria.

Comment #43:
If the materials in Settling Basin #2 Containment Cell are not characteristically hazardous, then AOC-2 is protective, meets the NCP criteria, and should be selected as the remedial alternative for this area of the Site; the ROD should provide for pre-design testing to determine if the Settling Basin #2 Containment Cell does contain characteristically hazardous wastes, with the excavation of the Settling Basin #2 Containment Cell being contingent on a positive hazardous waste determination.

EPA Response: Based on this comment and review of the record, EPA has modified the remedy as presented in the Proposed Plan to allow the material in the Settling Basin #2 Containment Cell to be tested to see if it exhibits hazardous waste characteristics. If it does exhibit hazardous waste characteristics the material will be removed and disposed of off-site (presented in the FS and Part 2, Section K of this ROD in relation to alternative AOC-3). If it is found to be non-hazardous, the existing cover can be maintained and institutional controls and monitoring standards, as applied to the remaining AOC area under the ROD, will be established for the containment cell area (as presented in relation to alternative AOC-2). See Part 2, Sections L and N of this ROD for further details about this significant change to the Proposed Plan.

Comment #44:
USEPA's FS Report did not include an Executive Summary as indicated in the first bullet on page 2. USEPA should revise its FS Report to include an Executive Summary.

EPA Response: The final version of the FS was included in the Administrative Record on June 18, 2008 and no further modifications to the document will be made. An Executive Summary is not a substantive component of the FS nor is it required for EPA to analyze remedial alternatives prior to selecting a remedial action.

Comment #45:
In several places in its FS Report, USEPA makes statements such as "during remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place." These statements assume that hazardous wastes were historically

deposited on-site, an assumption not supported by the administrative record.

EPA Response: Although no further changes to the FS are to be made, EPA did take this comment into account when crafting this ROD. When discussing the potential presence of hazardous waste on-site the terminology generally used in the ROD is soil/sediment that "exhibits hazardous waste characteristics." This takes into account that sampling of soil and sediment around the site as part of the RI did encounter high enough levels of certain contaminants, particularly lead, that could potentially exceed characteristic hazardous waste standards. At the time the samples were tested, however, the test required under the hazardous waste regulations to identify regulated wastes was not conducted. Contaminated materials will be tested during pre-design to determine if they are regulated as hazardous waste and need to be handled/managed in compliance with the standards.

Comment #46:
The remedial alternative comparative evaluation tables for alternative AOC-2 should be marked "Y" for ARAR compliance and associated narrative in USEPA's FS Report be changed to reflect that the current cover over the AOC area is compliant with ARARs.

EPA Response: *Although no further changes to the FS are to be made, EPA did take this* comment into account when crafting this ROD. This issue was previously discussed in EPA's response to Comment #43, in that whether the entire AOC area complies with ARARs depends on whether materials that exhibit hazardous waste characteristics are present in the Settling Basin #2 Containment Cell (which is part of the AOC area). If materials exhibiting hazardous waste characteristics are present, the cover over the containment cell may not be compliant with hazardous waste standards outlined in the ARAR tables in Appendix D; if not present the cover throughout the AOC area is compliant. In the comparison summary table, Table K-4a, ARARs compliance for alternative AOC-2 is marked "P" for "potentially complies" with ARARs.

Comment #47:
In Section 1.4.2, page 14, fifth paragraph, second sentence of the FS Report, USEPA states that "Use of site groundwater at [*sic*] tap water is currently prohibited, since no wells can be installed under the existing deed restriction in the Area of Containment". To accurately reflect current circumstances, this sentence should be revised to "Installation of potable wells (among other non-investigatory activities that may disturb the cap) is prohibited within the Area of Containment under the terms of the Use Restrictions currently in effect. Further the yield of the aquifer impacted by contaminants is such that any production well placed in this area would not provide a useful quantity of water."

EPA Response: As previously noted, no further changes to the FS are to be made. Although the AOC land use restriction apparently does not explicitly forbid the withdrawal of groundwater, it does disallow the installation of any wells, effectively disallowing the withdrawal of groundwater. Any description of the existing restrictions on groundwater use in the AOC area is based on the content of the recorded use restriction. Section L of the ROD includes a requirement re-examining the land use restrictions currently in place and their modification to conform to the requirements of the remedy in this ROD.

Comment #48:
In Section 4.1.2, page 34, second paragraph of its FS Report, USEPA describes that alternative SW-2 includes "...establishing a compliance boundary around the SO and AOC waste management areas (see Figure 27A), within which deed restrictions would prevent use/exposure to contaminated groundwater." USEPA should change the language in the FS from the "SO and AOC waste management areas" to the "SO and AOC areas."

EPA Response: As previously noted, no further changes to the FS are to be made. The terminology used in the ROD adequately describes the scope of each selected alternative that makes up the overall selected remedy.

Comment # 49:
In Section 2.2.2, page 23, third full paragraph of its FS Report, USEPA describes that the "Site Worker" PRGs were developed "assuming changes in the allowed uses to preclude uses by children." USEPA should revise its FS Report to state that a deed restriction prohibiting development of the site for child intensive uses would also be considered protective of human health. The commenter recommends that USEPA describe that changes in the current allowed uses of the site could include changes in the Town of Walpole zoning ordinances or institutional controls; such as, deed restrictions prohibiting development of the site for child intensive uses.

EPA Response: As previously noted, no further changes to the FS are to be made. See EPA's response to Comment #42 regarding the protectiveness of alternatives in the SO areas that do not permit the current allowed uses of the Site.

Comment #50:
USEPA describes its site-specific risk assessment for asbestos as conservative, including activity-based sampling in areas that USEPA considers to be representative of other areas of the site. Therefore, it is not clear why the PRG for asbestos is "less than 1%; would not contribute to a cumulative ILCR > 1E -04 through inhalation pathway" instead of simply "less than 1%." USEPA should revise the asbestos PRG to "less than 1%," or alternately "Less than 1% (i.e. would not contribute to a cumulative ILCR > 1E-04 through inhalation pathway)."

EPA Response: EPA believes that the <1% standard in soil and sediment is protective of the 1E -04 risk standard; however, both are required to be complied with to ensure compliance with the ROD. Based on the current data set and the HHRA, the selected Cleanup Level is considered protective of human health and the environment and consistent with the NCP. The details of confirmatory methods, sampling and analysis, including potential activity based sampling will be addressed during remedial design

Comment #51:
Given USEPA's asbestos PRG for soil and/or sediment, the FS Report is not clear how USEPA expects confirmatory soil/sediment sampling/analysis for asbestos (post implementation of the remedy) would be performed. Will USEPA not require activity-based confirmatory sampling unless future site use was to significantly change from that currently anticipated? USEPA should revise its FS Report to clarify this matter.

EPA Response: As previously noted, no further changes to the FS are to be made. Procedures for confirmatory sampling will be developed during the pre-design process based on the requirement that there is sufficient confirmatory sampling to show that the implemented remedy is protective of human health and the environment.

Comment #52:
USEPA states in Section 2.2, page 19, second paragraph of its FS Report, that there were no actionable ecological risks "...within the Former Mill Tailrace or in the Neponset River immediately downstream of the Tailrace." However, USEPA describes in Section 5.3 and on Table 14A that alternatives SW-1 and SW-2 are not protective of the environment, and alternative SW-3 as protective of the environment. The implication that the environment is at risk is contradictory to the findings of the BERA. USEPA should remove language from its FS Report that implies that there are potential ecological risks / impairments present at the site and clarify that the only cause of action is exceedance of state or federal numeric standards for aluminum, copper, lead and pH.

EPA Response: As previously noted, no further changes to the FS are to be made. Remedial Objectives for the protection of ecological receptors, as described in Part 2, Section H of the ROD, are based on exceedances of surface water quality standards for protecting environmental quality, not ecological risks identified in the BERA. Therefore, actionable threats to the environment are present.

Comment #53:
In the second table on page 26 of its FS Report text, USEPA indicates that soil is the primary remediation driver for this portion of the site (the AOC). USEPA also indicates on the table that the assumed depth of excavation in the AOC (third column of table) is "the shallower of the base of contaminated soil, or the groundwater table." Contaminated soil is not defined. USEPA had previously directed SHA to include a PRG for these soils as "Fill Soil" during SHA's preparation of its Draft FS Report. USEPA should revise its FS Report to use "Fill Soil" as the PRG for soil on this potion of the site. Also, for consistency, the Primary Remediation Driver" should be "fill soil" not just soil.

EPA Response: As previously noted, no further changes to the FS are to be made. The AOC contains contaminated soil present and consolidated at this location during the 1992-3 Removal Action conducted by the PRPs. The HHRA assumes the soil contained under the AOC cover to be an unacceptable risk to human health. The terminology used in the ROD adequately describes the contaminated material that is to be addressed in the AOC area.

Comment #54:
On page 7 of Table 14B of its FS Report, USEPA states that alternatives SO-3 and SO-4 would "...not be protective of the community." This statement is not the typical way that short-term effectiveness is evaluated. As described in Section 6.2.3.5 of USEPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," short-term effectiveness "...addresses the effects of the alternative during the construction and implementation phase until remedial response objectives are met..." USEPA should revise its FS Report by removing from page 7 of Table 14B the statements that suggest that alternatives SO-3 and SO-4 would not be protective of the community or revise it to state that SO-3 and SO-4 would be protective, as defined in USEPA's Guidance document referenced above.

EPA Response: As previously noted, no further changes to the FS are to be made. In the SO area, levels of contamination on-site pose a risk to the currently allowed uses of the area, which include uses by children. Therefore, EPA has determined that alternatives SO-3 and SO-4 would not be protective of the community, since these alternatives do not achieve the Remedial Objectives of the remedy, as described in Part 2, Section H of this ROD.

Comment #55:
A similar misuse of the short-term effectiveness criterion is located on page 5 of Table 14D of USEPA's FS Report. USEPA states under the SSW-3 alternative that: "There would be potential environmental impacts if sediments exceeding hazardous waste standards are left in place in Lewis Pond." As described above, the short term effectiveness criterion should be used to evaluate the effects of the alternative during the construction and implementation phase until remedial response objectives are met. The statement is also incorrect because the implication that the environment is at risk is contradictory to the findings of the BERA. USEPA should revise its FS Report by removing the above statement from the short-term effectiveness language for the SSW-3 alternative on page 5 of Table 14D or revise it to state that SSW-3 [*sic*] would be protective, as defined in USEPA's Guidance document referenced above.

EPA Response: As previously noted, no further changes to the FS are to be made. As discussed in EPA's Response to Comment #45, sediment testing conducted as part of the RI showed lead at high enough levels that there may be exceedances of hazardous waste characteristic standards. Adequate testing was not conducted to determine the regulatory status of the sediment. If pre-design sampling shows that sediments do exceed hazardous waste characteristic standards the relevant and appropriate hazardous waste regulations would prohibit the sediments from being left in place unless adequately contained or treated. Therefore, as discussed in Part 2, Section K of this ROD, the SSW-3 alternative would be neither protective of human health and the environment nor compliant with ARARs. This regulatory compliance issue was not addressed in the BERA.

Comment #56:
USEPA reduced the PRGs for naphthalene and 2-methylnaphthalene by incorporating the assumption that the inhalation dose from residential tap water use would be equal to the ingestion dose from residential tap water use. However, the USEPA Region 1 Risk Update dated August 1995 describes this qualitative assessment applicable to VOCs in tap water and concludes that "This qualitative assessment of risks will not be factored in to the derivation of groundwater cleanup levels." USEPA should make its study involving shower vapor modeling that supports the assumption that inhalation dose is 100% or more of the ingestion dose for VOCs available as part of its FS Report and explain how it applies to PRG calculations for naphthalene and 2-methylnaphthalene given its lack of consistency with currently available USEPA guidance.

EPA Response: As previously noted, no further changes to the FS are to be made. Two volatile COCs listed on Table B-3.3 of the FS (2-methylnaphthalene and naphthalene) do not have MCLs. The inhalation contribution to non-carcinogenic effects for these COCs was originally estimated (in the BHHRA; SHA, 2007) through the assumption that the inhalation dose was equal to the ingestion dose. However, the EPA's 1991 Risk Assessment Guidance for Superfund (RAGS) Part B (Chapter 3) recommends use of the Andelman (1990) equation to quantify risk from indoor inhalation of volatiles in household water through domestic uses such as showering, laundering, dish washing.

Only non-cancer effects are evaluated for 2-methylnaphthalene and naphthalene because there is lack of studies or strong evidence on cancer effects from these two contaminants.

$$HQ = \frac{C \times K \times IRa \times EF \times ED}{RfDi \times BW \times AT \times 365\ \text{day/yr}}$$

where: HQ = Hazard Quotient
C = Chemical concentration in water (mg/L)
K = Volatilization Factor (L/m3)
IRa = Daily Indoor Inhalation Rate (m3/day)
EF = Exposure Frequency (day/yr)
ED = Exposure Duration (yr)
RfDi = Inhalation Chronic Reference Dose (mg/kg-day)
BW = Adult Body Weight (kg)
AT = Averaging time (yr)

Furthermore, rather than adjusting an RfC to an RfDi, the equation is adjusted to utilize an RfC to be consistent with EPA's inhalation dosimetry approach as published in EPA's 1994 Methods for Derivation of Inhalation Reference Concentration and Application of Inhalation Dosimetry, 1996 and 2002 Soil Screening Guidance and 2008 Regional Screening Tables. The equation used to quantify non-carcinogenic effects from indoor inhalation of 2-methylnaphthalene and naphthalene is as follows:

$$HQ = \frac{C \times K \times EF \times ED}{RfC \times AT \times 365 \text{ day/yr}}$$

where: HQ = Hazard Quotient
C = Chemical concentration in water (mg/L)
K = Volatilization Factor (L/m3)
EF = Exposure Frequency (day/yr)
ED = Exposure Duration (yr)
RfC = Inhalation Reference Concentration (mg/m3)
AT = Averaging time (yr)

The Hazard Quotient contribution calculated below will be used to replace that which was originally estimated in the BHHRA to generate PRGs in Table B-3.3. More details of this calculation can be found in Table 6 of Attachment 1 of Appendix B-3 of the FS.

Comment #57:
In its site-specific asbestos risk assessment, USEPA defines low intensity activities as raking, walking, and jogging, and high intensity activities as mowing, landscaping, gardening, biking, and excavation. USEPA uses "professional judgment" to define exposure times and exposure frequencies for these activities. Exposure times and frequencies should be based on time-activity pattern studies. USEPA should describe in its FS Report why it relied on professional judgment to define exposure times rather than using time-activity pattern studies.

The asbestos risk assessment should be revised to include additional description of sampling conditions such as ground cover in areas where activity-based sampling was conducted.

EPA Response: USEPA believes that its professional judgment to define exposure times and exposure frequencies for low-intensity and high-intensity activities during the asbestos activity-based sampling warrants a conservative approach to assess exposures to inhalation of asbestos in air generated from contaminated soil.

Regarding additional description of sampling conditions such as ground cover in areas where activity-based sampling was conducted, soil sampling was conducted and documented in the Lockheed Martin/REAC Final Report on Asbestos Activity Based Sampling (Appendix B-2 of the FS).

As previously noted, no further changes to the FS are to be made. EPA's final version of the asbestos risk assessment (Appendix B of the FS) was also included in the Administrative Record on June 18, 2008 and no further changes to the document will be made.

Comment #58:
In Table 6 of USEPA's asbestos risk assessment, USEPA should edit Note 1. It is misleading as written, suggesting that USEPA's latest IRIS review for asbestos occurred in January 2008. The last IRIS review occurred in 1993.

EPA Response: Comment noted. The date that the IRIS database was checked was January 2008 as stated by the commenter. This is reflected in Table G-7 of the ROD.

Comment #59:
USEPA included toluene in column 10 of the actionable risk table (i.e. Table B-3.2) of its FS Report. The maximum exposure point concentration (EPC) for toluene does not exceed the maximum contaminant level (MCL; see Table 3.7 RME in Appendix F of the Baseline Human Health Risk Assessment) for toluene; therefore, toluene does not belong on this actionable risk table.

EPA Response: Column 10 of Tables B-3.1 and B-3.2 for Potentially Actionable Risks from the FS report presents analytes where the EPC is above the MCL. Toluene's EPC is not. However, its maximum detected concentration is above the MCL and it is listed in Table B-3.3 as such. Therefore, the interim cleanup level has been established as the MCL. The text of Appendix B-3 describes how toluene and styrene are in Tables B-3.1 and B-3.2 due to their maximum detected concentrations being above the MCLs.

As previously noted, no further changes to EPA's final version of the FS are to be made.

Comment #60:
Several of the supporting calculation worksheets in Appendix D of USEPA's FS Report have SHA's logo on them. USEPA should remove SHA's logo from these worksheets.

EPA Response: As previously noted, no further changes to EPA's final version of the FS are to be made. SHA's logo was not included in any figures or tables in the ROD.

FIGURES

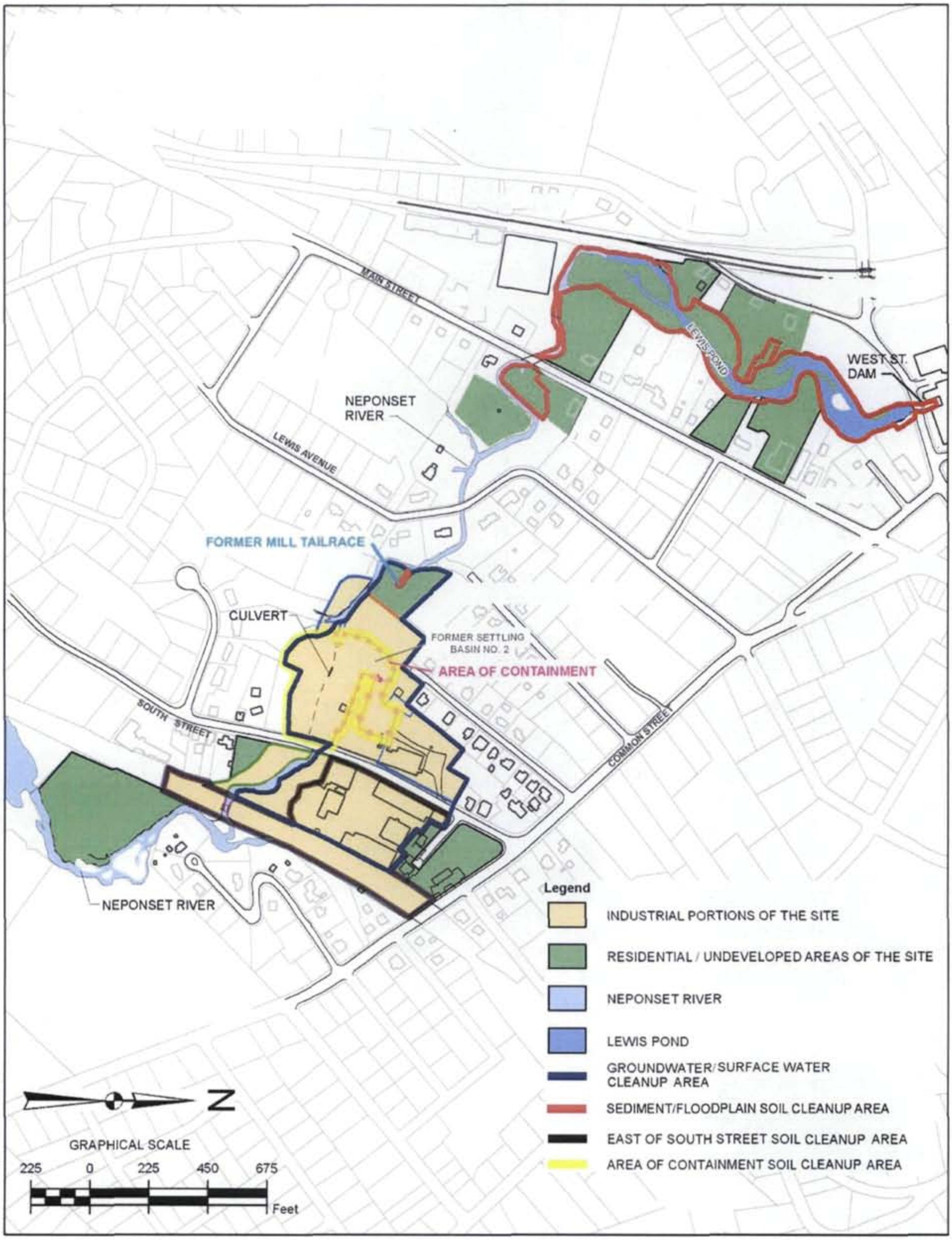


Figure A-1 Blackburn and Union Site

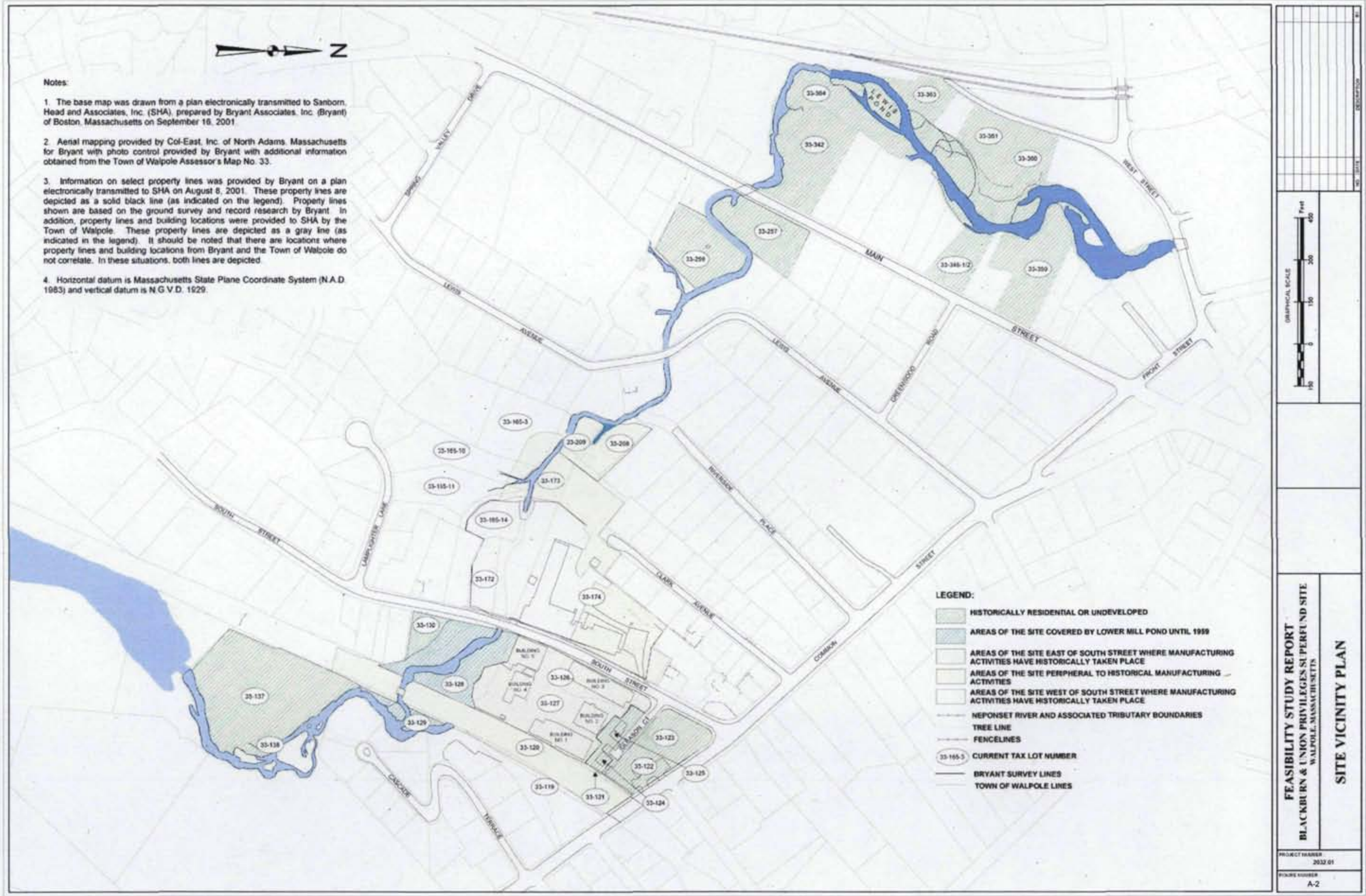
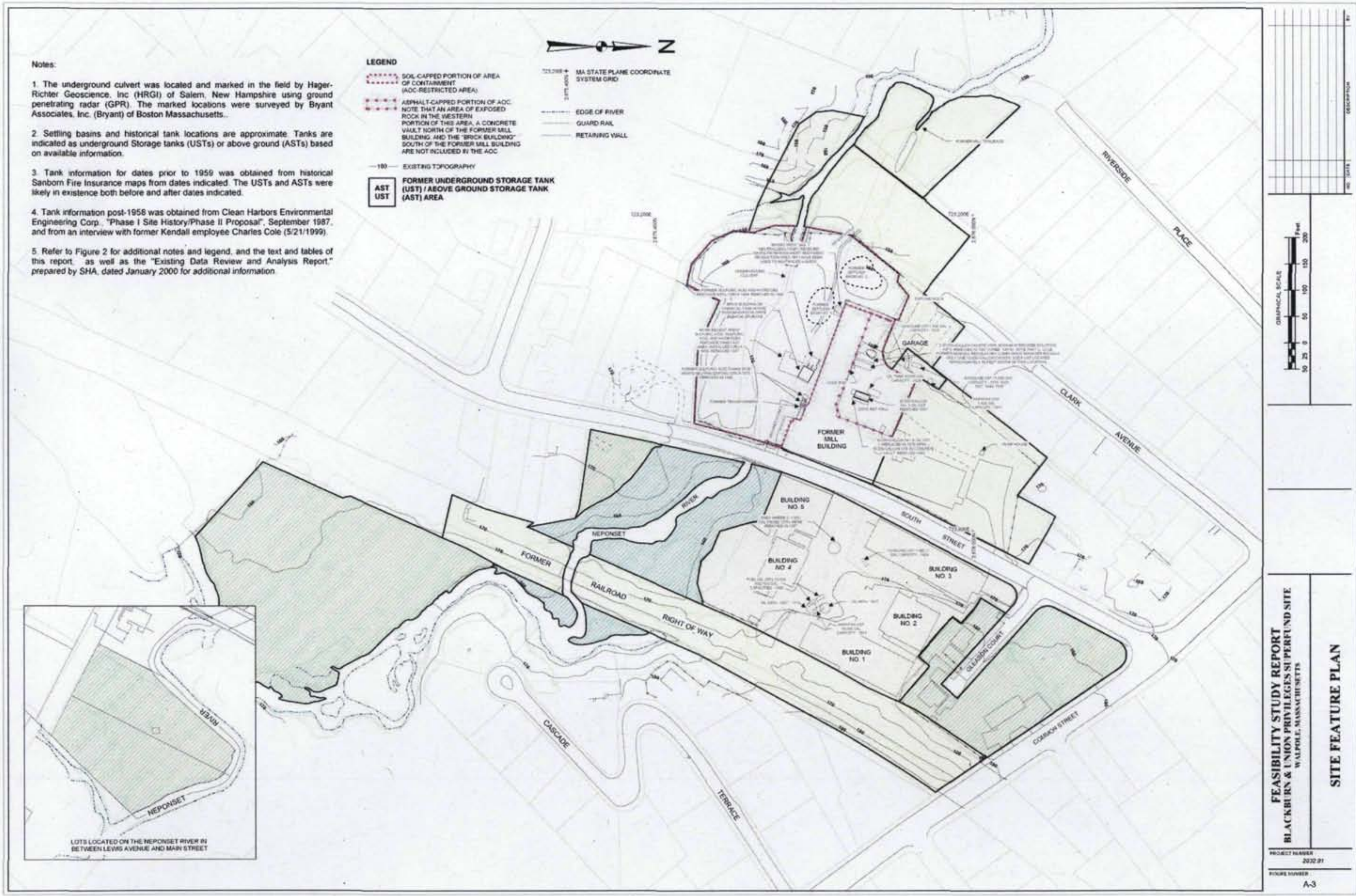

N
Notes:
1. The base map was drawn from a plan electronically transmitted to Sanborn, Head and Associates, Inc. (SHA), prepared by Bryant Associates, Inc. (Bryant) of Boston, Massachusetts on September 16, 2001.
2. Aerial mapping provided by Col-East, Inc. of North Adams, Massachusetts for Bryant with photo control provided by Bryant with additional information obtained from the Town of Walpole Assessor's Map No. 33.
3. Information on select property lines was provided by Bryant on a plan electronically transmitted to SHA on August 8, 2001. These property lines are depicted as a solid black line (as indicated on the legend). Property lines shown are based on the ground survey and record research by Bryant. In addition, property lines and building locations were provided to SHA by the Town of Walpole. These property lines are depicted as a gray line (as indicated in the legend). It should be noted that there are locations where property lines and building locations from Bryant and the Town of Walpole do not correlate. In these situations, both lines are depicted.
4. Horizontal datum is Massachusetts State Plane Coordinate System (N.A.D. 1983) and vertical datum is N.G.V.D. 1929.
LEWIS POND
MAIN STREET
WEST STREET
FRONT STREET
SPRING VALLEY DRIVE
LEWIS AVENUE
GREENWOOD ROAD
RIVERSIDE PLACE
CLARK AVENUE
COMMON STREET
SOUTH STREET
LAMPLIGHTER LANE
CASCADE TERRACE
GLEASON CT
LEGEND:
HISTORICALLY RESIDENTIAL OR UNDEVELOPED
AREAS OF THE SITE COVERED BY LOWER MILL POND UNTIL 1959
AREAS OF THE SITE EAST OF SOUTH STREET WHERE MANUFACTURING ACTIVITIES HAVE HISTORICALLY TAKEN PLACE
AREAS OF THE SITE PERIPHERAL TO HISTORICAL MANUFACTURING ACTIVITIES
AREAS OF THE SITE WEST OF SOUTH STREET WHERE MANUFACTURING ACTIVITIES HAVE HISTORICALLY TAKEN PLACE
NEPONSET RIVER AND ASSOCIATED TRIBUTARY BOUNDARIES
TREE LINE
FENCELINES
33-165-3 CURRENT TAX LOT NUMBER
BRYANT SURVEY LINES
TOWN OF WALPOLE LINES
GRAPHICAL SCALE
Feet
FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS
SITE VICINITY PLAN
PROJECT NUMBER
2032.01
FIGURE NUMBER
A-2

FIGURE A-2



Notes:
1. The underground culvert was located and marked in the field by Hager-Richter Geoscience, Inc (HRGI) of Salem, New Hampshire using ground penetrating radar (GPR). The marked locations were surveyed by Bryant Associates, Inc. (Bryant) of Boston Massachusetts.
2. Settling basins and historical tank locations are approximate. Tanks are indicated as underground Storage tanks (USTs) or above ground (ASTs) based on available information.
3. Tank information for dates prior to 1959 was obtained from historical Sanborn Fire Insurance maps from dates indicated. The USTs and ASTs were likely in existence both before and after dates indicated.
4. Tank information post-1958 was obtained from Clean Harbors Environmental Engineering Corp., "Phase I Site History/Phase II Proposal", September 1987, and from an interview with former Kendall employee Charles Cole (5/21/1999).
5. Refer to Figure 2 for additional notes and legend, and the text and tables of this report, as well as the "Existing Data Review and Analysis Report," prepared by SHA, dated January 2000 for additional information.
LEGEND
SOIL-CAPPED PORTION OF AREA OF CONTAINMENT (AOC-RESTRICTED AREA)
ASPHALT-CAPPED PORTION OF AOC. NOTE THAT AN AREA OF EXPOSED ROCK IN THE WESTERN PORTION OF THIS AREA, A CONCRETE VAULT NORTH OF THE FORMER MILL BUILDING, AND THE "BRICK BUILDING" SOUTH OF THE FORMER MILL BUILDING ARE NOT INCLUDED IN THE AOC
100 EXISTING TOPOGRAPHY
AST UST
FORMER UNDERGROUND STORAGE TANK (UST) / ABOVE GROUND STORAGE TANK (AST) AREA
MA STATE PLANE COORDINATE SYSTEM GRID
EDGE OF RIVER
GUARD RAIL
RETAINING WALL
N
RIVERSIDE PLACE
GARAGE
FORMER MILL BUILDING
CLARK AVENUE
BUILDING NO. 5
BUILDING NO. 4
BUILDING NO. 3
BUILDING NO. 2
BUILDING NO. 1
SOUTH STREET
NEPONSET RIVER
FORMER RAILROAD RIGHT OF WAY
CASCADE TERRACE
COMMON STREET
LOTS LOCATED ON THE NEPONSET RIVER IN BETWEEN LEWIS AVENUE AND MAIN STREET
GRAPHICAL SCALE
FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS
SITE FEATURE PLAN
PROJECT NUMBER
2032.01
FIGURE NUMBER
A-3

FIGURE A-3

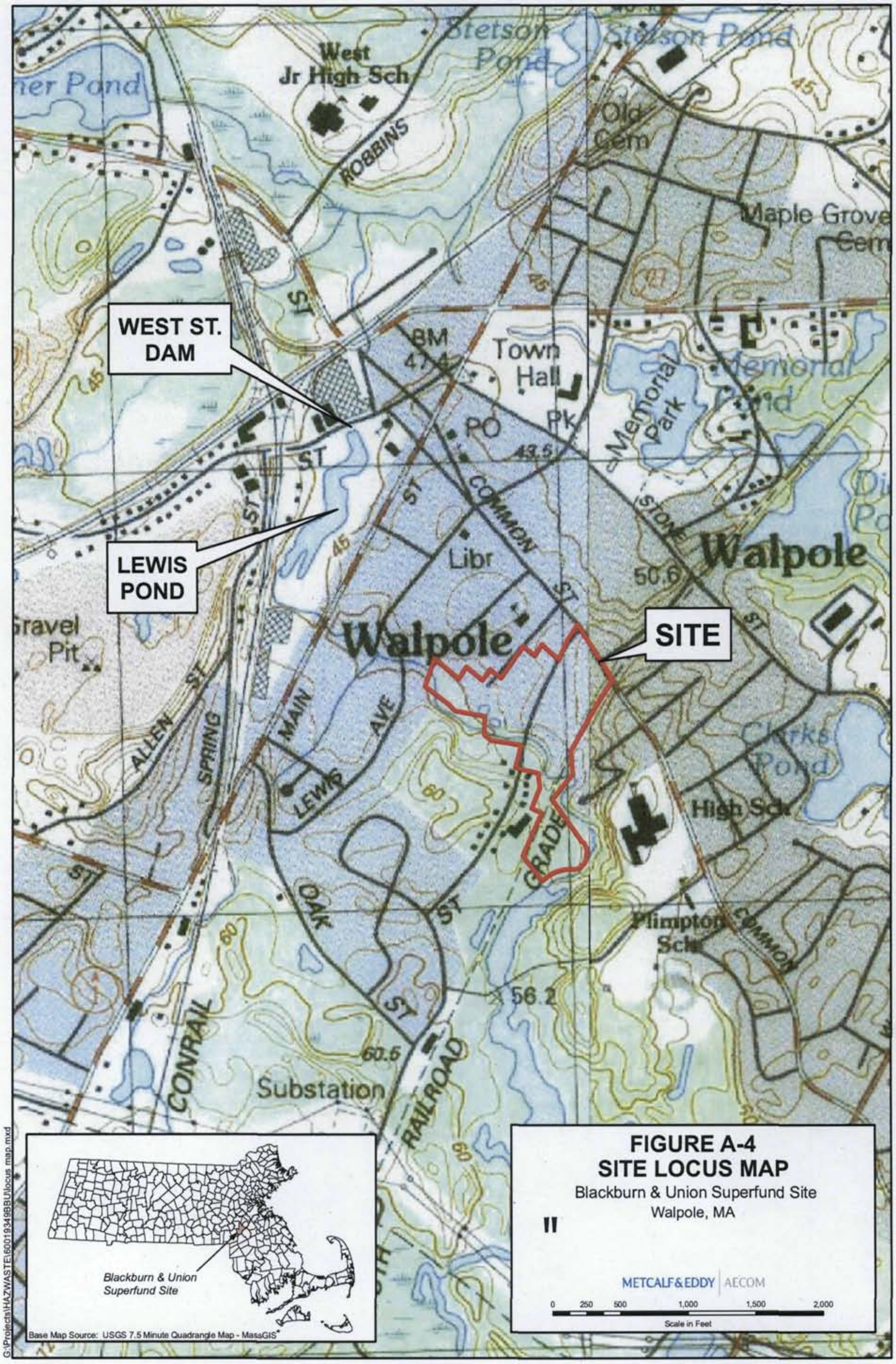


FIGURE A-4
SITE LOCUS MAP
Blackburn & Union Superfund Site
Walpole, MA

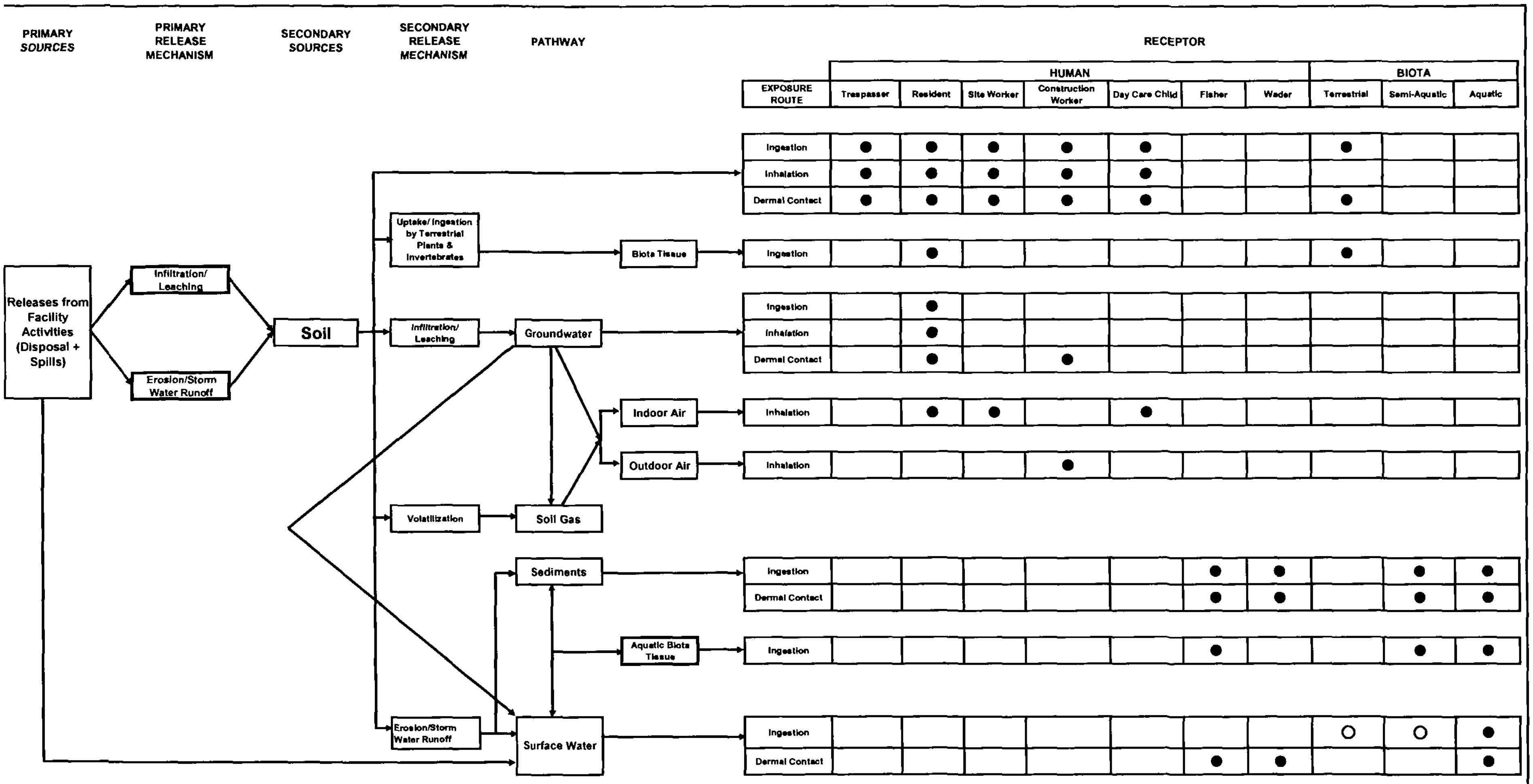
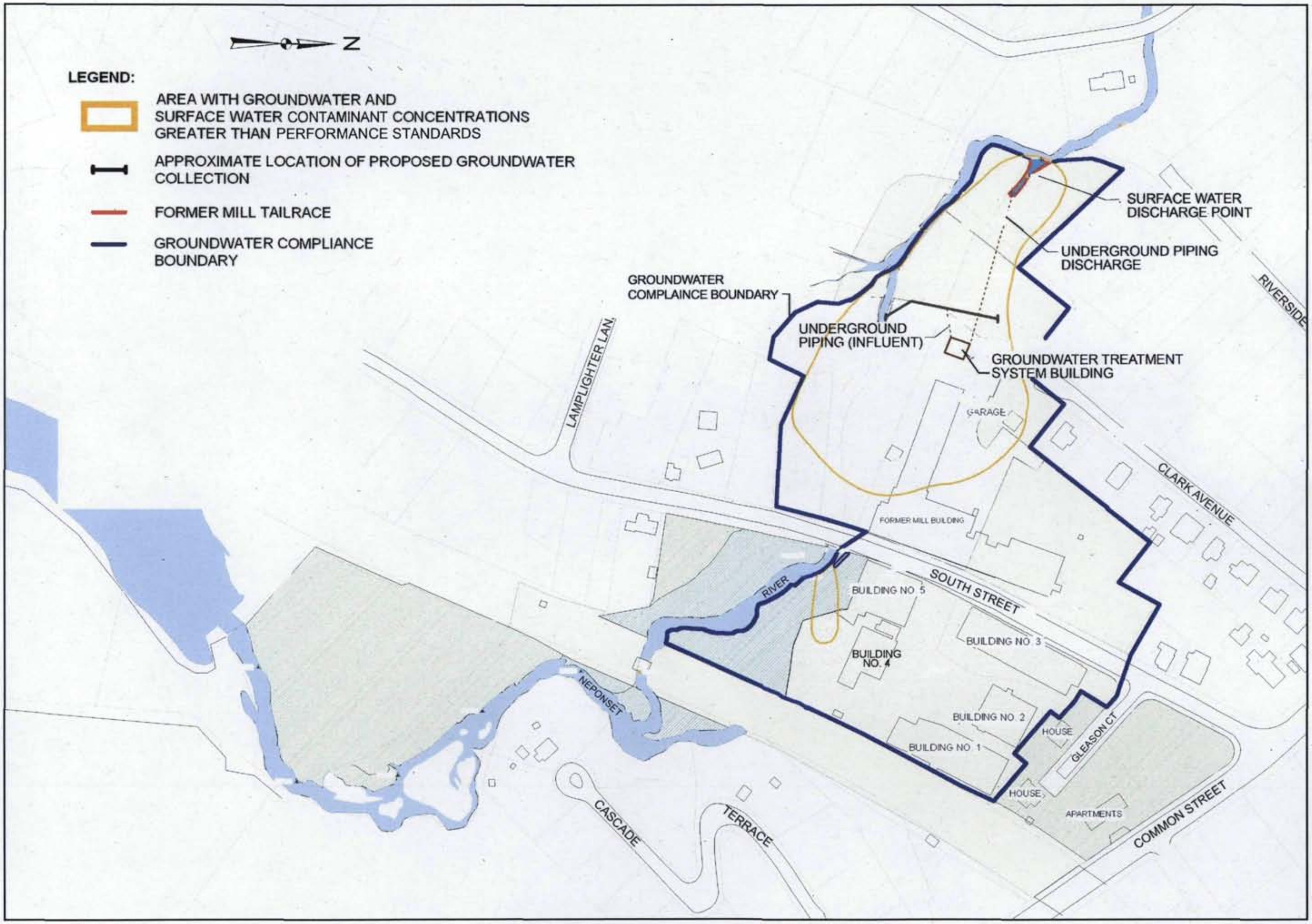
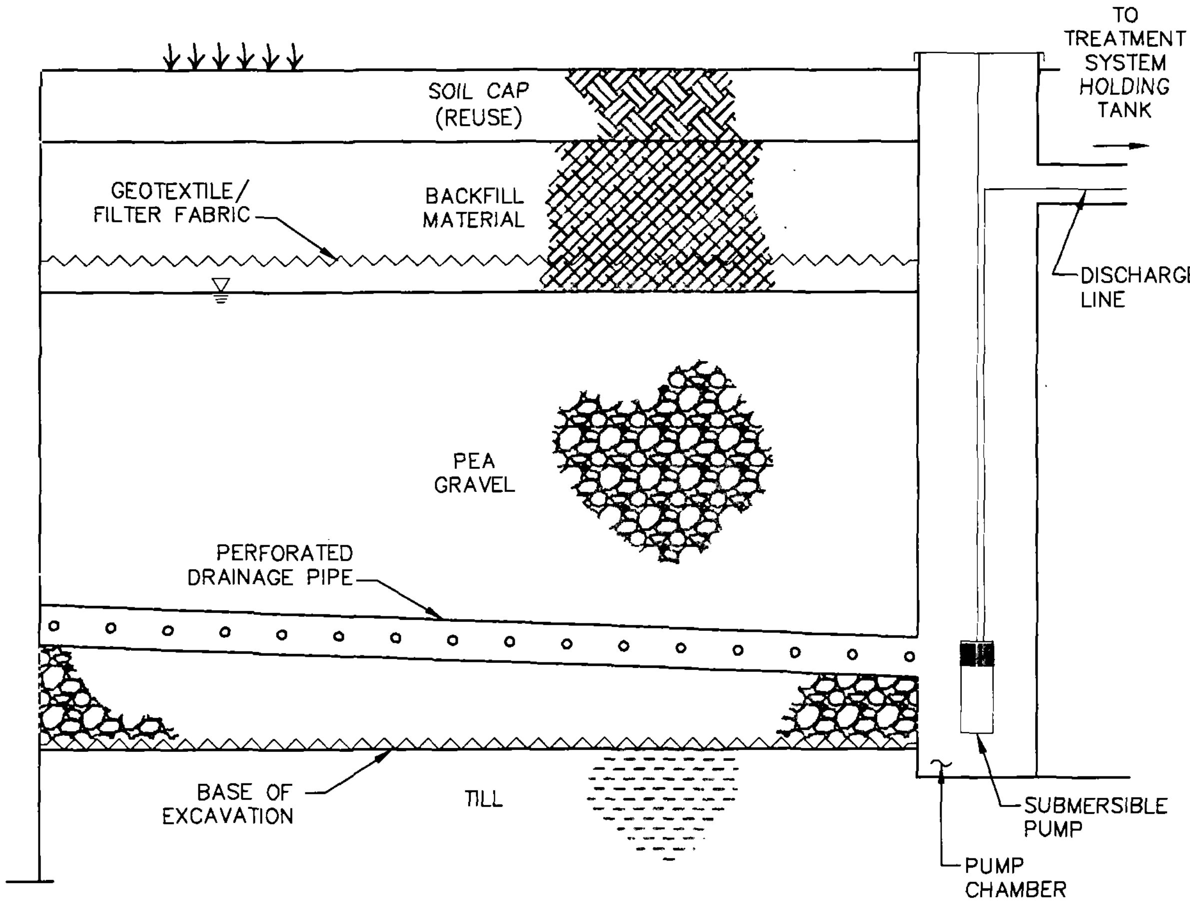


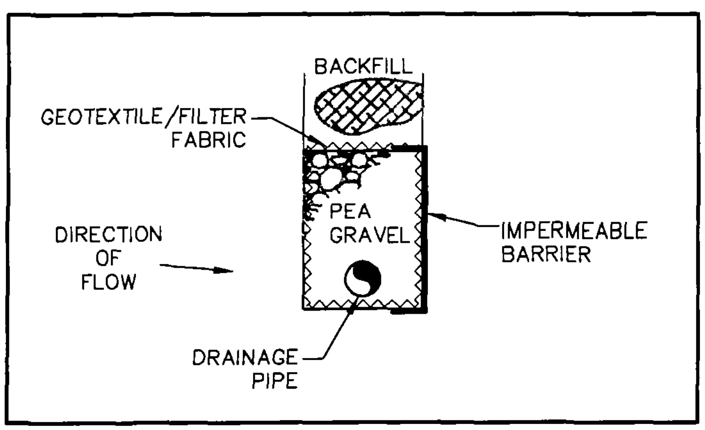
Figure E-1-Conceptual Site Model



LEGEND:
AREA WITH GROUNDWATER AND SURFACE WATER CONTAMINANT CONCENTRATIONS GREATER THAN PERFORMANCE STANDARDS
APPROXIMATE LOCATION OF PROPOSED GROUNDWATER COLLECTION
FORMER MILL TAILRACE
GROUNDWATER COMPLIANCE BOUNDARY
N
SURFACE WATER DISCHARGE POINT
UNDERGROUND PIPING DISCHARGE
GROUNDWATER COMPLAINCE BOUNDARY
UNDERGROUND PIPING (INFLUENT)
GROUNDWATER TREATMENT SYSTEM BUILDING
RIVERSIDE
LAMPLIGHTER LAN.
GARAGE
CLARK AVENUE
FORMER MILL BUILDING
SOUTH STREET
RIVER
BUILDING NO. 5
BUILDING NO. 3
BUILDING NO. 4
NEPONSET
BUILDING NO. 2
BUILDING NO. 1
HOUSE
GLEASON CT
HOUSE
APARTMENTS
COMMON STREET
CASCADE
TERRACE

FIGURE L-1





DETAIL

NOTES:

1. THIS FIGURE IS INTENDED TO ILLUSTRATE THE CONCEPTUAL DESIGN OF A GROUNDWATER EXTRACTION TRENCH SYSTEM; SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE **WALPOLE, MASSACHUSETTS**	**SCHEMATIC OF GROUNDWATER INTERCEPTOR TRENCH DESIGN**		
FIGURE L-2	SCALE: NTS DATE: SEP 07		FILE NO.2032.01 FIGURE NO. L-2

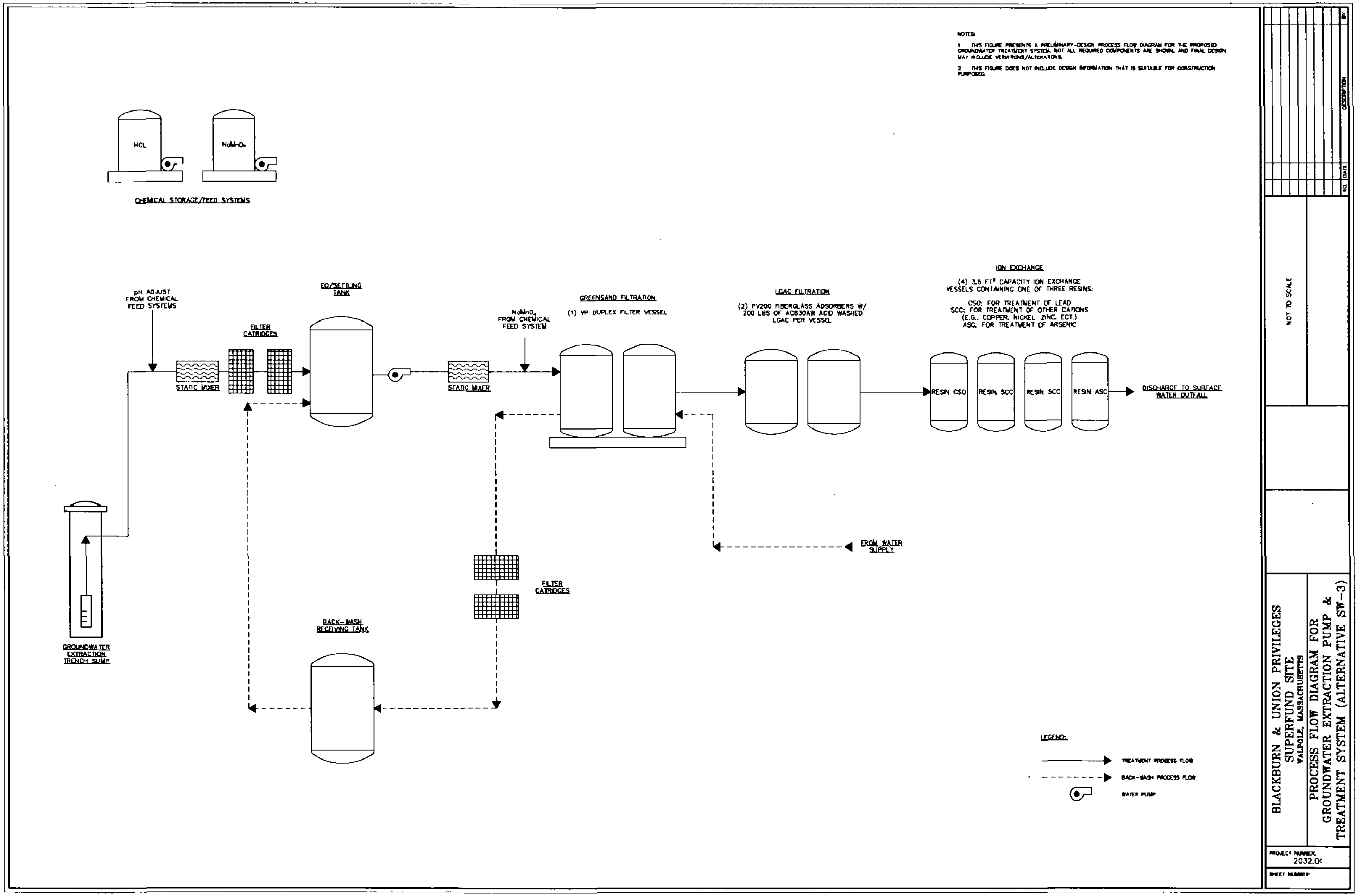
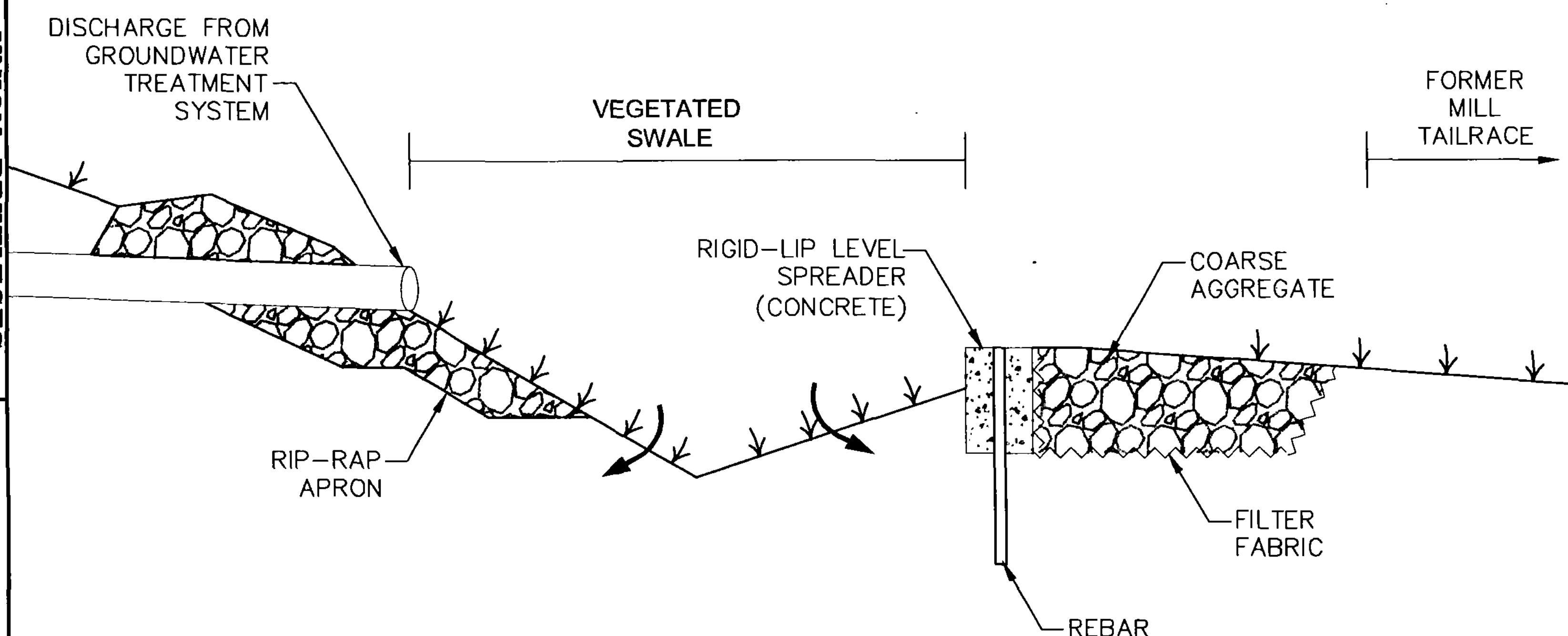

NOTES:
1 THIS FIGURE PRESENTS A PRELIMINARY-DESIGN PROCESS FLOW DIAGRAM FOR THE PROPOSED GROUNDWATER TREATMENT SYSTEM. NOT ALL REQUIRED COMPONENTS ARE SHOWN, AND FINAL DESIGN MAY INCLUDE VERIATIONS/ALTERATIONS.
2 THIS FIGURE DOES NOT INCLUDE DESIGN INFORMATION THAT IS SUITABLE FOR CONSTRUCTION PURPOSES.
HCL
NaMnO4
CHEMICAL STORAGE/FEED SYSTEMS
pH ADJUST FROM CHEMICAL FEED SYSTEMS
STATIC MIXER
FILTER CATRIDGES
EQ/SETTLING TANK
STATIC MIXER
NaMnO4 FROM CHEMICAL FEED SYSTEM
GREENSAND FILTRATION
(1) VP DUPLEX FILTER VESSEL
LGAC FILTRATION
(2) PV200 FIBERGLASS ADSORBERS W/ 200 LBS OF ACB30AW ACID WASHED LGAC PER VESSEL
ION EXCHANGE
(4) 3.6 FT³ CAPACITY ION EXCHANGE VESSELS CONTAINING ONE OF THREE RESINS:
CSO: FOR TREATMENT OF LEAD
SCC: FOR TREATMENT OF OTHER CATIONS (E.G. COPPER, NICKEL, ZINC, ECT.)
ASC: FOR TREATMENT OF ARSENIC
RESIN CSO
RESIN SCC
RESIN SCC
RESIN ASC
DISCHARGE TO SURFACE WATER OUTFALL
GROUNDWATER EXTRACTION TRENCH SUMP
FROM WATER SUPPLY
FILTER CATRIDGES
BACK-WASH RECEIVING TANK
LEGEND:
TREATMENT PROCESS FLOW
BACK-WASH PROCESS FLOW
WATER PUMP
NOT TO SCALE
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS
PROCESS FLOW DIAGRAM FOR GROUNDWATER EXTRACTION PUMP & TREATMENT SYSTEM (ALTERNATIVE SW-3)
PROJECT NUMBER: 2032.01
SHEET NUMBER:
NO.
DATE
DESCRIPTION
BY

FIGURE L-3



NOTES:

1. THIS FIGURE IS INTENDED TO ILLUSTRATE THE CONCEPTUAL DESIGN OF A SURFACE WATER OUTFALL SYSTEM; SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

FIGURE L-4

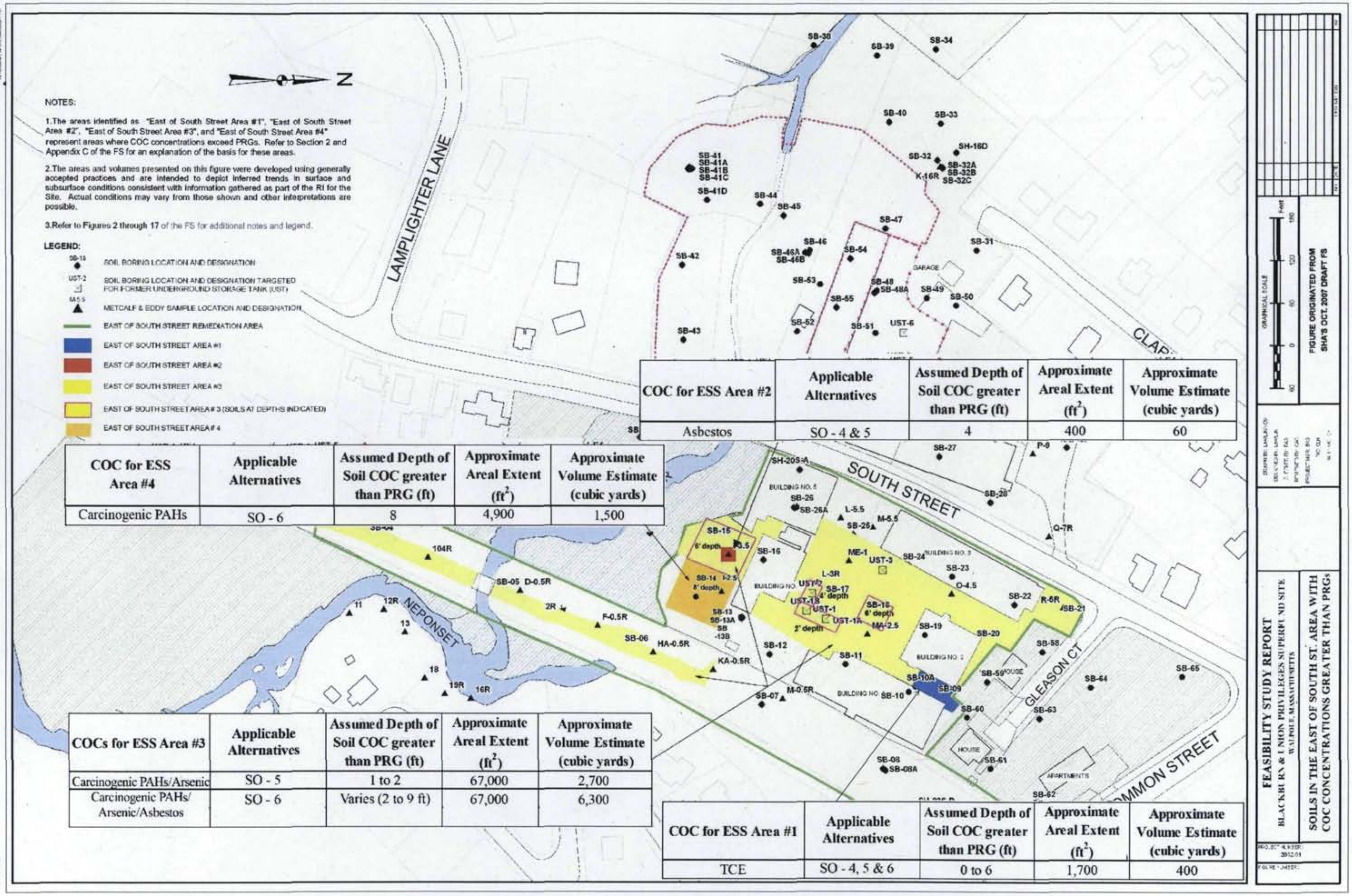
SCHEMATIC OF SURFACEWATER OUTFALL FOR GROUNDWATER TREATMENT SYSTEM

SCALE: NTS

DATE: SEP 07

FILE NO.2032.01

FIGURE NO. L-4



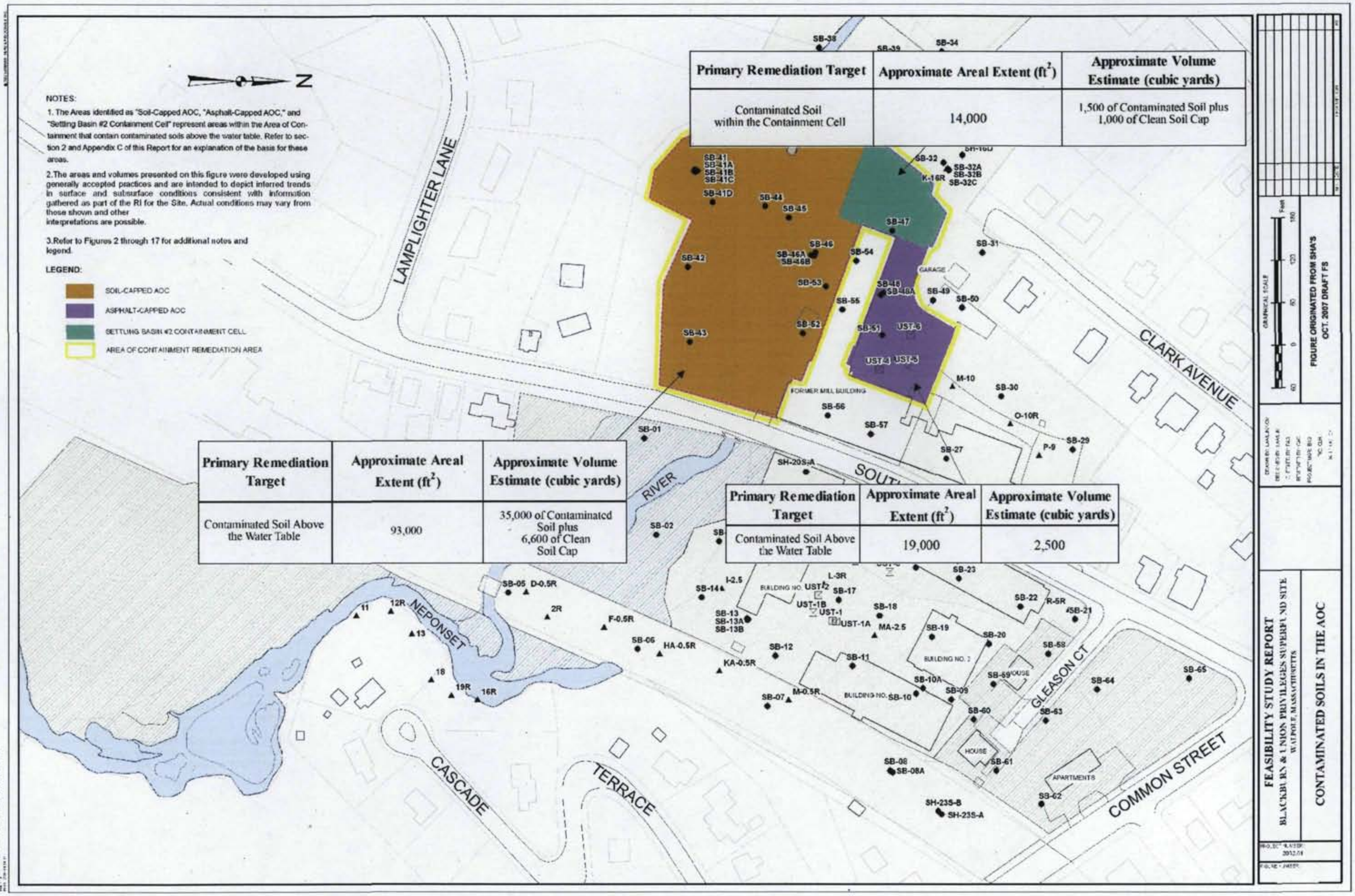
COC for ESS Area #2	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	SO - 4 & 5	4	400	60

COC for ESS Area #4	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Carcinogenic PAHs	SO - 6	8	4,900	1,500

COCs for ESS Area #3	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Carcinogenic PAHs/Arsenic	SO - 5	1 to 2	67,000	2,700
Carcinogenic PAHs/ Arsenic/Asbestos	SO - 6	Varies (2 to 9 ft)	67,000	6,300

COC for ESS Area #1	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
TCE	SO - 4, 5 & 6	0 to 6	1,700	400

FIGURE L-5. SOILS EXCEEDING CLEANUP LEVELS, ALTERNATIVE SO-6

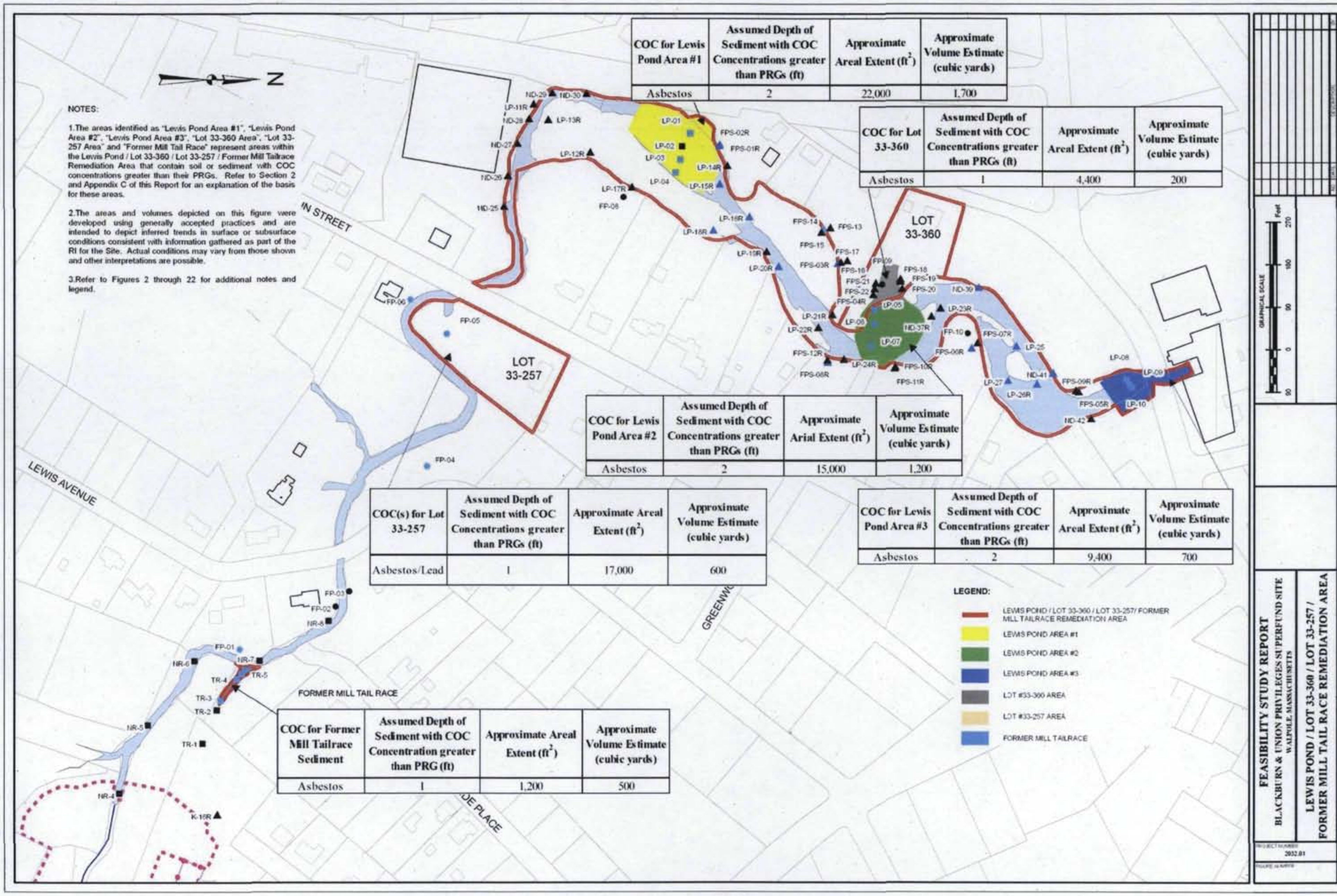


Primary Remediation Target	Approximate Areal Extent (ft²)	Approximate Volume Estimate (cubic yards)
Contaminated Soil within the Containment Cell	14,000	1,500 of Contaminated Soil plus 1,000 of Clean Soil Cap

Primary Remediation Target	Approximate Areal Extent (ft²)	Approximate Volume Estimate (cubic yards)
Contaminated Soil Above the Water Table	93,000	35,000 of Contaminated Soil plus 6,600 of Clean Soil Cap

Primary Remediation Target	Approximate Areal Extent (ft²)	Approximate Volume Estimate (cubic yards)
Contaminated Soil Above the Water Table	19,000	2,500

FIGURE L-6. AOC-3



COC for Lewis Pond Area #1	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	22,000	1,700

COC for Lot 33-360	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	1	4,400	200

COC for Lewis Pond Area #2	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Arial Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	15,000	1,200

COC(s) for Lot 33-257	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos/Lead	1	17,000	600

COC for Lewis Pond Area #3	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	9,400	700

COC for Former Mill Tailrace Sediment	Assumed Depth of Sediment with COC Concentration greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	1	1,200	500

FIGURE L-7. SSW-5 REMEDIATION AREA

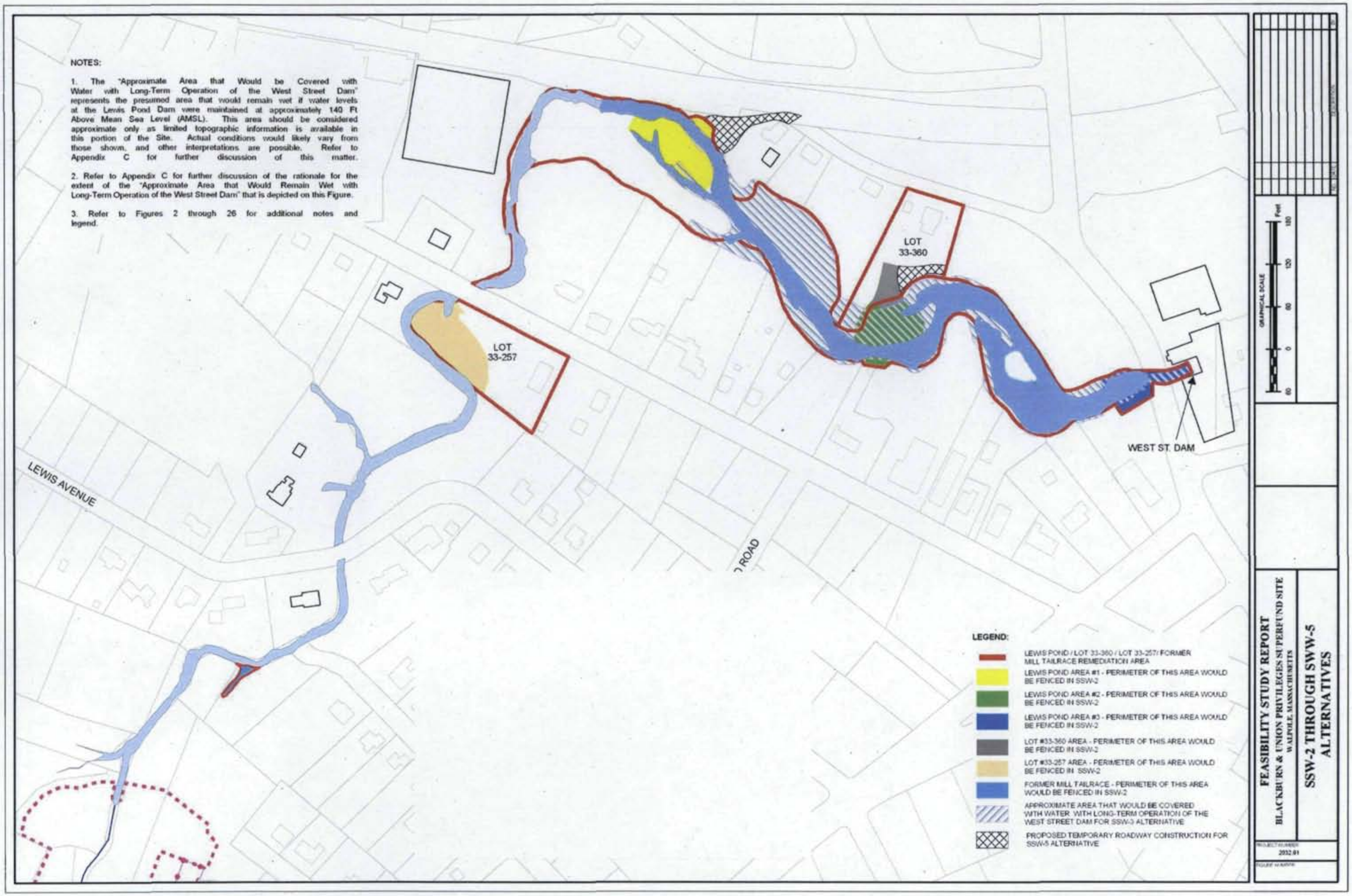


FIGURE L-8. POTENTIAL SSW-5 HAUL ROAD LOCATIONS (PRELIMINARY)

TABLES

Table D-1. Principal and Low-Level Threats

Principal Threats	Medium	Contaminant(s)	Action To Be Taken
West of South Street On-Facility	Dermal contact with groundwater	pH	Maintain Existing AOC Soil and Asphalt Covers; Establish Institutional Controls
Off-Facility groundwater Lot 208 / Lot 209	Tap water from groundwater	benzene; benzo(a)pyrene; dibenz(ah)anthracene; arsenic; manganese; vanadium; lead; pH	Collection and Active Treatment
Off-facility groundwater Lot 208 / Lot 209	Dermal contact with groundwater	pH	Collection and Active Treatment
On-Site Groundwater	Tap water from groundwater	methylene chloride; trichloroethene; benz(a)anthracene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; bis(2-ethylhexyl)phthalate; carbazole; benzene; 2-methylnaphthalene; naphthalene; benzo(a)pyrene; 4-methylphenol; antimony; arsenic; chromium; manganese; nickel; vanadium; zinc; pH	Institutional Controls and Monitoring
Low-Level Threats	**Medium**	**Contaminant(s)**	**Action To Be Taken**
Lot 33-257	Soil	lead	Source Removal
East of South Street On-Facility	Soil	trichloroethene; benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic; asbestos	Source Removal
	Indoor air from soil vapor (SB-09 area)	trichloroethene	Source Removal
Old Railroad and Former Lower Mill Pond Area	Soil	benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic; asbestos	Source Removal
West of South Street On-Facility	Soil	benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic; asbestos	Maintain Existing AOC Soil and Asphalt Covers; Excavate Settling Basin #2 Containment Cell and Dispose Off-Site; Establish Institutional Controls
Inhalation of asbestos fibers from soil	Soil	asbestos	Source Removal
On-Site Groundwater	Vapor from use of groundwater as tap water	ethylbenzene; trichloroethene; benzene; 2-methylnaphthalene; naphthalene	Institutional Controls and Monitoring
Former Mill Tailrace	Surface water	pH	Collection and Active Treatment
Inhalation of asbestos fibers from sediment	Sediment	asbestos	Source Removal

Table G-1

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

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1')

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Lot 33-257								
	Lead	470	657	mg/kg	3 / 3	566	mg/kg	Mean

Key

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

The table represents the current chemical of concern (COC) and exposure point concentration (EPC) for the COC detected in surface soil (i.e., the concentration that will be used to estimate the exposure and risk for the COC in surface soil). The table includes the range of concentrations detected for the 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 is the only COC in surface soil at the site. The arithmetic mean was used as the EPC for lead.

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: Soil (0-10')

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
East of South Street - On-Facility								
	Trichloroethene	0.0018	27	mg/kg	6 / 33	9.0	mg/kg	95% UCL
	Benzo(a)anthracene	0.007	83	mg/kg	42 / 44	29.5	mg/kg	95% UCL
	Benzo(a)pyrene	0.0055	72	mg/kg	40 / 44	27.6	mg/kg	95% UCL
	Benzo(b)fluoranthene	0.0062	89	mg/kg	40 / 44	32.4	mg/kg	95% UCL
	Dibenz(a,h)anthracene	0.0068	6.1	mg/kg	29 / 44	2.5	mg/kg	95% UCL
	Indeno(1,2,3-cd)pyrene	0.0052	21	mg/kg	39 / 44	9.2	mg/kg	95% UCL
	Arsenic	0.69	15.5	mg/kg	38 / 38	3.9	mg/kg	95% UCL
	Asbestos	0.0096	0.01335	f/cc	2 / 3	0.00815	f/cc	Mean
West of South Street - On-Facility								
	Benzo(a)anthracene	0.007	6.4	mg/kg	22 / 29	3.2	mg/kg	95% UCL
	Benzo(a)pyrene	0.0062	7.3	mg/kg	22 / 29	3.7	mg/kg	95% UCL
	Benzo(b)fluoranthene	0.0066	6.7	mg/kg	22 / 29	3.6	mg/kg	95% UCL
	Dibenz(a,h)anthracene	0.0055	0.88	mg/kg	14 / 29	0.42	mg/kg	95% UCL
	Indeno(1,2,3-cd)pyrene	0.0062	3.3	mg/kg	20 / 29	1.6	mg/kg	95% UCL
	Arsenic	0.65	35.7	mg/kg	29 / 29	9.5	mg/kg	95% UCL
	Asbestos	0.0096	0.01335	f/cc	2 / 3	0.00815	f/cc	Mean
Old Railroad and Former Lower Mill Pond Area								
	Benzo(a)anthracene	0.007	22	mg/kg	14 / 14	19.4	mg/kg	95% UCL
	Benzo(a)pyrene	0.0067	18	mg/kg	14 / 14	8.8	mg/kg	95% UCL
	Benzo(b)fluoranthene	0.0076	30	mg/kg	14 / 14	15.4	mg/kg	95% UCL
	Dibenz(a,h)anthracene	0.011	3.4	mg/kg	9 / 14	2.1	mg/kg	95% UCL
	Indeno(1,2,3-cd)pyrene	0.0056	13	mg/kg	13 / 14	10.8	mg/kg	95% UCL
	Arsenic	0.83	106	mg/kg	14 / 14	96.1	mg/kg	95% UCL
	Asbestos	0.0096	0.01335	f/cc	2 / 3	0.00815	f/cc	Mean

Key

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

f/cc = fibers per cubic centimeter

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in soil (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in 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 the carcinogenic PAHs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, arsenic, lead, asbestos, and trichloroethene are the only COCs in soil at the site. The 95% UCL on the arithmetic mean was used as the EPC for the carcinogenic PAHs, arsenic, and trichloroethene. The arithmetic mean concentration was used as the EPC for asbestos and lead.

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-3								
Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration								
Scenario Timeframe: Future **Medium: Soil Gas** **Exposure Medium: Indoor Air**								
Exposure Point	**Chemical of Concern**	**Concentration Detected**		**Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Exposure Point Concentration Units**	**Statistical Measure (1)**
		Minimum	**Maximum**					
East of South Street On-Facility (SB-09 Area)								
	Trichloroethene	0.0021	3.86	mg/m^3	9 / 11	0.0126	mg/m^3	Max

Key

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

The table represents the future chemical of concern (COC) and exposure point concentration (EPC) for the COC for the vapor intrusion (i.e., indoor air) pathway that was detected in soil gas (i.e., the concentration that will be used to estimate the exposure and risk for the COC for the vapor intrusion pathway). The table includes the range of concentrations detected for the COC in soil gas, as well as the frequency of detection (i.e., the number of times the chemical was detected in the soil gas samples collected at the site), the modeled indoor air EPC, and how the EPC was derived. This table indicates that the volatile organic chemical trichloroethene in soil gas may potentially impact indoor air at the site. The maximum detected soil gas concentration was used to estimate a maximum indoor air concentration that was used as the EPC for the COC selected for the vapor intrusion pathway.

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

Table G-4

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

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Tap Groundwater

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
On-Site Groundwater								
	Benzene	0.00039	0.81	mg/L	48 / 124	0.58	mg/L	Max
	Ethylbenzene	0.0017	0.4	mg/L	25 / 124	0.353	mg/L	Max
	Methylene chloride	0.014	0.014	mg/L	1 / 123	0.034	mg/L	Max
	Trichloroethene	0.00031	0.0032	mg/L	15 / 123	0.00253	mg/L	Max
	2-Methylnaphthalene	0.000069	0.62	mg/L	51 / 124	0.503	mg/L	Max
	Benzo(a)anthracene	0.000053	0.0011	mg/L	18 / 124	0.00078	mg/L	Max
	Benzo(a)pyrene	0.0000019	0.0027	mg/L	45 / 124	0.0016	mg/L	Max
	Benzo(b)fluoranthene	0.000084	0.00059	mg/L	12 / 124	0.000405	mg/L	Max
	Dibenz(a,h)anthracene	0.0000024	0.00085	mg/L	29 / 124	0.000627	mg/L	Max
	Indeno(1,2,3-cd)pyrene	0.000057	0.00045	mg/L	9 / 124	0.000285	mg/L	Max
	Naphthalene	0.000055	3.3	mg/L	62 / 124	3.13	mg/L	Max
	4-Methylphenol	0.0001	0.094	mg/L	20 / 92	0.092	mg/L	Max
	Bis(2-ethylhexyl)phthalate	0.00068	0.11	mg/L	10 / 124	0.0372	mg/L	Max
	Carbazole	0.00016	0.022	mg/L	19 / 124	0.0627	mg/L	Max
	Antimony	0.0011	0.042	mg/L	31 / 124	0.034	mg/L	Max
	Arsenic	0.00014	0.812	mg/L	111 / 124	0.631	mg/L	Max
	Chromium	0.0011	0.13	mg/L	88 / 124	0.13	mg/L	Max
	Lead	0.00036	0.575	mg/L	69 / 124	0.0208	mg/L	Mean
	Manganese	0.011	9.1	mg/L	105 / 124	3.9	mg/L	Max
	Nickel	0.0007	1	mg/L	84 / 124	0.629	mg/L	Max
	Vanadium	0.0011	3.75	mg/L	75 / 124	3.35	mg/L	Max
	Zinc	0.01	7.7	mg/L	31 / 124	4.84	mg/L	Max
	pH	5.63	14.06	S.U.	N/A	14.06	s.u.	Max

Key

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

Max is maximum concentration for all wells, individually averaged over time, at the exposure point

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in on-site groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in on-site 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 the inorganic chemicals, arsenic, chromium, lead, manganese, nickel, and vanadium, and the organic chemicals, benzene, 2-methylnaphthalene, naphthalene, and benzo(a)pyrene are the most frequently detected COCs in on-site groundwater. The maximum detected concentration, identified after averaging wells individually over time, was used as the EPC for each of the COCs detected in groundwater, except for lead for which the mean was used.

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

Table G-5

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

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Tap Groundwater

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Off-Facility Groundwater (Lots 208/209)								
	Benzene	0.00019	0.0076	mg/L	6 / 10	0.00457	mg/L	Max
	Benzo(a)pyrene	0.0000042	0.000077	mg/L	7 / 10	0.000077	mg/L	Max
	Dibenz(a,h)anthracene	0.0000033	0.000025	mg/L	5 / 10	0.000025	mg/L	Max
	Naphthalene	0.0031	0.059	mg/L	6 / 10	0.0413	mg/L	Max
	Arsenic	0.00013	0.059	mg/L	9 / 10	0.059	mg/L	Max
	Lead	0.0011	0.17	mg/L	6 / 10	0.0362	mg/L	Mean
	Manganese	0.022	0.62	mg/L	9 / 10	0.62	mg/L	Max
	Vanadium	0.0015	0.22	mg/L	7 / 10	0.22	mg/L	Max
	pH	5.24	11.9	S.U.	N/A	11.9	S.U.	Max

Key

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

Max is maximum concentration for all wells, individually averaged over time, at the exposure point

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in off-facility groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in off-facility 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 the inorganic chemicals, arsenic, manganese, and vanadium, and the organic chemical benzo(a)pyrene are the most frequently detected COCs in off-facility groundwater. The maximum detected concentration, identified after averaging wells individually over time, was used as the EPC for each of the COCs detected in groundwater, except for lead for which the mean was used.

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

Table G-6

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

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

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Former Mill Tailrace								
	pH	8.2	10	S.U.	N/A	10	S.U.	Max

Key

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

The table represents the current/future chemical of concern (COC) and exposure point concentration (EPC) for the COC detected in surface water (i.e., the concentration that will be used to estimate the exposure and risk for each COC in surface water). The table includes the range of concentrations detected for the 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. The maximum detected concentration was used as the EPC for the COC detected in surface water.

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

Table G-7

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 (1) (MM/DD/YYYY)
Benzene	5.5E-02	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/08/07
Methylene chloride	7.5E-03	7.5E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Trichloroethene	4.0E-01	4.0E-01	$(mg/kg\text{-}day)^{-1}$	B1	NCEA	8/1/2001 (3)
Benzo(a)anthracene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Benzo(a)pyrene	7.3E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Benzo(b)fluoranthene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
bis(2-Ethylhexyl)phthalate	1.4E-02	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Dibenz(a,h)anthracene	7.3E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Indeno(1,2,3-cd)pyrene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	11/08/07
Carbazole	2.0E-02	2.0E-02	$(mg/kg\text{-}day)^{-1}$	B2	HEAST	7/31/1997 (3)
Arsenic	1.5E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	11/08/07
Lead	N/A	N/A	N/A	B2	IRIS	11/08/07

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date (1) (MM/DD/YYYY)
Benzene	7.8E-06	$(ug/m^3)^{-1}$	2.73E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS*	11/08/07
Ethylbenzene	1.1E-06	$(ug/m^3)^{-1}$	N/A	N/A	Likely	STSC	10/12/1999 (3)
Methylene chloride	4.7E-07	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	11/08/07
Trichloroethene	1 1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B1	NCEA	8/1/2001 (3)
Asbestos	2.3E-01	$(f/cc)^{-1}$	N/A	N/A	A	IRIS	01/15/08
Day Care Child (ED = 6 years; from birth to age 5)	4.6E-02	$(f/cc)^{-1}$	N/A	N/A	A	EPA, 1986	(4)
Resident (ED = 30 years; from birth to age 30)	1.6E-01	$(f/cc)^{-1}$	N/A	N/A	A	EPA, 1986	(4)

Key

N/A: Not applicable

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

HEAST = National Center for Exposure Assessment, Health Effects Assessment Summary Tables

NCEA = National Center for Exposure Assessment

STSC = Superfund Technical Support Center

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

(1) Date indicates when IRIS was last reviewed for the most current toxicity value.

(2) The following toxicity equivalency factors (TEFs) were applied to the toxicity value for benzo(a)pyrene to derive a toxicity value for carcinogenic PAHs:

* - indicates slope factor calculated from unit risk; SF = 70 kg / 20 $m^3\text{-}d^{-1}$ * UR

Table G-7

Cancer Toxicity Data Summary

Benzo(a)anthracene	0.1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.1
Dibenz(a,h)anthracene	1
Indeno(1,2,3-cd)pyrene	0.1

(3) Dates indicate the last time the toxicity value was updated.

(4) Exposure duration and less-than-lifetime unit risk values have been used in the evaluation, derived based on information presented in "Airborne Asbestos Health Assessment Update" (EPA, 1986).

$(f/cc)^{-1}$ = risk per fiber per cubic centimeter

ED = Exposure Duration

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in soil, indoor air, and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in this assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site. Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants. Five of the COCs are also considered carcinogenic via the inhalation route. The carcinogenic PAHs, carbazole, arsenic, and bis(2-ethylhexyl)phthalate, as non-volatile contaminants, were not included in the evaluation of inhalation exposures.

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

Table G-8

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 (1) (MM/DD/YYYY)
Benzene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Hematological; Immunological	300	IRIS	11/08/07
2-Methylnaphthalene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Respiratory	1000	IRIS	11/08/07
4-Methylphenol	Chronic	5.0E-03	mg/kg-day	5.0E-03	mg/kg-day	Neurological; Respiratory; Developmental; Whole Body	1000	HEAST	07/31/97
Benzo(a)anthracene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Renal	3000	IRIS (pyrene)	11/08/07
Benzo(a)pyrene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Renal	3000	IRIS (pyrene)	11/08/07
Benzo(b)fluoranthene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Renal	3000	IRIS (pyrene)	11/08/07
Dibenz(a,h)anthracene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Renal	3000	IRIS (pyrene)	11/08/07
Indeno(1,2,3-cd)pyrene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Renal	3000	IRIS (pyrene)	11/08/07
Naphthalene	Chronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Whole Body; Respiratory	3000	IRIS	11/08/07
									11/08/07
Antimony	Chronic	4.0E-04	mg/kg-day	6.0E-05	mg/kg-day	Whole Body; Hepatic	1000	IRIS	11/08/07
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Integumental; Cardiovascular	3	IRIS	11/08/07
Chromium VI	Chronic	3.0E-03	mg/kg-day	7.5E-05	mg/kg-day	None observed	900	IRIS	11/08/07
Lead	Chronic	N/A	N/A	N/A	N/A	Developmental	N/A	N/A	N/A
Manganese	Chronic	2.4E-02	mg/kg-day	N/A	mg/kg-day	Neurological	3	IRIS	11/08/07
Nickel	Chronic	2.0E-02	mg/kg-day	8.0E-04	mg/kg-day	Whole Body; Hepatic	300	IRIS	11/08/07
Vanadium	Chronic	5.0E-03	mg/kg-day	1.3E-04	mg/kg-day	Renal	100	IRIS	11/08/07
Zinc	Chronic	3.0E-01	mg/kg-day	3.0E-01	mg/kg-day	Hematological	3	IRIS	11/08/07

Table G-8									
Non-Cancer Toxicity Data Summary									
Pathway: Inhalation									
Chemical of Concern	**Chronic/ Subchronic**	**Inhalation RfC**	**Inhalation RfC Units**	**Inhalation RfD**	**Inhalation RfD Units**	**Primary Target Organ**	**Combined Uncertainty/ Modifying Factors**	**Sources of RfC: RfD: Target Organ**	**Dates (MM/DD/YYYY)**
Benzene	Chronic	30	ug/m^3	N/A	N/A	Hematological; Immunological	300	IRIS	11/08/07
2-Methylnaphthalene	Chronic	3	ug/m^3	N/A	N/A	Respiratory	3000	IRIS (naphthalene)	11/08/07
Naphthalene	Chronic	3	ug/m^3	N/A	N/A	Respiratory	3000	IRIS	11/08/07

Key

N/A - No information available

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

HEAST = National Center for Exposure Assessment, Health Effects Assessment Summary Tables

(1) Date indicates when IRIS was last reviewed for the most current toxicity value.

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil, indoor air, and groundwater. Sixteen of the COCs have oral toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the sixteen 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 benzene affects the immune system, antimony and nickel affect the liver, benzene and zinc affect the blood, the PAHs and vanadium affect the kidney, 4-methylphenol, naphthalene, antimony, and nickel are general systemic toxicants, 4-methylphenol and manganese affect the central nervous system, 4-methylphenol is a developmental toxicant, 2-methylnaphthalene, naphthalene, and 4-methylphenol affect the respiratory system, and arsenic affects the skin and cardiovascular system. A reference dose is not available for lead. Dermal RfDs are not available for any of the COCs. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (antimony, chromium, nickel, and vanadium) to derive dermal RfDs for these COCs. Inhalation reference concentrations (RfCs) are available for three volatile COCs evaluated for the inhalation pathway. The carcinogenic PAHs, 4-methlyphenol, antimony, arsenic, chromium, manganese, nickel, vanadium, and zinc as non-volatile contaminants, were not included in the evaluation of inhalation exposures.

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-9

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil Gas	Indoor Air	East of South Street On-Facility (SB-09 Area)	Trichloroethene	--	2E-04	--	--	2E-04
							Indoor Air Risk Total =	2E-04
							Total Risk =	2E-04

Key

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

This table provides risk estimates for the significant routes of exposure for the future adult site worker east of South Street On-Facility in the SB-09 area. 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 site worker's exposure to indoor air, as well as the toxicity of the COC (trichloroethene). The total risk from direct exposure to contaminated indoor air at this site to a future adult site worker east of South Street On-Facility in the SB-09 area is estimated to be 2×10^{-4}. The COC contributing most to this risk level is trichloroethene in soil gas. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 10,000 of developing cancer as a result of site-related exposure to the COC.

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

Table G-10

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Potable Groundwater	On-Site Groundwater						
			Benzene	6E-04	2E-04	7E-05	- -	8E-04
			Ethylbenzene	N/A	2E-05	N/A	- -	2E-05
			Methylene chloride	4E-06	7E-07	- -	- -	5E-06
			Trichloroethene	2E-05	1E-05	3E-06	- -	3E-05
			Benzo(a)anthracene	4E-05	- -	- -	- -	4E-05
			Benzo(a)pyrene	8E-04	- -	- -	- -	8E-04
			Benzo(b)fluoranthene	2E-05	- -	- -	- -	2E-05
			Dibenz(a,h)anthracene	3E-04	- -	- -	- -	3E-04
			Indeno(1,2,3-cd)pyrene	2E-05	- -	- -	- -	2E-05
			Bis(2-ethylhexyl)phthalate	9E-06	- -	1E-05	- -	2E-05
			Carbazole	2E-05	- -	1E-05	- -	4E-05
			Arsenic	2E-02	- -	- -	- -	2E-02
							Groundwater Risk Total =	2E-02
							Total Risk =	2E-02

Key

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

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 risk estimates for the significant routes of exposure for the future child and adult resident exposed to on-site groundwater used as household water. 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 a child's and adult's exposure to groundwater, as well as the toxicity of the COCs (benzene, ethylbenzene, methylene chloride, trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, bis(2-ethylhexyl)phthalate, carbazole, and arsenic). The total risk from direct exposure to contaminated on-site groundwater to a future resident, in the event that groundwater is used as a potable source, is estimated to be 2×10^{-2}. The COCs contributing most to this risk level are benzene, benzo(a)pyrene, and arsenic in groundwater. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 100 of developing cancer as a result of site-related exposure to the COCs in groundwater.

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

Table G-11

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Potable Groundwater	On-Site Groundwater	Benzene	Hematological; Immunological	1E+01	3E+00	1E+00	2E+01
			2-Methylnaphthalene	Respiratory	1E+01	3E+01	1E+01	5E+01
			Naphthalene	Whole Body; Respiratory	2E+01	2E+02	6E+00	2E+02
			4-Methylphenol	Neurological; Respiratory; Developmental; Whole Body	2E+00	--	1E-01	2E+00
			Antimony	Whole Body; Hepatic	8E+00	--	--	8E+00
			Arsenic	Integumental; Cardiovascular	2E+02	--	--	2E+02
			Chromium VI	None observed	4E+00	--	1E+00	6E+00
			Manganese	Neurological	2E+01	--	--	2E+01
			Nickel	Whole Body; Hepatic	3E+00	--	--	3E+00
			Vanadium	Renal	6E+01	--	1E+01	8E+01
			Zinc	Hematological	2E+00	--	4E-03	2E+00
							Groundwater Hazard Index Total =	6E+02
							Hematological Hazard Index =	2E+01
							Immunological Hazard Index =	2E+01
							Respiratory Hazard Index =	3E+02
							Developmental Hazard Index =	2E+00
							Whole Body Hazard Index =	2E+02
							Hepatic Hazard Index =	1E+01
							Integumental Hazard Index =	2E+02
							Cardiovascular Hazard Index =	2E+02
							Neurological Hazard Index =	2E+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 hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future resident exposed to on-site groundwater used as household water. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 300 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing benzene, 2-methylnaphthalene, naphthalene, 4-methylphenol, antimony, arsenic, chromium, manganese, nickel, vanadium, and zinc.

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

Table G-12

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Potable Groundwater	Off-facility groundwater Lot 208/Lot 209	Benzene	4E-06	2E-06	6E-07	- -	7E-06
			Benzo(a)pyrene	4E-05	- -	- -	- -	4E-05
			Dibenz(a,h)anthracene	1E-05	- -	- -	- -	1E-05
			Arsenic	2E-03	- -	- -	- -	2E-03
							Groundwater Risk Total =	2E-03
							Total Risk =	2E-03

Key

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

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for the future child and adult residents exposed to Off-Facility groundwater used as household water. 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 a child's and adult's exposure to groundwater, as well as the toxicity of the COCs (benzene, benzo(a)pyrene, dibenz(a,h)anthracene, and arsenic). The total risk from direct exposure to contaminated Off-Facility groundwater at this site to a future resident is estimated to be 2×10^{-3}. The COC contributing most to this risk level is arsenic in groundwater. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 1000 of developing cancer as a result of site-related exposure to the COCs in groundwater.

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

Table G-13

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Potable Groundwater	Off-facility groundwater Lot 208/Lot 209	Naphthalene	Whole Body; Respiratory	2E-01	2E+00	8E-02	2E+00
			Arsenic	Integumental; Cardiovascular	2E+01	--	--	2E+01
			Manganese	Neurological	2E+00	--	--	2E+00
			Vanadium	Renal	4E+00	--	7E-01	5E+00
							Groundwater Hazard Index Total =	3E+01
							Whole Body Hazard Index =	2E+00
							Integumental Hazard Index =	2E+01
							Cardiovascular Hazard Index =	2E+01
							Renal Hazard Index =	5E+00
							Respiratory Hazard Index =	2E+00
							Neurological Hazard Index =	2E+00

Key

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

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

NE = Not evaluated

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future resident exposed to Off-Facility groundwater used as household water. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 20 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing naphthalene, arsenic, manganese, and vanadium.

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

Table G-14

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Soil/Fugitive Dust	East of South Street On-Facility	Trichloroethene	2E-06	- -	—	- -	2E-06
			Benzo(a)anthracene	5E-05	- -	2E-05	- -	7E-05
			Benzo(a)pyrene	5E-04	- -	2E-04	- -	7E-04
			Benzo(b)fluoranthene	6E-05	- -	2E-05	- -	8E-05
			Dibenz(a,h)anthracene	5E-05	- -	2E-05	- -	6E-05
			Indeno(1,2,3-cd)pyrene	2E-05	- -	6E-06	- -	2E-05
			Arsenic	4E-06	- -	4E-07	- -	4E-06
			Asbestos	—	3E-05	—	- -	3E-05
							Soil Risk Total =	1E-03
Soil Gas	Indoor Air	East of South Street On-Facility (SB-09 Area)	Trichloroethene	- -	6E-04	- -	- -	6E-04
							Indoor Air Risk Total =	6E-04
							Total Risk =	2E-03

Key

– Route of exposure is not applicable to this medium.

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for a future young child and adult resident exposed to soil in the East of South Street On-Facility area. 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 a young child and adult resident's exposure to soil, as well as the toxicity of the COCs (trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, and asbestos). The total risk from exposure to contaminated soil and indoor air at the East of South Street On-Facility area to future residents is estimated to be 2×10^{-3}. The COCs contributing most to this risk level are trichloroethene and benzo(a)pyrene in soil gas and soil. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 1000 of developing cancer as a result of site-related exposure to the COCs in soil.

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

Table G-15

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Soil/Fugitive Dust	West of South Street On-Facility						
			Benzo(a)anthracene	6E-06	- -	2E-06	- -	8E-06
			Benzo(a)pyrene	7E-05	- -	2E-05	- -	9E-05
			Benzo(b)fluoranthene	7E-06	- -	2E-06	- -	9E-06
			Dibenz(a,h)anthracene	8E-06	- -	3E-06	- -	1E-05
			Indeno(1,2,3-cd)pyrene	3E-06	- -	1E-06	- -	4E-06
			Arsenic	1E-05	- -	9E-07	- -	1E-05
			Asbestos	---	3E-05	---	- -	3E-05
							Soil Risk Total =	2E-04
							Total Risk =	2E-04

Key

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

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for a future young child and adult resident exposed to soil in the West of South Street On-Facility area. 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 a young child and adult resident's exposure to soil, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, and asbestos). The total risk from direct exposure to contaminated soil at the West of South Street On-Facility area to future residents is estimated to be 2×10^{-4}. The COC contributing most to this risk level is benzo(a)pyrene in soil. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 10,000 of developing cancer as a result of site-related exposure to the COCs in soil.

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

Table G-16

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Soil/Fugitive Dust	Old Railroad and Former Lower Mill Pond Area	Benzo(a)anthracene	4E-05	- -	1E-05	- -	5E-05
			Benzo(a)pyrene	2E-04	- -	6E-05	- -	2E-04
			Benzo(b)fluoranthene	3E-05	- -	1E-05	- -	4E-05
			Dibenz(a,h)anthracene	4E-05	- -	1E-05	- -	5E-05
			Indeno(1,2,3-cd)pyrene	2E-05	- -	7E-06	- -	3E-05
			Arsenic	1E-04	- -	9E-06	- -	1E-04
			Asbestos	---	3E-05	---	- -	3E-05
							Soil Risk Total =	5E-04
							Total Risk =	5E-04

Key

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

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for a future young child and adult resident exposed to soil in the Old Railroad and Former Lower Mill Pond area. 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 a young child and adult resident's exposure to soil, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, and asbestos). The total risk from direct exposure to contaminated soil at the Old Railroad and Former Lower Mill Pond area to future residents is estimated to be 5×10^{-4}. The COCs contributing most to this risk level are benzo(a)pyrene and arsenic in soil. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 5 in 10,000 of developing cancer as a result of site-related exposure to the COCs in soil.

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

Table G-17

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil/Fugitive Dust	Old Railroad and Former Lower Mill Pond Area	Arsenic	Integumental; Cardiovascular	2E+00	- -	1E-01	2E+00
							Soil Hazard Index Total =	2E+00
							Integumental Hazard Index =	2E+00
							Cardiovascular Hazard Index =	2E+00

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 hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future young child and adult resident exposed to soil in the Old Railroad and Former Lower Mill Pond area. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 2 indicates that the potential for adverse effects could occur from exposure to contaminated soil containing arsenic.

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

Table G-18

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Day Care Child
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Soil/Fugitive Dust	East of South Street On-Facility	Trichloroethene	2E-06	--	—	--	2E-06
			Benzo(a)anthracene	4E-05	--	1E-05	--	5E-05
			Benzo(a)pyrene	4E-04	--	1E-04	--	5E-04
			Benzo(b)fluoranthene	4E-05	--	1E-05	--	6E-05
			Dibenz(a,h)anthracene	3E-05	--	1E-05	--	4E-05
			Indeno(1,2,3-cd)pyrene	1E-05	--	4E-06	--	2E-05
			Arsenic	3E-06	--	2E-07	--	3E-06
			Asbestos	—	6E-06	—	--	6E-06
							Soil Risk Total =	6E-04
Soil Gas	Indoor Air	East of South Street On-Facility (SB-09 Area)	Trichloroethene	--	4E-05	--	--	4E-05
							Indoor Air Risk Total =	4E-05
							Total Risk =	7E-04

Key

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

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for a future day care child exposed to soil in the East of South Street On-Facility area. 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 a day care child's exposure to soil, as well as the toxicity of the COCs (trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, and asbestos). The total risk from exposure to contaminated soil and indoor air at the East of South Street On-Facility area to future day care children is estimated to be 7×10^{-4}. The COC contributing most to this risk level is benzo(a)pyrene in soil. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 7 in 10,000 of developing cancer as a result of site-related exposure to the COCs in soil.

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

Table G-19

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Day Care Child
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Soil/Fugitive Dust	Old Railroad and Former Lower Mill Pond Area	Benzo(a)anthracene	3E-05	- -	8E-06	- -	3E-05
			Benzo(a)pyrene	1E-04	- -	4E-05	- -	2E-04
			Benzo(b)fluoranthene	2E-05	- -	6E-06	- -	3E-05
			Dibenz(a,h)anthracene	3E-05	- -	9E-06	- -	4E-05
			Indeno(1,2,3-cd)pyrene	1E-05	- -	4E-06	- -	2E-05
			Arsenic	7E-05	- -	6E-06	- -	7E-05
			Asbestos	---	6E-06	---	- -	6E-06
							Soil Risk Total =	3E-04
							Total Risk =	3E-04

Key

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

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

NE = Not evaluated

This table provides risk estimates for the significant routes of exposure for a future day care child exposed to soil in the Old Railroad and Former Lower Mill Pond area. 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 a day care child's exposure to soil, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, and asbestos). The total risk from direct exposure to contaminated soil at the Old Railroad and Former Lower Mill Pond area to a future day care child is estimated to be 3×10^{-4}. The COC contributing most to this risk level is benzo(a)pyrene in soil. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 3 in 10,000 of developing cancer as a result of site-related exposure to the COCs in soil.

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

Table G-20

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Day Care Child
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil/Fugitive Dust	Old Railroad and Former Lower Mill Pond Area	Arsenic	Integumental; Cardiovascular	2E+00	--	1E-01	2E+00
							Soil Hazard Index Total =	2E+00
							Integumental Hazard Index =	2E+00
							Cardiovascular Hazard Index =	2E+00

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 hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future day care child exposed to soil in the Old Railroad and Former Lower Mill Pond area. The Risk Assessment Guidance (RAGS) for Superfund states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 2 indicates that the potential for adverse effects could occur from exposure to contaminated soil containing arsenic.

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

Table G-21

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: Neponset River Surface Water

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (u g/L)	Screening Value (u g/L)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
Acetone	No	1.2	1500	Tier II SCV	<1	No	BSV
4-Nitroaniline	No	0.71	No SL	NA	NA	Yes	
Acenaphthene	No	0.028	23	FCV	<1	No	BSV
Benzo[a]pyrene	No	0.006	0.014	ET (Tier II)	<1	No	BSV
Benzo[b]fluoranthene	No	0.0063	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	0.012	No SL	NA	NA	Yes	
Benzo[k]fluoranthene	No	0.0052	No SL	NA	NA	Yes	
Benzyl alcohol	No	1	8.6	Tier II SCV	<1	No	BSV
bis(2-Ethylhexyl)phthalate	No	1.5	32	ET (Tier II)	<1	No	BSV
Chrysene	No	0.0054	No SL	NA	NA	Yes	
Fluoranthene	No	0.014	8.1	FCV	<1	No	BSV
Fluorene	No	0.017	3.9	ET (Tier II)	<1	No	BSV
Naphthalene	No	0.03	24	ET (Tier II)	<1	No	BSV
Phenanthrene	No	0.028	6.3	FCV	<1	No	BSV
Pyrene	No	0.011	No SL	NA	NA	Yes	
Aluminum - Total	No	68.3	87	NRWQC	<1	No	BSV
Arsenic - Dissolved	No	3.6	150	NRWQC	<1	No	BSV
Barium - Dissolved	No	19.6	3.9	ET (Tier II)	5	Yes	
Barium - Total	No	22.7	3.9	ET (Tier II)	6	Yes	
Chromium - Dissolved	No	3.8	11	NRWQC	<1	No	BSV
Copper - Dissolved	No	2.8	4.4	NRWQC	<1	No	BSV
Copper - Total	No	2.5	4.6	NRWQC	<1	No	BSV
Iron - Dissolved	No	1280	1000	NRWQC	1	Yes	
Iron - Total	No	555	1000	NRWQC	<1	No	BSV
Manganese - Dissolved	No	62.7	80	ET (Tier II)	<1	No	BSV
Manganese - Total	No	194	80	ET (Tier II)	2	Yes	
Nickel - Dissolved	No	3.7	26	NRWQC	<1	No	BSV
Nickel - Total	No	1.3	26	NRWQC	<1	No	BSV
Selenium - Dissolved	No	1.5	4.6	NRWQC	<1	No	BSV
Selenium - Total	No	2.3	5	NRWQC	<1	No	BSV
Zinc - Total	No	24	60	NRWQC	<1	No	BSV

Notes:
NA = Not Available or Not Applicable
NRWQC = EPA National Recommended Water Quality Criteria (USEPA, 1999)
ET (Tier II) = Great Lakes Water Quality Initiative Tier II Methodology (Suter & Tsao, 1996)
Tier II SCV = Secondary Chronic Values for Aquatic Biota (Suter & Tsao, 1996)
FCV = Final Chronic Value (Suter & Tsao, 1996)

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)
COPEC - Contaminant of potential ecological concern
BSV - Below Screening Value

Table G-22

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: Tailrace Surface Water

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (ug/L)	Screening Value (ug/L)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
2-Butanone (MEK)	No	1.9	No SL	NA	NA	Yes	
Acetone	No	6.1	1500	Tier II SCV	<1	No	BSV
Toluene	No	1.2	130	ET (Tier II)	<1	No	BSV
2-Methylnaphthalene	No	0.6	No SL	NA	NA	Yes	
Acenaphthene	No	0.39	23	FCV	<1	No	BSV
Acenaphthylene	No	0.27	No SL	NA	NA	Yes	
Anthracene	No	0.19	0.73	Tier II SCV	<1	No	BSV
Benzo[a]anthracene	No	0.6	0.027	Tier II SCV	22	Yes	
Benzo[a]pyrene	No	0.89	0.014	ET (Tier II)	64	Yes	
Benzo[b]fluoranthene	No	0.9	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	0.5	No SL	NA	NA	Yes	
Benzo[k]fluoranthene	No	0.47	No SL	NA	NA	Yes	
bis(2-Ethylhexyl)phthalate	No	1.2	32	ET (Tier II)	<1	No	BSV
Chrysene	No	0.98	No SL	NA	NA	Yes	
Dibenz[a,h]anthracene	No	0.12	No SL	NA	NA	Yes	
Fluoranthene	No	1.3	8.1	FCV	<1	No	BSV
Fluorene	No	0.26	3.9	ET (Tier II)	<1	No	BSV
Indeno[1,2,3-cd]pyrene	No	0.43	No SL	NA	NA	Yes	
Naphthalene	No	1.2	24	ET (Tier II)	<1	No	BSV
Phenanthrene	No	0.96	6.3	FCV	<1	No	BSV
Pyrene	No	1.6	No SL	NA	NA	Yes	
Aluminum - Dissolved	No	535	87	NRWQC	6	Yes	
Aluminum - Total	No	18000	87	NRWQC	207	Yes	
Arsenic - Dissolved	No	24.7	150	NRWQC	<1	No	BSV
Arsenic - Total	No	28	150	NRWQC	<1	No	BSV
Barium - Dissolved	No	28.3	3.9	ET (Tier II)	7	Yes	
Barium - Total	No	219	3.9	ET (Tier II)	56	Yes	
Cadmium - Total	No	1.5	0.14	NRWQC	11	Yes	
Chromium - Dissolved	No	9.3	11	NRWQC	<1	No	BSV
Chromium - Total	No	38.3	11	NRWQC	3	Yes	
Cobalt - Total	No	9	3	ET (Tier II)	3	Yes	
Copper - Dissolved	No	17.8	4.1	NRWQC	4	Yes	
Copper - Total	No	90.5	4.3	NRWQC	21	Yes	
Iron - Dissolved	No	790	1000	NRWQC	<1	No	BSV
Iron - Total	No	13800	1000	NRWQC	14	Yes	
Lead - Dissolved	No	67.4	0.9	NRWQC	75	Yes	
Lead - Total	No	576	1	NRWQC	576	Yes	
Manganese - Dissolved	No	125	80	ET (Tier II)	2	Yes	
Manganese - Total	No	950	80	ET (Tier II)	12	Yes	
Mercury - Dissolved	No	0.014	0.77	NRWQC	<1	No	BSV
Mercury - Total	No	0.044	0.91	NRWQC	<1	No	BSV
Nickel - Dissolved	No	11	24	NRWQC	<1	No	BSV
Nickel - Total	No	61.3	24	NRWQC	3	Yes	
Selenium - Dissolved	No	2.3	4.6	NRWQC	<1	No	BSV
Selenium - Total	No	2.9	5	NRWQC	<1	No	BSV
Vanadium - Dissolved	No	43.6	20	Tier II SCV	2	Yes	
Vanadium - Total	No	122	20	Tier II SCV	6	Yes	
Zinc - Dissolved	No	40.7	54	NRWQC	<1	No	BSV
Zinc - Total	No	340	55	NRWQC	6	Yes	

Notes:

NA = Not Available or Not Applicable

NRWQC = EPA National Recommended Water Quality Criteria (USEPA, 1999)

ET (Tier II) = Great Lakes Water Quality Initiative Tier II Methodology (Suter & Tsao, 1996)

Tier II SCV = Secondary Chronic Values for Aquatic Biota (Suter & Tsao, 1996)

FCV = Final Chronic Value (Suter & Tsao, 1996)

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-23

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: Neponset River Sediment

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (ug/kg)	Screening Value (ug/kg)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
2-Methylnaphthalene	No	240	65	NOAA ER-L 1990	4	Yes	
Acenaphthene	No	290	150	NOAA ER-L 1990	2	Yes	
Acenaphthylene	No	110	No SL	NA	NA	Yes	
Anthracene	No	600	85	NOAA ER-L 1990	7	Yes	
Benzo[a]anthracene	No	1700	230	NOAA ER-L 1990	7	Yes	
Benzo[a]pyrene	No	1900	400	NOAA ER-L 1990	5	Yes	
Benzo[b]fluoranthene	No	2200	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	550	170	LEL	3	Yes	
Benzo[k]fluoranthene	No	890	240	LEL	4	Yes	
Benzoic acid	No	79	No SL	NA	NA	Yes	
bis(2-Ethylhexyl)phthalate	No	6500	182	TEL	36	Yes	
Carbazole	No	340	No SL	NA	NA	Yes	
Chrysene	No	1900	400	NOAA ER-L 1990	5	Yes	
Dibenz[a,h]anthracene	No	210	60	NOAA ER-L 1990	4	Yes	
Dibenzofuran	No	120	6000	SQB	<1	No	BSV
Di-n-octylphthalate	No	53	No SL	NA	NA	Yes	
Fluoranthene	No	2700	600	NOAA ER-L 1990	5	Yes	
Fluorene	No	370	35	NOAA ER-L 1990	11	Yes	
Indeno[1,2,3-cd]pyrene	No	700	200	LEL	4	Yes	
Naphthalene	No	730	340	NOAA ER-L 1990	2	Yes	
Phenanthrene	No	1800	225	NOAA ER-L 1990	8	Yes	
Pyrene	No	2100	350	NOAA ER-L 1990	6	Yes	
Aluminum	No	4220000	No SL	NA	NA	Yes	
Arsenic	No	1600	33000	NOAA ER-L 1990	<1	No	BSV
Barium	No	30800	No SL	NA	NA	Yes	
Cadmium	No	580	5000	NOAA ER-L 1990	<1	No	BSV
Chromium	No	6300	80000	NOAA ER-L 1990	<1	No	BSV
Cobalt	No	3600	No SL	NA	NA	Yes	
Copper	No	34400	70000	NOAA ER-L 1990	<1	No	BSV
Iron	No	22200000	21200000	LEL	1	Yes	
Lead	No	63000	35000	NOAA ER-L 1990	2	Yes	
Manganese	No	692000	460000	LEL	2	Yes	
Nickel	No	5200	30000	NOAA ER-L 1990	<1	No	BSV
Vanadium	No	18300	No SL	NA	NA	Yes	
Zinc	No	99900	120000	NOAA ER-L 1990	<1	No	BSV

Notes:

NA = Not Available or Not Applicable

NOAA ER-L 1990 = the National Oceanic and Atmospheric Administration (NOAA) effects range-low (ER-L) threshold concentrations in sediment from "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (1990).

LEL = lowest effect level indicating a level of sediment contamination at which the majority of benthic organisms are unaffected.

TEL = threshold effect level derived in MacDonald (1994) and cited in Jones et al. (1997)

SQB = the EPA sediment quality benchmark derived from an EPA Tier II chronic value, assuming one percent total organic carbon (see Jones et al. 1997).

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-24							

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: Tailrace Sediment

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (ug/kg)	Screening Value (ug/kg)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
Carbon disulfide	No	15	5.1	SCV	3	Yes	
Ethylbenzene	No	5.4	21600	SQB	<1	No	BSV
m,p-Xylene	No	8.6	150	SQB	<1	No	BSV
o-Xylene	No	5.4	150	SQB	<1	No	BSV
Toluene	No	5.8	4020	SQB	<1	No	BSV
2,4-Dimethylphenol	No	72	No SL	NA	NA	Yes	
2-Methylnaphthalene	No	730	65	NOAA ER-L 1990	11	Yes	
4-Methylphenol	No	190	No SL	NA	NA	Yes	
Acenaphthene	No	600	150	NOAA ER-L 1990	4	Yes	
Acenaphthylene	No	1300	No SL	NA	NA	Yes	
Anthracene	No	1400	85	NOAA ER-L 1990	16	Yes	
Benzo[a]anthracene	No	4000	230	NOAA ER-L 1990	17	Yes	
Benzo[a]pyrene	No	3200	400	NOAA ER-L 1990	8	Yes	
Benzo[b]fluoranthene	No	4600	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	1600	170	LEL	9	Yes	
Benzo[k]fluoranthene	No	3800	240	LEL	16	Yes	
Benzoic acid	No	620	No SL	NA	NA	Yes	
Benzyl alcohol	No	66	6.6	SCV	10.000	Yes	
bis(2-Ethylhexyl)phthalate	No	290	182	TEL	2	Yes	
Carbazole	No	630	No SL	NA	NA	Yes	
Chrysene	No	4500	400	NOAA ER-L 1990	11	Yes	
Dibenz[a,h]anthracene	No	240	60	NOAA ER-L 1990	4	Yes	
Dibenzofuran	No	460	12000	SQB	<1	No	BSV
Fluoranthene	No	9000	600	NOAA ER-L 1990	15	Yes	
Fluorene	No	870	35	NOAA ER-L 1990	25	Yes	
Indeno[1,2,3-cd]pyrene	No	1800	200	LEL	9	Yes	
Naphthalene	No	920	340	NOAA ER-L 1990	3	Yes	
Phenanthrene	No	6900	225	NOAA ER-L 1990	31	Yes	
Phenol	No	95	186	NAWQC chronic	<1	No	BSV
Pyrene	No	8500	350	NOAA ER-L 1990	24	Yes	
Aluminum	No	14000000	No SL	NA	NA	Yes	
Arsenic	No	9300	33000	NOAA ER-L 1990	<1	No	BSV
Barium	No	143000	No SL	NA	NA	Yes	
Beryllium	No	590	No SL	NA	NA	Yes	
Cadmium	No	2100	5000	NOAA ER-L 1990	<1	No	BSV
Chromium	No	38000	80000	NOAA ER-L 1990	<1	No	BSV
Cobalt	No	12500	No SL	NA	NA	Yes	
Copper	No	53300	70000	NOAA ER-L 1990	<1	No	BSV
Iron	No	19100000	21200000	LEL	<1	No	BSV
Lead	No	850000	35000	NOAA ER-L 1990	24	Yes	
Manganese	No	2500000	460000	LEL	5	Yes	
Mercury	No	160	150	NOAA ER-L 1990	1	Yes	
Nickel	No	93100	30000	NOAA ER-L 1990	3	Yes	
Selenium	No	610	No SL	NA	NA	Yes	
Thallium	No	110	No SL	NA	NA	Yes	
Vanadium	No	49100	No SL	NA	NA	Yes	
Zinc	No	264000	120000	NOAA ER-L 1990	2	Yes	

Notes:

NA = Not Available or Not Applicable

NOAA ER-L 1990 = the National Oceanic and Atmospheric Administration (NOAA) effects range-low (ER-L) threshold concentrations in sediment from "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (1990).

LEL = lowest effect level indicating a level of sediment contamination at which the majority of benthic organisms are unaffected.

TEL = threshold effect level derived in MacDonald (1994) and cited in Jones et al. (1997)

SQB = the EPA sediment quality benchmark derived from an EPA Tier II chronic value, assuming one percent total organic carbon (see Jones et al. 1997).

SCV = Equilibrium partitioning-derived benchmark based on Secondary Chronic Value water quality criteria (Jones et al., 1997).

NAWQC chronic = Equilibrium partitioning-derived benchmark based on chronic National Ambient Water Quality Criteria (Jones et al., 1997).

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-25							
Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs) Blackburn & Union Privileges Site, Walpole, Massachusetts							
Medium: Lewis Pond Sediment							
Analyte	**Frequency of Detection <5%**	***Maximum* Detected Concentration (ug/kg)**	**Screening Value (ug/kg)**	**Screening Value Source**	**HQ**	**COPEC?**	**Reason for Exclusion**
2-Butanone (MEK)	No	68	2430	SCV	<1	No	BSV
Acetone	No	440	78.3	SCV	6	Yes	
Carbon disulfide	No	8.2	7.65	SCV	1	Yes	
Methyl tert-butyl ether (MTBE)	No	2.7	No SL	NA	NA	Yes	
Toluene	No	4.5	6030	SQB	<1	No	BSV
1,2-Dichlorobenzene	No	59	3060	SQB	<1	No	BSV
1,4-Dichlorobenzene	No	54	3150	SQB	<1	No	BSV
2,4-Dimethylphenol	No	120	No SL	NA	NA	Yes	
2-Methylnaphthalene	No	250	65	NOAA ER-L 1990	4	Yes	
4-Methylphenol	No	550	No SL	NA	NA	Yes	
Acenaphthene	No	230	150	NOAA ER-L 1990	2	Yes	
Acenaphthylene	No	900	No SL	NA	NA	Yes	
Anthracene	No	930	85	NOAA ER-L 1990	11	Yes	
Benzo[a]anthracene	No	2800	230	NOAA ER-L 1990	12	Yes	
Benzo[a]pyrene	No	2600	400	NOAA ER-L 1990	7	Yes	
Benzo[b]fluoranthene	No	3900	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	520	170	LEL	3	Yes	
Benzo[k]fluoranthene	No	3900	240	LEL	16	Yes	
Benzoic acid	No	1600	No SL	NA	NA	Yes	
Benzyl alcohol	No	100	9.9	SCV	10	Yes	
bis(2-Ethylhexyl)phthalate	No	3000	182	TEL	16	Yes	
Butylbenzylphthalate	No	650	99000	SQB	<1	No	BSV
Carbazole	No	280	No SL	NA	NA	Yes	
Chrysene	No	3100	400	NOAA ER-L 1990	8	Yes	
Dibenz[a,h]anthracene	No	200	60	NOAA ER-L 1990	3	Yes	
Dibenzofuran	No	160	18000	SQB	<1	No	BSV
Di-n-butylphthalate	No	72	99000	SQB	<1	No	BSV
Fluoranthene	No	5100	600	NOAA ER-L 1990	9	Yes	
Fluorene	No	360	35	NOAA ER-L 1990	10	Yes	
Indeno[1,2,3-cd]pyrene	No	590	200	LEL	3	Yes	
Naphthalene	No	760	340	NOAA ER-L 1990	2	Yes	
Phenanthrene	No	2700	225	NOAA ER-L 1990	12	Yes	
Phenol	No	110	279	NAWQC chronic	<1	No	BSV
Pyrene	No	5200	350	NOAA ER-L 1990	15	Yes	
Aluminum	No	9830000	No SL	NA	NA	Yes	
Antimony	No	1600	2000	NOAA ER-L 1990	<1	No	BSV
Arsenic	No	28200	33000	NOAA ER-L 1990	<1	No	BSV
Barium	No	127000	No SL	NA	NA	Yes	
Beryllium	No	890	No SL	NA	NA	Yes	
Cadmium	No	8000	5000	NOAA ER-L 1990	2	Yes	
Chromium	No	99400	80000	NOAA ER-L 1990	1	Yes	
Cobalt	No	12800	No SL	NA	NA	Yes	
Copper	No	136000	70000	NOAA ER-L 1990	2	Yes	
Iron	No	19700000	21200000	LEL	<1	No	BSV
Lead	No	1260000	35000	NOAA ER-L 1990	36	Yes	
Manganese	No	1010000	460000	LEL	2	Yes	
Mercury	No	670	150	NOAA ER-L 1990	4	Yes	
Nickel	No	57900	30000	NOAA ER-L 1990	2	Yes	
Selenium	No	1300	No SL	NA	NA	Yes	
Silver	No	1900	1000	NOAA ER-L 1990	2	Yes	
Thallium	No	140	No SL	NA	NA	Yes	
Vanadium	No	84600	No SL	NA	NA	Yes	
Zinc	No	477000	120000	NOAA ER-L 1990	4	Yes	

Notes:

NA = Not Available or Not Applicable

NOAA ER-L 1990 = the National Oceanic and Atmospheric Administration (NOAA) effects range-low (ER-L) threshold concentrations in sediment from "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program" (1990).

LEL = lowest effect level indicating a level of sediment contamination at which the majority of benthic organisms are unaffected.

TEL = threshold effect level derived in MacDonald (1994) and cited in Jones et al. (1997)

SQB = the EPA sediment quality benchmark derived from an EPA Tier II chronic value, assuming one percent total organic carbon (see Jones et al. 1997)

SCV = Equilibrium partitioning-derived benchmark based on Secondary Chronic Value water quality criteria (Jones et al , 1997).

NAWQC chronic = Equilibrium partitioning-derived benchmark based on chronic National Ambient Water Quality Criteria (Jones et al., 1997).

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-26

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: On-Site Soil

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (u g/kg)	Screening Value (u g/kg)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
1,1,1-Trichloroethane	Yes	5 1	2060000	ORNL mammal	<1	No	BSV
2-Butanone (MEK)	No	17	6487000	ORNL mammal	<1	No	BSV
Acetone	No	150	36600	ORNL mammal	<1	No	BSV
Benzene	No	9 4	52200	ORNL mammal	<1	No	BSV
Carbon disulfide	No	13	No SL	NA	NA	Yes	
Chloroform	Yes	1 3	55000	ORNL mammal	<1	No	BSV
cis-1 2-Dichloroethene	Yes	64	No SL	NA	NA	No	BSV
Ethylbenzene	Yes	7 6	No SL	NA	NA	No	BSV
m,p-Xylene	No	100	4162	ORNL mammal	<1	No	BSV
Methylene chloride	Yes	42	21400	ORNL mammal	<1	No	BSV
o-Xylene	No	57	No SL	NA	NA	Yes	
Styrene	Yes	1 5	300000	ORNL phyto	<1	No	BSV
Toluene	No	160	51500	ORNL mammal	<1	No	BSV
Trichloroethene	Yes	4500	1387	ORNL mammal	3	No	BSV
Trichlorofluoromethane	No	200	No SL	NA	NA	Yes	
C5-C8 Aliphatic Hydrocarbons	Yes	23000	No SL	NA	NA	No	BSV
C9-C10 Aromatic Hydrocarbons	No	14000	No SL	NA	NA	Yes	
C9-C12 Aliphatic Hydrocarbons	No	36000	No SL	NA	NA	Yes	
C11-C22 Aromatic Hydrocarbons	No	190000	No SL	NA	NA	Yes	
C19-C36 Aliphatic Hydrocarbons	No	290000	No SL	NA	NA	Yes	
C9-C18 Aliphatic Hydrocarbons	No	210000	No SL	NA	NA	Yes	
1,2-Dichlorobenzene	Yes	54	No SL	NA	NA	No	BSV
1,4-Dichlorobenzene	Yes	69	20000	ORNL earthworm	<1	No	BSV
2,4-Dimethylphenol	Yes	370	No SL	NA	NA	No	BSV
2-Methylnaphthalene	No	31000	No SL	NA	NA	Yes	
2-Methylphenol	Yes	160	1043900	ORNL mammal	<1	No	BSV
4-Methylphenol	No	9200	No SL	NA	NA	Yes	
Acenaphthene	No	25000	20000	ORNL phyto	1	Yes	
Acenaphthylene	No	12000	No SL	NA	NA	Yes	
Anthracene	No	40000	No SL	NA	NA	Yes	
Benzo(a)anthracene	No	39000	No SL	NA	NA	Yes	
Benzo(a)pyrene	No	35000	1960	ORNL mammal	18	Yes	
Benzo(b)fluoranthene	No	39000	No SL	NA	NA	Yes	
Benzo(g,h,i)perylene	No	11000	No SL	NA	NA	Yes	
Benzo(k)fluoranthene	No	23000	No SL	NA	NA	Yes	
Benzoic acid	No	4600	No SL	NA	NA	Yes	
Benzyl alcohol	Yes	48	No SL	NA	NA	No	BSV
bis(2-Ethylhexyl)phthalate	No	460	910	ORNL avian	<1	No	BSV
Butylbenzylphthalate	No	4200	No SL	NA	NA	Yes	
Carbazole	No	23000	No SL	NA	NA	Yes	
Chrysene	No	39000	No SL	NA	NA	Yes	
Dibenz(a,h)anthracene	No	3500	No SL	NA	NA	Yes	
Dibenzofuran	No	26000	No SL	NA	NA	Yes	
Diethylphthalate	Yes	82	100000	ORNL phyto	<1	No	BSV
Di-n-butylphthalate	Yes	350	90	ORNL avian	4	No	BSV
Fluoranthene	No	110000	No SL	NA	NA	Yes	
Fluorene	No	35000	30000	ORNL earthworm	1	Yes	
Indeno(1 2,3-cd)pyrene	No	13000	No SL	NA	NA	Yes	
Isophorone	Yes	93	No SL	NA	NA	No	BSV
Naphthalene	No	82000	No SL	NA	NA	Yes	
Pentachlorophenol	Yes	68	3000	ORNL phyto	<1	No	BSV
Phenanthrene	No	140000	No SL	NA	NA	Yes	
Phenol	Yes	310	30000	ORNL earthworm	<1	No	BSV
Pyrene	No	85000	No SL	NA	NA	Yes	
4 4'-DDD	No	7 5	2	ORNL avian	4	Yes	
4 4'-DDE	No	8 9	2	ORNL avian	4	Yes	
4,4'-DDT	No	13	2	ORNL avian	7	Yes	
alpha-chlordane	No	2 2	1600	ORNL avian	<1	Yes	
delta-BHC	No	22	No SL	NA	NA	Yes	
Dieldrin	No	27	64	ORNL avian	<1	Yes	
endosulfan sulfate	No	4	550	ORNL mammal	<1	Yes	
endrin ketone	No	8 9	No SL	NA	NA	Yes	
gamma-BHC	Yes	4 2	1660	ORNL avian	<1	No	BSV
gamma-chlordane	No	5 6	1600	ORNL avian	<1	Yes	
heptachlor	No	0 91	476	ORNL mammal	<1	Yes	
Heptachlor epoxide (B)	No	4 8	No SL	NA	NA	Yes	
Aroclor 1260	No	28	40000	ORNL phyto	<1	Yes	
Aluminum	No	12200000	3825	ORNL mammal	3190	Yes	
Antimony	No	15000	248	ORNL mammal	60	Yes	
Arsenic	No	106000	250	ORNL mammal	424	Yes	
Barium	No	1320000	17200	ORNL avian	77	Yes	
Beryllium	No	870	2420	ORNL mammal	<1	No	BSV
Cadmium	No	4000	1200	ORNL avian	3	Yes	
Chromium	No	58000	400	ORNL earthworm	145	Yes	
Cobalt	No	501000	20000	ORNL phyto	25	Yes	
Copper	No	1110000	38900	ORNL avian	29	Yes	
Cyanide (weak acid dissociable)	No	3200	236500	ORNL mammal	<1	No	BSV
Iron	No	135000000	No SL	NA	NA	Yes	
Lead	No	5850000	940	ORNL avian	6223	Yes	
Manganese	No	723000	322000	ORNL mammal	2	Yes	
Mercury	No	14000	100	ORNL earthworm	140	Yes	
Nickel	No	98700	30000	ORNL phyto	3	Yes	
Selenium	No	1700	331	ORNL avian	5	Yes	
Silver	Yes	15000	2000	ORNL phyto	8	No	BSV
Thallium	No	1500	27	ORNL mammal	56	Yes	
Vanadium	No	199000	714	ORNL mammal	279	Yes	
Zinc	No	5410000	12000	ORNL avian	451	Yes	

Notes:

NA = Not Available or Not Applicable

ORNL phyto = Benchmark for terrestrial plants from Efroymson et al 1997a

ORNL earthworm = Benchmark for earthworms from Efroymson et al 1997b

ORNL avian = NOAEL-based benchmark for food ingestion for the robin from Sample et al 1996

ORNL mammal = NOAEL-based benchmark for food ingestion for the short-tailed shrew from Sample et al 1996

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-27							

Occurrence, Distribution, and Selection of Chemicals of Concern (COPECs)
Blackburn & Union Privileges Site, Walpole, Massachusetts

Medium: Floodplain Soil

Analyte	Frequency of Detection <5%	Maximum Detected Concentration (u g/kg)	Screening Value (u g/kg)	Screening Value Source	HQ	COPEC?	Reason for Exclusion
Acetone	No	73	36600	ORNL mammal	<1	No	BSV
Chloroform	No	1	55000	ORNL mammal	<1	No	BSV
1,2-Dichlorobenzene	No	40	No SL	NA	NA	Yes	
2-Methylnaphthalene	No	1100	No SL	NA	NA	Yes	
4-Methylphenol	No	93	No SL	NA	NA	Yes	
4-Nitrophenol	No	49	7000	ORNL earthworm	<1	No	BSV
Acenaphthene	No	1300	20000	ORNL phyto	<1	No	BSV
Acenaphthylene	No	250	No SL	NA	NA	Yes	
Anthracene	No	1500	No SL	NA	NA	Yes	
Benzo[a]anthracene	No	3600	No SL	NA	NA	Yes	
Benzo[a]pyrene	No	2700	1980	ORNL mammal	1	Yes	
Benzo[b]fluoranthene	No	3200	No SL	NA	NA	Yes	
Benzo[g,h,i]perylene	No	660	No SL	NA	NA	Yes	
Benzo[k]fluoranthene	No	1800	No SL	NA	NA	Yes	
Benzoic acid	No	830	No SL	NA	NA	Yes	
bis(2-Ethylhexyl)phthalate	No	210	910	ORNL avian	<1	No	BSV
Butylbenzylphthalate	No	37	No SL	NA	NA	Yes	
Carbazole	No	1200	No SL	NA	NA	Yes	
Chrysene	No	3400	No SL	NA	NA	Yes	
Dibenz[a,h]anthracene	No	160	No SL	NA	NA	Yes	
Dibenzofuran	No	680	No SL	NA	NA	Yes	
Fluoranthene	No	10000	No SL	NA	NA	Yes	
Fluorene	No	970	30000	ORNL earthworm	<1	No	BSV
Indeno[1,2,3-cd]pyrene	No	720	No SL	NA	NA	Yes	
Naphthalene	No	1100	No SL	NA	NA	Yes	
Phenanthrene	No	11000	No SL	NA	NA	Yes	
Pyrene	No	9200	No SL	NA	NA	Yes	
Aluminum	No	10400000	3825	ORNL mammal	2719	Yes	
Antimony	No	6700	248	ORNL mammal	27	Yes	
Arsenic	No	28300	250	ORNL mammal	113	Yes	
Barium	No	156000	17200	ORNL avian	9	Yes	
Beryllium	No	420	2420	ORNL mammal	<1	No	BSV
Cadmium	No	2800	1200	ORNL avian	2	Yes	
Chromium	No	96800	400	ORNL earthworm	242	Yes	
Cobalt	No	6000	20000	ORNL phyto	<1	No	BSV
Copper	No	163000	38900	ORNL avian	4	Yes	
Iron	No	46800000	No SL	NA	NA	Yes	
Lead	No	730000	940	ORNL avian	777	Yes	
Manganese	No	965000	322000	ORNL mammal	3	Yes	
Mercury	No	1400	100	ORNL earthworm	14	Yes	
Nickel	No	165000	30000	ORNL phyto	6	Yes	
Selenium	No	1500	331	ORNL avian	5	Yes	
Thallium	No	150	27	ORNL mammal	6	Yes	
Vanadium	No	48600	714	ORNL mammal	68	Yes	
Zinc	No	460000	12000	ORNL avian	38	Yes	

Notes:

NA = Not Available or Not Applicable

ORNL phyto = Benchmark for terrestrial plants from Efroymson et al. 1997a.

ORNL earthworm = Benchmark for earthworms from Efroymson et al. 1997b.

ORNL avian = NOAEL-based benchmark for food ingestion for the robin from Sample et al. 1996.

ORNL mammal = NOAEL-based benchmark for food ingestion for the short-tailed shrew from Sample et al. 1996.

HQ - Hazard Quotient (ratio of the maximum detected concentration to the screening toxicity value)

COPEC - Contaminant of potential ecological concern

BSV - Below Screening Value

Table G-28						
Ecological Exposure Pathways of Concern						
Exposure Media	**Sensitive Environment Flag Y or N**	**Receptor**	**Endangered/ Threatened Species Flag Y or N**	**Exposure Routes**	**Assessment Endpoints**	**Measurement Endpoints**
AQUATIC HABITAT						
Sediment and Surface Water	N	Benthic Invertebrates and Fish Populations	N	Ingestion and direct contact with chemicals in sediment and surface water	Survival and growth of local populations of benthic invertebrates and fish	- Exposure concentrations in fish at or below published no observable adverse effects concentrations based on site-specific fish data, and published toxicity studies
						- Comparison of surface water COPEC concentrations to National Recommended Water Quality Criteria
						- No significant adverse effects to benthic invertebrates from exposure to sediment based on toxicty tests, bioassays and published toxicity studies
SEMI-AQUATIC HABITAT						
Sediment and Prey	N	Kingfisher Great Blue Heron Muskrat Raccoon	N	Dietary exposures of COPECs	Sustainability (survival, growth, and reproduction) of local populations of aquatic wildlife	- Comparison of estimated dietary doses of COPECs to wildlife as compared to TRVs for dietary dose to wildlife
TERRESTRIAL HABITAT						
Soils and Prey	N	American Robin Short-tailed Shrew	N	Dietary exposures of COPECs	Sustainability (survival, growth, and reproduction) of local populations of aquatic wildlife	- Comparison of estimated dietary doses of COPECs to wildlife as compared to TRVs for dietary dose to wildlife

Notes:

COPEC - Chemical of Potential Ecological Concern
TRVs - Toxicity reference values

Table G-29

COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis[1]	Assessment Endpoint
AQUATIC HABITAT						
Upper Former Mill Tailrace	Surface water	Aluminum[2,3]	87	ug/L	NRWQC for Freshwater Aquatic Life	Survival and growth of local populations of benthic invertebrates and fish
		Copper[2,4]	4.4	ug/L	NRWQC for Freshwater Aquatic Life	
		Lead[2,4]	1	ug/L	NRWQC for Freshwater Aquatic Life	
		pH	6.5 - 8.3	Standard units	Massachusetts Surface Water Qality Regulation	
Lewis Pond	Sediment	Nickel	*		No actionable risk. Toxicity testing indicated no measureable impact on invertebrates	Survival and growth of local populations of benthic invertebrates and fish
SEMI-AQUATIC HABITAT						
Neponset River	Sediment, Prey	Aluminum	*		No actionable risk. Aluminum risks are similar to reference, and do not pose an unnacceptable risk	Sustainability (survival, growth, and reproduction) of local populations of aquatic wildlife
Lewis Pond	Sediment, Prey	Aluminum	*		No actionable risk. Aluminum risks are similar to reference, and do not pose an unnacceptable risk	
Upper Former Mill Tailrace	Sediment, Prey	Aluminum	*		No actionable risk. Aluminum risks are similar to reference, and do not pose an unnacceptable risk	

TERRESTRIAL HABITAT						
East of South Street	Soil, Prey	Aluminum	*		No actionable risk. Aluminum risks are similar to reference, and do not pose an unacceptable risk	Sustainability (survival, growth, and reproduction) of local populations of terrestrial wildlife
		Selenium	*		No actionable risk. Selenium risks are less than reference, and do not pose an unacceptable risk	
		Lead	*		No actionable risk. Lead risks are less than reference, and do not pose an unacceptable risk	
West of South Street	Soil, Prey	Aluminum	*		No actionable risk. Aluminum risks do not exceed reference, and do not pose an unacceptable risk	
		Selenium	*		No actionable risk. Selenium risks are less than reference, and do not pose an unacceptable risk	
Orlando Property	Soil, Prey	Aluminum	*		No actionable risk. Aluminum risks do not exceed reference, and do not pose an unacceptable risk	
		Selenium	*		No actionable risk. Selenium risks are less than reference, and do not pose an unacceptable risk	
		Lead	*		No actionable risk. Lead risks are similar to reference, and do not pose an unacceptable risk	
Floodplain	Soil, Prey	Aluminum	*		No actionable risk. Aluminum risks do not exceed reference, and do not pose an unacceptable risk	
		Selenium	*		No actionable risk. Selenium risks are similar to reference, and do not pose an unacceptable risk	
		Lead	*		No actionable risk. Lead risks are similar to reference, and do not pose an unacceptable risk	

Notes:

1. Basis for PRGs includes: National Recommended Water Quality Criteria (NRWQC). "NRWQC – Freshwater Aquatic Life" refers to "Freshwater CCC" (Criterion Continuous Concentration) or freshwater chronic exposure value; or the Massachusetts Surface Water Quality Regulations [314 CMR 4.05(3)(b)]

2. Dissolved (as opposed to total) metals concentrations are compared to the NRWQC.

3. The aluminum NRWQC is expressed as total recoverable metal.

4. Consistent with the BERA, a hardness of 44 mg/l ($CaCO_3$ equivalent) for the Neponset River is assumed for hardness dependant NRWQC (copper and lead).

* No protective level concentration was developed for this COC, because it was not determined to pose an unacceptable ecological risk as part of the risk management decision in the Feasibility Study, based on chemical-specific evaluations including COC background concentrations and risks compared to reference locations

COC - Chemical of Concern
NRWQC - National Recommended Water Quality Criteria

Media	Risk Type	TABLE H-1 Remedial Action Objectives
Groundwater/ Surface Water	Human Health	Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed MCLs or result in cumulative excess cancer risk > 1E-04, non-carcinogenic HI > 1, or PBL > 5%, or where pH conditions are elevated; and meet ARARs
		Prevent dermal contact by a future construction worker with groundwater having elevated pH conditions, and meet ARARs
		Prevent dermal contact by a current/future wader with surface water having elevated pH conditions, and meet ARARs
		Prevent migration of contaminated groundwater beyond the compliance boundary for the SO and AOC waste management areas. (Note that the SO waste management area refers to soils to the East of South Street, including the Old Railroad right-of-way.)
	Ecological	Surface water concentrations shall meet ARARs
Soil	Human Health	Prevent ingestion of soil by a future resident/construction worker with lead concentrations resulting in PBL > 5%, and meet ARARs
		Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative excess cancer risk > 1E-04 or non-carcinogenic HI > 1, and meet ARARs
		Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.
		Prevent non residential exposure to contaminated soils in the Area of Containment that would result in unacceptable levels of risk to a future human receptor and meet ARARs
	Ecological	Prevent exposure to contaminated soil in the Area of Containment that would result in unacceptable levels of risk to an ecological receptor
Sediment	Human Health	Prevent inhalation of asbestos fibers from sediment having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from sediment which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.
Soil Vapor	Human Health	Prevent inhalation of indoor air that is impacted by soil vapor and has resultant COC concentrations which result in a cumulative excess cancer risk >1E-4 or non-carcinogenic HI>1, and meet ARARs.

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Protection of Human Health	Not protective of human health because no measures to prevent ingestion/dermal contact/inhalation with groundwater used as tap water with contaminant of concern (COC) concentrations greater than preliminary remediation goals (PRGs), nor does this alternative prevent dermal contact by a future construction worker or current/future wader with groundwater or surface water with elevated pH conditions	Establishment of institutional controls, such as a deed restriction that prohibits use of Site groundwater as tap water, establishes a compliance boundary around the SO and AOC waste management areas, and prohibits wading/fishing in the Former Mill Tailrace, and installation and maintenance of fencing surrounding the Former Mill Tailrace, provide protection of human health by preventing exposure to groundwater and surface water COCs with concentrations greater than PRGs Groundwater and surface water monitoring would be required to confirm that human receptors are not exposed to groundwater or surface water COCs at concentrations exceeding PRGs	Establishment of institutional controls, such as a deed restriction that prohibits use of Site groundwater as tap water and establishes a compliance boundary around the waste management areas, provides protection of human health by preventing exposure to groundwater COCs with concentrations greater than PRGs. Installation of groundwater collection and treatment measures to prevent contaminated groundwater discharge to the Former Mill Tailrace provides protection of human health Groundwater and surface water monitoring would be required to confirm that human receptors are not exposed to groundwater or surface water COCs. Further, the protection of human health from surface water exposures is dependant upon the successful and long-term operation of a groundwater collection and treatment system
Protection of the Environment	Not protective of the environment since surface water quality standards to protect ecological receptors will not be met	Not protective of the environment since surface water quality standards to protect ecological receptors will not be met	Protective of the environment since installation of the groundwater collection and treatment measure will prevent contaminated groundwater from impairing the water quality of the Former Mill Tailrace, thereby protecting ecological receptors Where wetlands are disturbed as part of this alternative (e.g , construction of a surface water outfall for treated groundwater in the Former Mill Tailrace), the potential disturbances to wetlands would be mitigated

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	Alternatives		
	Alternative SW-1: No Action	Alternative SW-2: Limited Action	Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Chemical-Specific ARARs	This alternative does not address groundwater or surface water contamination, therefore, it does not comply with chemical-specific ARARs.	Groundwater outside the compliance boundary for the waste management areas is currently, and would continue to be in compliance with chemical specific ARARs identified in Table 12A Groundwater within the compliance boundary would meet chemical-specific ARARs by implementing institutional controls to preclude exposure to potential receptors This alternative will not meet the requirements of the CWA and NRWQC, or the MSWQS, since concentrations of surface water in the Former Mill Tailrace will remain above these water quality standards in these regulations	Groundwater outside the compliance boundary for the waste management areas is currently, and would continue to be in compliance with chemical specific ARARs identified in Table 12A Groundwater within the compliance boundary would meet chemical-specific ARARs by implementing institutional controls to preclude exposure to potential receptors Surface water in the Former Mill Tailrace would be in compliance with chemical specific ARARs
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	The measures contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12A Coordination with appropriate regulatory agencies would be completed to confirm compliance with these ARARs, as necessary.	The measures contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12A. In particular, construction activities in the wetlands, floodplain, or surface water bodies near the Former Mill Tailrace would be completed in a manner that addresses impacts to wetlands, the floodplain, and/or surface water bodies Coordination with appropriate regulatory agencies would be completed to confirm general compliance with these ARARs, as necessary.
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	The activities implemented as part of this alternative would be completed in a manner that is compliant with some of the action-specific ARARs identified in Table 12A (e.g., waste listing, waste generation, groundwater protection standards) However, this alternative would not meet the requirements of the state and federal RCRA closure and post-closure standards, since institutional controls and fencing alone will not address migration of contaminants to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace	The activities implemented as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the action-specific ARARs identified in Table 12A (e g., surface water discharge standards, waste listing, waste generation, groundwater protection standards, TSCA standards related to transport and disposal of asbestos-impacted soil/sediment, closure/post closure standards, etc)

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Long-Term Effectiveness and Permanence	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative Therefore, this alternative is neither effective, nor permanent	Institutional controls, such as a deed restriction that: prohibits use of Site groundwater as tap water, establishes the compliance boundary around the waste management areas, prevents the use of groundwater within the compliance boundary, and prohibits wading/fishing in the Former Mill Tailrace; and installation and maintenance of fencing surrounding these areas, are effective means of removing the exposure pathways for groundwater and surface water, and hence eliminating potential human health risks However, environmental risks from impaired water quality would not be addressed Contamination would remain on-Site, therefore, five-year reviews would be required	Institutional controls, such as a deed restriction that. prohibits use of Site groundwater as tap water, and establishes the compliance boundary around the waste management areas, are effective means of removing the exposure pathways for groundwater. and hence eliminating potential groundwater risks Yearly compliance monitoring would ensure institutional controls remain in effect The groundwater collection and treatment system will adequately address potential surface water-related human health risk and environmental impairment in the Former Mill Tailrace in less than one month from start-up of the groundwater collection and treatment system Contamination would remain on-Site, therefore, five-year reviews would be required
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative	When properly established and implemented, institutional controls and fencing provide adequate and reliable measures as long-term effective groundwater and surface water remedies for human health exposure, but not environmental exposure, particularly when combined with a groundwater and surface water monitoring program, compliance monitoring, quarterly inspections, and five-year reviews However, implementation of these measures is dependant upon cooperation of affected property owners, in the case of deed restrictions, and some types of institutional controls, such as local by-laws restricting groundwater use, may require regulatory enforcement In particular, precluding exposure to surface water for a period of possibly greater than 100 years by fencing and institutional controls on residential property may be difficult in the long-term	When properly established and implemented, institutional controls provide adequate and reliable measures as a long-term effective groundwater remedy, particularly when combined with a groundwater monitoring program, compliance monitoring, quarterly inspections, and five-year reviews While the groundwater collection and treatment system generally consists of well-proven technologies, the adequacy and reliability of the system for protection of surface water is dependant upon proper operation, monitoring, and maintenance of the groundwater collection and treatment system This system could be operated for greater than 100 years Surface water quality monitoring will also completed to evaluate the effectiveness of the alternative

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	Alternatives		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Treatment Process	None	None	Metals in groundwater would be removed by pH adjustment, ion exchange, and greensand filtration. Organic chemicals in groundwater would be removed by liquid phase granular activated carbon (GAC) The groundwater pH would be adjusted by addition of acid There is no treatment of site-wide groundwater contamination
Volume Treated	None	None	A design flow rate of approximately 10 gpm (equals approximately 5 3 x 10^8 gallons over the 100-year operational period of the system).
Reduction of Toxicity, Mobility and/or Volume	None	None	The pH would be reduced, and metals and organics would be removed from groundwater that discharges to the Former Mill Tailrace. *The remaining contaminated groundwater throughout the Site will not be treated.*
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	Metals and organics removal from Site groundwater discharging to the Former Mill Tailrace would be permanent. Extracted metals from pH adjustment/greensand filtration would be treated / disposed off-Site in filter cartridges Metals extracted by ion exchange resins would be treated and/or disposed off-Site Organics from the GAC would be sent off-Site for treatment and/or disposal
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	An estimated 24 55-gallon drums of filter cartridges with metals residuals would be generated per year Approximately 1,800 pounds of spent ion exchange resin would be generated per year Approximately 7,200 pounds of spent GAC would be generated per year.
Attainment of Statutory Preference for Treatment	No	No	Contaminated groundwater would be collected and treated to prevent its migration and discharge to the Former Mill Tailrace, but there would be no treatment of the remaining contaminated groundwater throughout the Site Hence, this alternative partially satisfies the statutory preference for treatment as a principal element of the remedial solution. Long-term operation of the groundwater collection and treatment system would be necessary

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	Alternatives		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Community Protection	No additional risks beyond those posed by current conditions.	No additional risks beyond those posed by current conditions	Engineering controls to limit potential fugitive dust associated with construction activities would be implemented as necessary
Worker Protection	No additional risks beyond those posed by current conditions	Risks to workers performing monitoring, well repair/installation, fence repair, quarterly inspections, and 5-year reviews can be controlled and mitigated with proper health and safety measures	Risks to workers performing construction activities, system maintenance, waste disposal, monitoring, well repair/installation, fence repair, quarterly inspections, and 5-year reviews can be controlled and mitigated with proper health and safety measures
Environmental Impacts	No additional risks beyond those posed by current conditions	Any minor impacts due to fence installation will be mitigated	Installation of a groundwater collection and treatment system would likely reduce groundwater flow conditions to the Former Mill Tailrace, which contains surface water and wetlands. However, discharge of treated groundwater to the Former Mill Tailrace would directly provide additional surface water flow
Time to Achieve RAOs	With no institutional controls or remedial measures implemented, groundwater and surface water COCs could remain at concentrations greater than PRGs for greater than 100 years	Institutional and access controls would achieve groundwater and surface water RAOs for human health risks immediately upon implementation of this measure	Institutional controls would achieve groundwater RAOs immediately upon implementation of this measure Clean-up of surface water to PRGs is expected to take approximately one month from start-up of the groundwater collection and treatment system However, operation and maintenance of the system may be required for 100 years or more to maintain compliance with surface water PRGs

TABLE K-1
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: *Implementability*	Alternatives		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative.	Well maintenance/drilling, fence maintenance, and groundwater and surface water sampling are standard activities that are routinely implemented	Well maintenance/drilling, and groundwater and surface water sampling are standard activities that are routinely implemented In addition, the groundwater collection and treatment system consists of methods / components that are routinely constructed and operated However the effective long-term (i e , potentially 100 years or more) operation and maintenance of this system requires substantial on-going effort The long-term operations requirements (i e., replacement of failed components) are uncertain
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative	Well maintenance/drilling, fence maintenance, and groundwater and surface water sampling can be completed with proven reliable technologies However, the reliability of maintaining fencing and enforcing institutional controls on residential property for a period of greater than 100 years is questionable	Well maintenance/drilling, and groundwater and surface water sampling can be completed with proven reliable technologies In addition, the groundwater collection and treatment system consists of proven and reliable methods / components However the effective long-term (i e , potentially 100 years or more) operation and maintenance of this system requires substantial on-going effort The long-term operations requirements (i e., replacement of failed components) are uncertain
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Modifications to the groundwater collection and treatment system could be added if warranted based on system performance and/or monitoring data
Monitorability	No monitoring would be undertaken as part of this alternative other than conducting Five-Year Reviews	Groundwater and surface water monitoring, quarterly Site inspections, yearly compliance monitoring, and five-year reviews enable the Site groundwater and surface water conditions and institutional controls to be effectively monitored	Groundwater and surface water monitoring, groundwater treatment system effluent monitoring, quarterly inspections, and five-year reviews enable the Site groundwater and surface water conditions to be effectively monitored. Yearly compliance monitoring of institutional controls can be effectively conducted
Administrative Feasibility	There are no administrative issues with this alternative	Establishment of groundwater compliance boundary around the waste management areas and establishment of other institutional controls, and continued access to Site monitoring wells and surface water sample locations requires the cooperation of affected property owners and enforcement by regulators Depending on the precise natural of the institutional controls, regulatory action, such as enactment of local by-laws, may also be required	Establishment of a compliance boundary around the waste management areas and establishment of other institutional controls, and continued access to Site monitoring wells and surface water sample locations requires the cooperation of affected property owners Depending on the precise nature of the institutional controls, regulatory action, such as enactment of local by-laws, may also be required
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative	Several facilities are currently able to accept the quantities of materials (purge water from sampling activities, and drill cuttings from well replacement activities) requiring off-Site treatment / disposal as part of this alternative	Several facilities are currently able to accept the quantities of materials (groundwater treatment residuals, purge water from sampling activities, drill cuttings from well replacement activities, and soil from installation of the groundwater collection trench) requiring off-Site treatment / disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment
Availability of Personnel, Equipment, and Materials	Personnel, equipment, or materials would be available to conduct Five-Year Reviews	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative	Well maintenance/drilling technologies, fence maintenance methods, and groundwater and surface water sampling and analysis technologies are well established	Well maintenance/drilling technologies, groundwater and surface water sampling and analysis, and the groundwater collection and treatment technologies are well established.

TABLE K-1
***Individual Analysis* of SW-1 through SW-3 Alternatives**
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Alternatives		
	Alternative SW-1: No Action	Alternative SW-2: Limited Action	Alternative SW-4: *Groundwater Collection with Ex-Situ Treatment of Groundwater*
Capital Cost	$0	$90,000	$1,700,000
Total Annual O&M Cost (7% discount rate)	$0	$2,100,000	$5,100,000
Total Periodic Costs (7% discount rate)	$32,000	$160,000	$120,000
Total Present Value (7% discount rate)	$32,000	$2,400,000	$7,000,000

1. The costs are generally rounded to two significant figures
2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up All capital costs are assumed to occur in year zero for cost discounting purposes
3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e g , routine operation, maintenance, and monitoring)
4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e g , five-year reviews)
5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent
6. Refer to the text and appendices of this report for additional information regarding costs.

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Protection of Human Health	Not protective of human health because no measures would be taken to prevent ingestion/dermal contact with soil that has contaminant of concern (COC) concentrations exceeding human health risk levels.	There are no risks to current receptors in the SO Area Establishment of institutional controls, such as deed restrictions, installing and maintaining fencing, long-term monitoring, and monitoring of soil vapor would not provide protection for the currently allowed uses of the site	There are no risks to current receptors in the SO Area. Institutional controls, such as deed restrictions that prevent development of the Site for "Daycare Age Child-type receptors", would not provide protection for the currently allowed uses of the site In addition, mitigation and monitoring of TCE-impacted soil vapor would provide protection of potential future "Site Workers" by preventing exposure to soil COCs	There are no risks to current receptors in the SO Area Institutional controls, such as deed restrictions, that prevent development of the Site for "Daycare Age Child-type receptors", would not provide protection for the currently allowed uses of the site In addition, excavation of TCE and asbestos contaminated soil would provide protection for potential future "Site Workers" by removing soil COCs from the Site	There are no risks to current receptors in the SO Area Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site, prevent disturbance of the newly installed asphalt or soil cover and require a soil management plan would provide protection to future receptors for the currently allowed uses of the site TCE and asbestos- contaminated soils would be addressed by excavation Similarly, surface PAH, lead, and arsenic-contaminated soils would be addressed by excavation to a depth of 1 ft bgs. The resulting excavations would be backfilled, and a new asphalt or soil cover would be constructed over these portions of the Site Excavation of soil and maintenance of the asphalt or soil cover would provide protection for future receptors as long as the one-foot cover can be designed to meet hazardous waste standards if characteristic hazardous waste is to be left below 1 ft bgs	There are no risks to current receptors in the SO Area. All contaminants posing a risk under currently allowed uses will be excavated and removed from the Site Remnant residential risk will be addressed by maintaining the backfilled soil cover over the remaining contaminated soil and instituting a soil management plan Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site and require a soil management plan would provide protection to future receptors for the currently allowed uses of the site
Protection of the Environment	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Chemical-Specific ARARs	This alternative does not address soil contamination, therefore, it does not comply with chemical-specific ARARs.	This alternative will not meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site	This alternative will not meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site The alternative will meet chemical-specific standards for mitigating risk from TCE contaminated soil vapor by preventing the migration of soil vapor into indoor air	This alternative will not fully meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site The alternative will mitigate risk to a future Site Worker through excavating and removing asbestos and TCE-contaminated soil	This alternative will meet chemical-specific ARARs by preventing exposure to COCs through removal of all contaminated soil to 1 ft bgs, institutional controls that prevent residential uses and disturbance of newly-installed cover material that would be constructed as part of this alternative TCE and asbestos-contaminated soils would be addressed by excavation PAH, lead, and arsenic-contaminated soils would be addressed by excavation to a depth of 1 ft bgs and off-site disposal The resultant excavations would be backfilled, and a new asphalt or soil cover would be constructed over these portions of the Site Excavation of soil and maintenance of the asphalt or soil cover, institutional controls, and implementation of a soil management plan would provide protection for future receptors for the currently allowed uses of the Site	This alternative will meet chemical-specific ARARs by excavation and off-site disposal of all contaminants that pose a risk to future receptors for the currently allowed uses of the Site
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	Remedial activities to be conducted as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-2 such as: limiting impacts to wetlands, floodplains, historic features, etc Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary	Installation and sampling of soil vapor implants, installation and maintenance of a sub-slab depressurization system and installation of a horizontal barrier would be conducted in a manner to meet location-specific ARARs pertaining to historic preservation, if applicable Maintenance of the existing asphalt cover over asbestos-impacted soils would be completed in a manner that is compliant with the substantive requirements of the location-specific ARARs identified in Table 12B-3 such as: limiting impacts to features such as wetlands, floodplains, historic features, etc Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary	The areas that would be excavated as part of this alternative are potentially near historic features and would be conducted in a manner to meet location-specific ARARs pertaining to historic preservation, if applicable Work adjacent to other protected features (wetlands and floodplains) would be completed in a manner that is compliant with the substantive requirements of the location-specific ARARs identified in Table 12B-4 Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary	The areas to be excavated, covered and monitored as part of this alternative are potentially near historic features and adjacent to wetlands and floodplains that are regulated under location-specific ARARS Therefore, activities contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-5 Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary	The areas to be excavated and monitored as part of this alternative are potentially near historic features and adjacent to wetlands and floodplains that are regulated under location-specific ARARS Therefore, activities contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-6 Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary.

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Compliance with ARARs	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	Remedial activities implemented as part of this alternative, including long-term monitoring, installation and maintenance of fencing, maintenance of existing soil and asphalt cover, and establishment and monitoring of institutional controls, are subject to the action-specific ARARs identified in Table 12B-2. The current asphalt cover at the site may not meet TSCA standards for asbestos If characteristic hazardous waste is present, this alternative will not meet federal and state hazardous waste closure/post-closure standards	Remedial activities implemented as part of this alternative, including long-term monitoring, installation and sampling of soil vapor implants, installation and maintenance of a sub-slab depressurization system, installation of a horizontal barrier, establishment and monitoring of institutional controls, and maintenance of the existing asphalt cover over asbestos-impacted soils, are subject to action-specific ARARs identified in Table 12B-3 The current asphalt cover at the site may not meet TSCA standards for asbestos If characteristic hazardous waste is present, this alternative will not meet federal and state hazardous waste closure/post-closure standards	Remedial activities implemented as part of this alternative, including long-term monitoring, establishment of institutional controls, and excavation, are subject to action-specific ARARs identified in Table 12 B-4 If characteristic hazardous waste (from lead or other contaminants) is left in place after the limited excavation, this alternative will not meet federal and state hazardous waste closure/post-closure standards	Excavation, cover, institutional controls, and monitoring activities implemented as part of this alternative would be completed in a manner that is compliant with the action-specific ARARs identified in Table 12B-5 such as: waste generation, handling, and listing requirements, TSCA requirements for asbestos-impacted soil, groundwater protection standards, air standards, capping guidance, and erosion and sediment control guidance, etc If characteristic hazardous waste is to be left in place below 1 ft bgs, the alternative can achieve compliance with hazardous waste requirements as long as the one-foot cover can be designed to meet relevant and appropriate standards .	Excavation, institutional controls, and monitoring activities implemented as part of this alternative would be completed in a manner that is compliant with the action-specific ARARs identified in Table 12B-6 such as waste generation, handling, and listing requirements, TSCA requirements for asbestos-impacted soil, groundwater protection standards, air standards; and erosion and sediment control guidance, etc

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
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Criteria: Long-Term Effectiveness and Permanence	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent	No contamination will be removed or treated as part of this alternative. Remedial measures under this alternative would not be effective for addressing risks for the currently allowed uses of the Site Contamination would remain on-Site; therefore, five-year reviews would be required	Only limited contamination will be removed under this alternative from the soil vapor mitigation system Remaining contamination will still pose a risk for the currently allowed uses of the Site Potential risks only for a future Site Worker would be mitigated by eliminating exposure to asbestos and TCE-contaminated soil/soil vapor by maintaining a cover over soils, and installing a horizontal barrier / sub-slab depressurization system beneath a hypothetical future building, respectively. Contamination would remain on-Site, therefore, five-year reviews would be required	Not all contamination will be removed under this alternative from the limited excavation. Remaining contamination will still pose a risk for the currently allowed uses of the Site Excavating asbestos or TCE-contaminated soils and disposing of these soils off-Site would only mitigate potential risks to a future Site Worker. It is estimated that excavation of these soils could be completed in less than one month from initiation of excavation activities Contamination would remain on-Site, therefore, five-year reviews would be required	Establishment of institutional controls, such as deed restrictions that prohibit residential use of the site, prohibit disturbance of the newly installed asphalt or soil cover, and require a soil management plan, would provide protection for the currently allowed uses of the site from contamination that will be left on site below 1 ft bgs PAH, lead, and arsenic-contaminated soils would be excavated to a depth of 1 ft bgs, TCE and asbestos-contaminated soils would be excavated to depths of approximately 6 ft bgs, and 4 ft bgs, respectively Excavations would be backfilled with "clean" fill and covered with an asphalt or vegetated soil cover It is estimated that these activities could be completed in approximately one to two months from initiation of excavation activities Contamination would remain on-Site; therefore, five-year reviews would be required.	Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site and require a soil management plan, would provide protection to future receptors for the currently allowed uses of the site It is estimated that these activities could be completed in approximately two months from initiation of excavation activities
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site The horizontal barrier and sub-slab depressurization system, which will address TCE-contaminated soil and soil vapor, consist of generally conventional and well-proven technologies, and are expected to be highly reliable when adequately operated and maintained, particularly when combined with soil vapor and indoor air monitoring	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site. Excavation and off-Site disposal of TCE and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas	When properly established and implemented, institutional controls provide adequate and reliable measures for a long-term soil remedy, particularly when combined with long-term monitoring and maintenance of the asphalt or soil cover Excavation and off-Site disposal of PAH, arsenic, lead, TCE, and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas	When properly established and implemented, institutional controls provide adequate and reliable measures for a long-term soil remedy, particularly when combined with long-term monitoring. Excavation and off-Site disposal of PAH, arsenic, lead, TCE and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Treatment Process	None	None	Soil vapor extracted by the sub-slab depressurization system would be collected and discharged to the atmosphere	Soils exceeding characteristic hazardous waste standard (lead) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary Excavated soil would then be disposed off-Site	Soils exceeding characteristic hazardous waste standard (lead and arsenic) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary Excavated soil would then be disposed off-Site.	Soils exceeding characteristic hazardous waste standard (lead and arsenic) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary Excavated soil would then be disposed off-Site
Volume Treated	None	None	The sub-slab depressurization system would have a design flow rate of approximately 100 cubic feet per minute of air (equals approximately 5 3 x 10^8 cubic feet of air over the estimated 10-year operational period of the system) The volume of TCE-contaminated soil that would be treated is approximately 400 cubic yards	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 130 cubic yards.	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 2,030 cubic yards	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 2,800 cubic yards
Reduction of Toxicity, Mobility and/or Volume	None	None	The primary purpose of the sub-slab depressurization system is not to treat soil or soil vapor, but rather to prevent the migration of soil vapor into indoor air of a hypothetical future building Nonetheless, the TCE soil contamination would be removed with a sub-slab depressurization system in approximately 10 years or less	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil..	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	TCE would be permanently removed from the subsurface. PAH-, arsenic-, lead -, and asbestos-impacted soils would remain in place	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site. The permanence of treatment would be dependant upon the method of stabilization	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site The permanence of treatment would be dependant upon the method of stabilization.	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site The permanence of treatment would be dependant upon the method of stabilization.

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	Assuming an average TCE concentration of 10,000 ug/kg (equivalent to 10 ppm), a total volume of 320 cubic yards of TCE-impacted soil, and a bulk density of 1 5 tons per cubic yard of soil, it is estimated that approximately 10 pounds of TCE are currently located in the subsurface in the ESS Area #1, which would be removed over an estimated 10-year operational period of the sub-slab depressurization system	It is not expected that soil stabilization will generate any treatment residuals	It is not expected that soil stabilization will generate any treatment residuals	It is not expected that soil stabilization will generate any treatment residuals
Attainment of Statutory Preference for Treatment	No	No	This alternative partially satisfies the statutory preference for treatment as a principal element of the remedial solution by installation and maintenance of a sub-slab depressurization system for TCE contaminated soil However, asbestos, PAH, lead, and arsenic contaminated soils would not be treated	This alternative only partially satisfies the statutory preference for treatment for a small quantity of contaminated soil that exceeds hazardous waste standards and that will require stabilization before off-site disposal Most of the excavated soil will be disposed of off-site untreated PAH, lead, and arsenic contaminated soil would remain on-Site and not be treated	This alternative only partially satisfies the statutory preference for treatment since not all of the contaminated soil that will be excavated and disposed of off-site will be stabilized, only the soil that exceeds hazardous waste standards Soils with PAH, lead, and arsenic contamination below 1 ft bgs would remain on-Site and not be treated	This alternative only partially satisfies the statutory preference for treatment since not all of the contaminated soil that will be excavated and disposed of off-site will be stabilized, only the soil that exceeds hazardous waste standards Remnant contamination below cleanup levels, but above levels permitting unrestricted use will be left on-site untreated

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
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Criteria: Short-Term Effectiveness	Alternatives					
	***Alternative SO-1:* No Action**	***Alternative SO-2:* Limited Action**	***Alternative SO-3: Vapor* Intrusion Mitigation and Covering of Soils Containing Asbestos**	***Alternative SO-4: Limited* Excavation**	***Alternative SO-5: Excavation of Surface Contaminated* Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	***Alternative SO 6: Comprehensive Excavation and* Off-Site Disposal**
Community Protection	No additional risks beyond those posed by current conditions	No additional risks beyond those posed by current conditions.	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with construction activities would be implemented, as necessary. Exhaust from operation of the sub-slab depressurization system would be vented above the normal breathing zone	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary. In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 37 truckloads would be necessary to remove soil and asphalt from the Site. Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary Asbestos-containing soil would be excavated/stabilized "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 273 truckloads would be necessary to remove soil and asphalt from the Site Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary. Asbestos-containing soil would be excavated/stabilized "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 655 truckloads would be necessary to remove soil and asphalt from the Site Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary Asbestos-containing soil would be excavated/stabilized "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils. In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet
Worker Protection	No additional risks beyond those posed by current conditions	Risks to workers performing installation of soil vapor implants, soil vapor monitoring,	Risks to workers performing long-term monitoring, construction activities, maintenance of the sub-slab depressurization system, soil	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, maintenance of asphalt or soil cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures Excavation, stabilization, and disposal of asbestos-	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures Excavation, stabilization, and disposal of asbestos-impacted

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Walpole, Massachusetts

Criteria: Short-Term Effectiveness	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
		long-term monitoring, fence repair, maintenance of the existing cap/cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures	vapor implant installation, soil vapor and indoor air monitoring, maintenance of the existing cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures	mitigated with proper health and safety measures Excavation, stabilization, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers	soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no ecological or environmental impacts would be posed by this alternative	Since no construction would occur under this alternative (i.e., beyond installation/ maintenance of fencing and the cover, along with long-term monitoring), no environmental impacts would be posed by this alternative as long as protective measures are taken, as necessary	Measures implemented as part of this alternative are not expected to cause adverse environmental impacts, as long as protective measures are taken, as necessary	Measures implemented as part of this alternative are not expected to cause adverse environmental impacts, as long as protective measures are taken, as necessary	Measures implemented as part of this alternative are not expected to cause adverse ecological or environmental impacts, as long as protective measures are taken, as necessary	Measures implemented as part of this alternative are not expected to cause adverse ecological or environmental impacts, as long as protective measures are taken, as necessary
Time to Achieve RAOs	With no institutional controls or remedial measures implemented, soil COCs would likely remain at concentrations greater than PRGs for greater than 100 years	This alternative will not fully achieve RAOs Soil contamination will likely remain greater than PRGs for greater than 100 years Long-term monitoring, including for soil vapor would provide a means of assessing compliance with RAOs	This alternative will not fully achieve RAOs Soil contamination will likely remain greater that PRGs for greater than 100 years Installation of the horizontal barrier and sub-slab depressurization system on a future building constructed in the vicinity of the ESS Area #1 would achieve RAOs immediately upon start-up of the system Soil vapor and indoor air monitoring would provide a means of assessing compliance with RAOs	This alternative will not fully achieve RAOs Soil contamination will likely remain greater that PRGs for greater than 100 years RAOs for soil contaminated by TCE and asbestos removed from the site would be achieved in less than one month from initiation of excavation activities. Confirmatory soil sampling would provide a means of assessing compliance with RAOs	Institutional controls that prevent residential use, establish soil management procedures, and prohibit disturbance of the newly installed asphalt or soil cover (see below) would be immediately effective at achieving PAH, lead, and arsenic soil RAOs upon implementation PAH, lead, and arsenic-contaminated soils would be excavated to a depth of 1 ft bgs, TCE and asbestos-contaminated soils would be excavated to depths of approximately 6 ft bgs, and 4 ft bgs, respectively Excavations would be backfilled with "clean" fill and covered with an asphalt or vegetated soil cover If characteristic hazardous waste is left in place, the cap would need to be designed to meet relevant and appropriate hazardous waste standards to achieve RAOs It is estimated that these activities could be completed in approximately one to two months from initiation of excavation activities. Confirmatory soil sampling would provide a means of assessing compliance with RAOs	Institutional controls that prevent residential use and excavation of all contaminated soil that exceeds clean up standards will achieve RAOs. It is estimated that these activities could be completed in approximately two months from initiation of excavation activities Confirmatory soil sampling would provide a means of assessing compliance with RAOs

Criteria:	Alternatives

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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	Alternative SO-1: No Action	Alternative SO-2: Limited Action	Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos	Alternative SO-4: Limited Excavation	Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils	Alternative SO 6: Comprehensive Excavation and Off-Site Disposal
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative	Soil vapor implant installation and maintenance, soil vapor sampling, long-term monitoring, fence installation and maintenance, and asphalt and soil cover maintenance, are standard activities that are routinely implemented	Soil vapor implant installation and maintenance, soil vapor and indoor air sampling, long-term monitoring, asphalt cover maintenance, and installation and maintenance of a horizontal barrier and sub-slab depressurization system are standard activities that are routinely implemented and/or constructed	Soil excavation (and soil stabilization) is a standard activity that is routinely implemented.	Soil excavation (and soil stabilization) and installation of an asphalt and soil cover are standard activities that are routinely implemented	Soil excavation (and soil stabilization) is a standard activity that is routinely implemented
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative	Soil vapor implant installation and maintenance, soil vapor sampling, long-term monitoring, fence installation and maintenance, and asphalt and soil cover maintenance can be completed with proven reliable technologies.	Soil vapor implant installation and maintenance, soil vapor and indoor air sampling, long-term monitoring, asphalt cover maintenance, and installation and maintenance of a horizontal barrier and sub-slab depressurization system can be completed with proven reliable technologies.	Soil excavation (and soil stabilization) can be completed with proven reliable technologies	Soil excavation (and soil stabilization) and installation of the asphalt cap and soil cover can be completed with proven reliable technologies	Soil excavation (and soil stabilization) can be completed with proven reliable technologies
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken	Additional actions could be readily undertaken	Modifications to the sub-slab depressurization system could be added, if warranted However, subsequent excavation of soils beneath any future building would be difficult once the building was constructed	Additional soil excavation activities could be undertaken, if necessary	Additional soil excavation and cover construction activities could be undertaken, if necessary	Additional soil excavation activities could be undertaken, if necessary
Monitorability	No monitoring would be	Long-term monitoring will	Long-term monitoring will assess whether the remedy is	Confirmatory soil samples collected as part of post excavation activities would	Confirmatory soil samples collected as part of post excavation activities would allow for confirmation of adequate excavation of	Confirmatory soil samples collected as part of post excavation activities would allow for confirmation of

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Walpole, Massachusetts

Criteria: Implementability	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
	undertaken as part of this alternative other than conducting Five-Year Reviews.	assess whether the remedy is protective. Soil vapor monitoring enables the Site soil vapor (and indirectly, site soil) to be effectively monitored Quarterly inspections and 5-year reviews would enable the site development and integrity of the asphalt or soil cover to be effectively monitored Compliance with institutional controls will be evaluated at least yearly	protective Soil vapor and indoor air monitoring enable the Site soil vapor and indoor air (and indirectly, site soil) to be effectively monitored Quarterly inspections and 5-year reviews would enable the site development and integrity of the asphalt cover to be effectively monitored Compliance with institutional controls will be evaluated at least yearly	allow for confirmation of adequate excavation of PAH and asbestos-contaminated soils in the ESS Areas #1 and #2. Quarterly inspections and 5-year reviews would enable the site development to be effectively monitored. Compliance with institutional controls will be evaluated at least yearly.	soils and characterization of waste left in place below the cover Quarterly inspections and 5-year reviews would enable the site development and the condition of the asphalt and soil cover to be effectively monitored Compliance with institutional controls would be evaluated at least yearly	adequate excavation of soils Quarterly inspections and 5-year reviews would enable the site development to be effectively monitored Compliance with institutional controls would be evaluated at least yearly
Administrative Feasibility	There are no administrative issues with this alternative.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.
Availability / Capacity of Treatment / Disposal	Not applicable, as no treatment or	Several facilities are currently able to	Several facilities are currently able to accept the limited	Several facilities are currently able to accept the quantities of TCE-	Several facilities are currently able to accept the quantities of TCE, PAH, and arsenic-contaminated soil requiring off-Site	Several facilities are currently able to accept the quantities of TCE, PAH, and arsenic-contaminated soil requiring off-Site

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Implementability	Alternatives					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Facilities	disposal would occur as part of this alternative	accept the limited quantities of soils that would require off-Site treatment/disposal as part of this alternative (e g , from long-term monitoring and soil vapor implant installation).	quantities of soils that would require off-Site treatment/ disposal as part of this alternative (e.g., from long-term monitoring, soil vapor implant installation, and construction of the sub-slab depressurization system)	contaminated soil requiring off-Site treatment/ disposal as part of this alternative The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.	treatment/disposal as part of this alternative The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.	treatment/disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.
Availability of Personnel, Equipment and Materials	Personnel, equipment, and materials readily available to conduct Five-Year Reviews	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative	Technologies implemented as part of this alternative are well established	Technologies implemented as part of this alternative are well established	Technologies implemented as part of this alternative are well established	Technologies implemented as part of this alternative are well established	Technologies implemented as part of this alternative are well established

TABLE K-2
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Cost	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining *Contaminated Soils***	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Capital Cost	$0	$240,000	$150,000	$220,000	$1,100,000	$2,010,000
Total Annual O&M Cost (7% discount rate)	$0	$630,000	$200,000	$0	$540,000	$0
Total Periodic Costs (7% discount rate)	$32,000	$89,000	$180,000	$32,000	$32,000	$32,000
Total Present Value (7% discount rate)	$32,000	$960,000	$500,000	$250,000	$1,700,000	$2,040,000

1 The costs are generally rounded to two significant figures

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up All capital costs are assumed to occur in year zero for cost discounting purposes

3 "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e g., routine operation, maintenance, and monitoring)

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g , five-year reviews)

5 "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent

6 Refer to the text and appendices of this report for additional information regarding costs.

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Criteria: Overall Protection of Human Health and the Environment	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Protection of Human Health	This alternative is not protective of human health because no measures to prevent exposure to contaminated soil in the AOC would be implemented.	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, installing fencing, and maintaining the soil and asphalt covers and the Neponset River culvert to prevent exposure to contaminated soil in the AOC	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, maintaining the soil and asphalt covers and the Neponset River culvert to prevent exposure to contaminated soil and maintaining fencing This alternative also provides protection of human health by excavating contaminated soil in the Settling Basin #2 Containment Cell	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, excavating contaminated soil above the water table in the AOC and Settling Basin #2 Containment Cell, maintaining the newly-installed cover material, and maintaining fencing
Protection of the Environment	This alternative is not protective of ecological receptors because no measures to prevent exposure to contaminated soil in the AOC would be implemented	Long-term monitoring and maintenance of the soil and asphalt covers and the Neponset River culvert would provide protection of ecological receptors	Long-term monitoring and maintenance of the soil and asphalt covers and the Neponset River culvert, and excavation of contaminated soil in the Settling Basin #2 Containment Cell would provide protection of ecological receptors	Long-term monitoring, excavation of contaminated soils in the AOC and Settling Basin #2 Containment Cell, and maintenance of the cover over remaining contamination would provide protection of ecological receptors Daylighting the Neponset River through the area will benefit the environment by restoring the former river channel through the site

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
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Criteria: Compliance with ARARs	Alternatives			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal; Institutional Controls**
Chemical-Specific ARARs	This alternative does not address soil contamination, therefore, it does not comply with chemical-specific ARARs	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, security/fencing, and maintaining the existing soil and asphalt covers and Neponset River culvert	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, security/fencing, and maintaining the existing soil and asphalt covers in the soil- and asphalt-covered portions of the AOC Contaminated soil in the Settling Basin #2 Containment Cell would be excavated and disposed off-Site	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, long-term monitoring, excavating contaminated soil above the water table in the AOC and Settling Basin #2 Containment Cell and installing a cover over remaining contaminated soils
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features during monitoring and maintenance-related activities Measures would be implemented to prevent a release of contaminated media to the surface water bodies or floodplains during maintenance activities, including maintenance of the Neponset River culvert	This alternative would involve the same monitoring and maintenance-related activities as AOC-2 as well as excavation in the Settling Basin #2 Containment Cell area, which is relatively removed from wetlands, floodplains, surface water bodies, potential historic features, etc. This alternative will meet location-specific ARARs since measures will be implemented that limit potential impacts to wetlands, surface water bodies, floodplains, and potentially historic features Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains, particularly during maintenance of the Neponset River culvert.	Given the magnitude of this excavation (approximately 39,000 cubic yards of contaminated soil), removal of the 400-foot long Neponset River culvert, damming and diversion of the Neponset River, and the near proximity of wetland and floodplain environments, some impacts to wetlands, surface water, and floodplains would occur However, this alternative will meet location-specific ARARs since measures will be implemented to limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	This alternative will meet action-specific ARARs for monitoring, institutional controls, and operation and maintenance of the covers and Neponset River culvert In addition, measures would be implemented to appropriately handle asbestos-containing media If the Settling Basin #2 Containment Cell contains characteristic hazardous waste, it will be necessary to assess whether the cell meets relevant and appropriate hazardous waste standards.	This alternative would involve the same monitoring, institutional control, maintenance-related activities as AOC-2 as well as excavation in the Settling Basin #2 Containment Cell area This alternative will meet action-specific ARARs such as CWA standards associated with discharge of water to a surface water body (if necessary), closure and erosion protection related to maintaining the covers, hazardous waste standards related to generation of hazardous waste, dust control standards related to the CAA, etc , as measures would be implemented to comply with action-specific ARARs In addition, measures would be implemented to appropriately handle asbestos-containing media	This alternative will meet action-specific ARARs, including CWA standards associated with discharge of water to a surface water body (during diversion of the Neponset River), closure and erosion protection related to maintaining the cover over areas with remaining contamination (which would be installed after excavation), hazardous waste standards related to generation of hazardous waste, as measures would be implemented to comply with action-specific ARARs In addition, measures would be implemented to appropriately handle asbestos-containing media and to comply with dust control standards related to the CAA; however, the magnitude of this remedial effort will require careful attention to limit inhalation of fugitive dust containing asbestos by workers and members of the community

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Criteria: Long-Term Effectiveness and Permanence	Alternatives			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative Therefore, this alternative is neither effective, nor permanent.	Long-term monitoring, institutional controls including deed restrictions, soil management plan, and installation of fencing provide a means of removing the exposure pathway for current or potential future receptors, and hence eliminating potential risks from contaminated soil in the AOC. It is anticipated that contaminated soil would remain on-Site for greater than 100 years Contamination would remain on-Site, therefore, five-year reviews would be required	Long-term monitoring, institutional controls including deed restrictions, soil management plan, and installation of fencing provide a means of removing the exposure pathway for current or potential future receptors and hence eliminating potential risks from contaminated soil in the AOC Potential risks from contaminated soils in the Settling Basin #2 Containment Cell would be addressed by excavation and off-Site disposal Contaminated soil in the soil- and asphalt-covered portions of the AOC would remain on-Site for greater than 100 years It is estimated that soil in the Settling Basin #2 Containment Cell would be excavated in approximately two to four months from initiation of excavation activities Contamination would remain on-Site; therefore, five-year reviews would be required	Potential risks from contaminated soils in the AOC and Settling Basin #2 Containment Cell would be addressed by excavation and off-Site disposal Institutional controls would prohibit excavation of contaminated soils remaining on-Site (i e , below the water table and under buildings), unless proper precautionary measures were followed It is estimated that excavation would be completed within approximately six to 12 months of initiation of excavation activities
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative	When properly established and implemented, institutional controls, with long-term monitoring and maintenance, provide adequate and reliable measures for a long-term effective soil remedy, particularly when combined with fencing, quarterly inspections, compliance monitoring, and five-year reviews	When properly established and implemented, institutional controls, with long-term monitoring and maintenance, provide adequate and reliable measures for a long-term effective soil remedy for the AOC, particularly when combined with fencing, quarterly inspections, compliance monitoring, and five-year reviews Excavation and off-Site disposal of contaminated soil in the Settling Basin #2 Containment Cell is highly reliable and would permanently remove these contaminated soils from the Site.	Excavation and off-Site disposal of contaminated soil from the AOC and Settling Basin #2 Containment Cell is highly reliable and would permanently remove contaminated soils from the Site When properly established, implemented, and enforced, institutional controls with long-term monitoring provide adequate and reliable measures for a long-term effective soil remedy for addressing contaminated soils remaining on-Site, which would be located below the water table, or under buildings

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
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Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	Alternatives			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Treatment Process	None	None	Contaminated soil excavated as part of this alternative could be stabilized on-Site to "de-mobilize" potentially hazardous wastes, if necessary Excavated contaminated and stabilized soil would then be disposed off-Site	Contaminated soil excavated as part of this alternative could be stabilized on-Site to "de-mobilize" potentially hazardous wastes, if necessary. Excavated contaminated and stabilized soil would then be disposed off-Site
Volume Treated	None	None	Approximately 1,500 cubic yards of contaminated soil would be excavated, stabilized to demobilize characteristic hazardous waste, and disposed off-Site from the Settling Basin #2 Containment Cell	Approximately 19,000 cubic yards of contaminated soil above characteristic hazardous waste levels, located above the water table would be excavated, stabilized, and disposed off-Site from the AOC However, contaminated soil located below the water table in the soil-capped portion of the AOC would remain in place
Reduction of Toxicity, Mobility and/or Volume	None	None	There will be a reduction in toxicity, mobility, and/or volume of only a small volume of waste from the AOC which will be stabilized to demobilize contaminants Most waste will remain on-site, untreated under the soil and asphalt covers	The reduction in toxicity, mobility, and/or volume for excavated contaminated soil disposed off-Site would depend upon the volume of soil that requires stabilization.
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	Stabilized contaminated soils excavated as part of this alternative would be permanently demobilized and removed from the Site.	Contaminated soils excavated as part of this alternative would be permanently removed from the Site The volume of contaminated soil that will be permanently treated is dependent on the amount of characteristic hazardous waste identified
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	Treatment residuals are not expected from the stabilization process	Treatment residuals are not expected from the stabilization process
Attainment of Statutory Preference for Treatment	No	No	The degree to which the stabilization of contaminated soils in the Settling Basin #2 Containment Cell would satisfy the statutory preference for treatment depends on the volume of contaminated soil that contains characteristic hazardous waste Excavation and disposal of remaining soils from the Settling Basin #2 Containment Cell not requiring stabilization, as well as maintenance of the AOC soil and asphalt cover does not meet the statutory preference for treatment	The degree to which this alternative would satisfy the statutory preference for treatment depends on the amount of characteristic hazardous waste identified which will require treatment

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
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Criteria: Short-Term Effectiveness	Alternatives			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of the Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Community Protection	No additional risks beyond those posed by current conditions	No additional risks beyond those posed by current conditions.	Engineering controls to limit potential fugitive dust associated with excavation, (soil stabilization,) and maintenance of the soil and asphalt cover and Neponset River culvert would be implemented, as necessary Assuming trucks capable of carrying 20 tons of material are used to transport contaminated soil to the off-Site disposal facility, approximately 110 truckloads would be necessary to remove the contaminated soils in the Settling Basin #2 Containment Cell Given that the soils in the Settling Basin #2 Containment Cell contain asbestos, particular attention to excavating, (stabilizing) and transporting soils would be necessary Soil excavation and stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities Air monitoring would need to be performed to assess potential inhalation risks to the community In addition, contaminated soils would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet	Assuming trucks capable of carrying 20 tons of material are used to transport contaminated soil to the off-Site disposal facility, approximately 3,000 truckloads would be necessary to remove the contaminated soils in the AOC, and an approximately equal number of truckloads of backfill would be required to be brought on-Site. Assuming excavation and backfilling of soils could be completed in 12 months (approximately equivalent to 240 working days), this amounts to approximately 25 truckloads per day of soil transported, on average The AOC is located on property that is, and has been industrial for hundreds of years, however, the property surrounding the AOC is primarily residential. This is a substantial amount of traffic and asbestos-containing soils to haul through the residential neighborhoods in Walpole The magnitude of this excavation would require a high degree of care in order to protect members of the community from inhalation of asbestos fibers. While engineering controls and air monitoring (such as those described in the AOC-3 community protection description) to limit potential fugitive dust associated with excavation, soil stabilization, daylighting of the Neponset River, and transport of soil would be implemented, the community could still be affected by the excavation effort due to increased risk from additional traffic, potential failure of engineering controls to limit fugitive dust during excavation, and in particular, transport of soil Daylighting of the Neponset River would involve rerouting it during the construction in a manner that it would not pose a risk to downstream receptors Further, a construction effort of this magnitude and duration would pose adverse impacts (noise from construction activities, additional traffic, etc) during implementation on the quality of life in this area of Walpole, which is primarily residential.
Worker Protection	No additional risks beyond those posed by current conditions	Risks to workers performing fence installation/repair, soil and asphalt cover repair, maintenance of the Neponset River culvert, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures	Risks to workers performing long-term monitoring, soil sampling, excavation, (soil stabilization.) transport and disposal of soils, and maintenance of the soil and asphalt covers and Neponset River culvert can be controlled and mitigated with proper health and safety measures Excavation, (stabilization,) transport, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers	Risks to workers performing soil sampling, excavation, soil stabilization, long-term monitoring, and transport and disposal of soil can be controlled and mitigated with proper health and safety measures Excavation, stabilization, transport, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no environmental impacts would be posed by this alternative.	It is not expected that maintenance of the fence or soil and asphalt covers would pose significant environmental impacts Long-term maintenance of the Neponset River culvert will have to be conducted in a manner that will prevent environmental impacts, particularly to downstream receptors	Measures that would be implemented as part of this alternative as part of long-term monitoring and maintaining the asphalt and soil covers are not expected to engender adverse environmental impacts Long-term maintenance of the Neponset River culvert will have to be conducted in a manner that will prevent environmental impacts, particularly to downstream receptors	Given the large volume of soils to be removed (approximately 39,000 cubic yards), the fact that the Neponset River would be temporarily re-routed, and the 400-ft long aluminum culvert through which the River currently flows would be removed, the aquatic environment would be disturbed/impacted in the short-term. However, the river bank and bottom would be re-established after removal of the AOC contaminated soils and aluminum culvert

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of the Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Time to Achieve RAOs	With no institutional controls or other remedial measures implemented, contaminated soil RAOs would not be achieved	Institutional controls, maintenance of fencing, and maintenance of the soil and asphalt covers, long-term monitoring, and maintenance of the Neponset River culvert would achieve RAOs immediately upon implementation of these measures Quarterly inspections, compliance monitoring, and five-year reviews would provide a means of assessing compliance with RAOs	Institutional controls, maintenance of fencing, and maintenance of the soil and asphalt covers, long-term monitoring, and maintenance of the Neponset River culvert would achieve RAOs immediately upon implementation of these measures Quarterly inspections, compliance monitoring, and five-year reviews would provide a means of assessing compliance with RAOs. Excavation of contaminated soil in the Settling Basin #2 Containment Cell will delay attainment of RAOs by approximately two to four months after initiation of construction activities	Excavation of contaminated soil above the water table in the AOC, installation and maintenance of a soil cover over remaining contamination, institution of a soil management plan for contamination under buildings, and establishment of institutional controls would achieve RAOs within six to 12 months of initiation of construction activities

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Walpole, Massachusetts

Criteria: Implementability	Alternatives			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative	Fence repair and maintenance of the soil and asphalt covers are standard activities that are routinely implemented. Maintenance of the Neponset River culvert will be more difficult since repair may require rerouting of the river and potential disturbance of covered contaminated soil	Fence repair, maintenance of the soil and asphalt covers, soil excavation, (and soil stabilization) are standard activities that are routinely implemented. Maintenance of the Neponset River culvert will be more difficult since repair may require rerouting of the river and potential disturbance of covered contaminated soil	Soil excavation and soil stabilization are standard activities that are routinely implemented. However, the magnitude of this remedial alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated soil, removal of 400-feet of aluminum culvert, diversion of the Neponset River, etc.) would pose challenges to completing this alternative in a timely manner. Rerouting of the Neponset River during the work may also provide difficulties. Coordination of a construction effort of this magnitude is considerable.
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative	Fence repair and maintenance of the soil and asphalt covers can be completed with proven reliable technologies. Technologies to maintain the culvert are available but may be more difficult to implement	Fence repair, maintenance of the soil and asphalt covers, soil excavation, and soil stabilization can be completed with proven reliable technologies. Technologies to maintain the culvert are available but may be more difficult to implement	Excavation and soil stabilization can be completed with proven reliable technologies. Technologies to reroute the Neponset River are available but may be difficult to implement
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Additional actions could be undertaken. However, after the river and river bank are restored and the excavations are backfilled, deeper excavations would require substantial effort
Monitorability	No monitoring would be undertaken as part of this alternative other than conducting Five-Year Reviews.	The integrity of the fence, Neponset River culvert, and the soil and asphalt cover would be assessed during quarterly inspections and five-year reviews, and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls	Construction observation would allow for confirmation of adequate excavation of contaminated soils from the Settling Basin #2 Containment Cell. The integrity of the fence and the soil and asphalt cover would be assessed during quarterly inspections and five-year reviews, and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls	Construction observation would allow for assessment of adequate excavation of contaminated soils. The integrity of the fence and cover would be assessed during quarterly inspections, long-term monitoring, and five-year reviews, and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls.
Administrative Feasibility	There are no administrative issues with this alternative, other than conducting Five-Year Reviews.	Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement	Given the magnitude of this remedial alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated soil, removal of 400 feet of aluminum culvert, etc.) the administrative feasibility of implementing this alternative would be substantial. Implementation of AOC-4 would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site, and property access to affected properties. Cooperation with surrounding property owners and local health authorities would be necessary to protect members of the community from inhalation of asbestos fibers. In addition, on-going traffic control would be necessary given the amount of construction-related traffic at the Site. Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative	No treatment would occur as part of this alternative. There may be some potential disposal of waste generated by monitoring or operation and maintenance.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soils in Massachusetts is limited. However, there are currently treatment/disposal facilities in the greater New England area that can accept this volume of asbestos-containing soils. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soils in Massachusetts is limited, particularly considering the volume of soils (approximately 39,000 cubic yards) that would be excavated under the AOC-4 alternative. However, there are currently treatment/disposal facilities in the greater New England area that can accept this volume of asbestos-containing soils. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Availability of Personnel, Equipment, and Materials	Personnel, equipment, and materials readily available to conduct Five-Year Reviews	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative	The magnitude of this remedial alternative would require substantial coordination to provide adequately trained personnel and appropriate equipment and materials for implementation
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established	Technologies that would be implemented as part of this alternative are well established.

TABLE K-3
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Capital Cost	$0	$15,000	$500,000	$12,000,000
Total Annual O&M Cost (7% discount rate)	$0	$330,000	$330,000	$330,000
Total Periodic Costs (7% discount rate)	$32,000	$67,000	$67,000	$67,000
Total Present Value (7% discount rate)	$32,000	$412,000	$900,000	$12,000,000

1 The costs are generally rounded to two significant figures

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3 "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e g , routine operation, maintenance, and monitoring)

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e g , five-year reviews)

5 "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent

6. Refer to the text and appendices of this report for additional information regarding costs.

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Protection of Human Health	This alternative is not protective of human health because no measures to prevent exposure to soil and sediment that has contaminant levels exceeding human health risk standards would be implemented	This alternative does not provide protection of human health since establishing institutional controls and fencing is not sufficient to prevent exposure to contaminated sediment and soil	This alternative does not fully provide protection of human health Excavation of contaminated soils and sediments in the Former Mill Tailrace and along the Neponset River will be protective However, the aqueous cap on Lewis Pond may not provide protection from exposure to asbestos-contaminated sediments and will not be protective against the release of hazardous waste that may be in the pond sediments.	This alternative provides protection of human health Excavation of contaminated soils and sediments in the Former Mill Tailrace and along the Neponset River will remove all contamination that poses a risk Capping of Lewis Pond sediment will be protective as long as an engineered cap can prevent the release of asbestos, as well as any hazardous waste present	This alternative provides protection of human health by excavating and disposing off-site all contaminated soils/sediments that pose a risk to human health
Protection of the Environment	Not applicable as there are no "actionable" ecological risks for soils or sediment from this portion of the Site	Not applicable as there are no "actionable" ecological risks for soils or sediment from this portion of the Site	Not applicable as there are no "actionable" ecological risks for soils or sediment from this portion of the Site	Not applicable as there are no "actionable" ecological risks for soils or sediment from this portion of the Site	Not applicable as there are no "actionable" ecological risks for soils or sediment from this portion of the Site

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
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Criteria: Compliance with ARARs	Alternatives				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Chemical-Specific ARARs	This alternative does not address soil/sediment contamination risks, therefore, it does not comply with chemical-specific ARARs.	This alternative will not meet the chemical-specific ARARs since potential risks/hazards would not be addressed by establishing institutional controls and installing fencing to preclude access to soil/sediment with COC concentrations greater than PRGs, particularly in an active residential setting	This alternative will meet the chemical-specific ARARs in excavation areas in the Former Mill Tailrace and along the Neponset River However, chemical-specific standards will not be addressed by only establishing institutional controls and maintaining the water levels in Lewis Pond.	This alternative will meet the chemical-specific ARARs in excavation areas in the Former Mill Tailrace and along the Neponset River Chemical-specific standards will also be met in Lewis Pond as long as the engineered cap can be constructed and maintained in a manner that will prevent release of contamination	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by excavating/dredging soil/sediment exceeding these standards
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	Given that the active remedial activities for this alternative are installation and maintenance of fencing and long-term monitoring, this alternative will meet location-specific ARARs that restrict impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e.g., potentially the West Street Dam and Former Mill Tailrace) This alternative does not include any measures that prevent a release of contaminated media to surface water bodies or floodplains	This alternative will meet location-specific ARARs for remedial actions in the Former Mill Tailrace and along the Neponset River since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features In Lewis Pond, maintenance of the aqueous cap through operation of the pond's dam would be conducted in a manner to meet all location-specific standards, however, if hazardous waste is present in Lewis Pond sediments, relevant and appropriated hazardous waste standards would not be met	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e g , potentially the West Street Dam) due to excavation/dredging activities Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains The engineered cap over the Lewis Pond sediments will meet these standards only if it can be constructed and maintained in a manner that will prevent release of contamination and that will mitigate for lost flood storage capacity from Lewis Pond, so as to not pose a threat to downstream resources	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e g , potentially the West Street Dam) due to excavation and/or dredging activities Measures would be implemented to prevent a release of contaminated media to the surface water bodies or floodplains.
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative	Since this alternative leaves asbestos and hazardous wasted in place without controls, it will not meet action-specific ARARs associated with hazardous waste standards, dust control standards related to the CAA, or asbestos-containing media handling standards	Action-specific ARARs will be met during the excavation of contaminated soils/sediments in the Mill Tailrace and along the Neponset River, including measures to protect water quality and properly handle hazardous waste and asbestos If hazardous waste is present in Lewis Pond sediments, this alternative will not meet relevant and appropriate hazardous waste standards.	Action-specific ARARs will be met during the excavation of contaminated soils/sediments in the Former Mill Tailrace and along the Neponset River, including measures to protect water quality and properly handle hazardous waste and asbestos If hazardous waste is present in Lewis Pond sediments, this alternative would be implemented and maintained to ensure the engineered cap complies with the relevant and appropriate portions of RCRA post closure standards In addition, measures would be implemented to appropriately manage and handle asbestos-containing media	Action-specific ARARs will be met during the excavation of contaminated soils/sediments, including measures to protect water quality and properly handle hazardous waste and asbestos

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
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Criteria: Long-Term Effectiveness and Permanence	Alternatives				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative Therefore, this alternative is neither effective, nor permanent	Institutional controls including deed restrictions, and installation of fencing provide only limited means of removing the exposure pathway for current or potential future receptors, and hence eliminating potential risks from lead in soil on Lot #33-257 (active residential), and from asbestos and potentially hazardous waste impacted soils and sediment in the remainder of this remedial area It is anticipated that lead-impacted soils on Lot 33-257 and asbestos and hazardous waste-impacted soils and sediments on the rest of this portion of the Site would remain on-Site for greater than 100 years Contamination would remain in place on-Site, therefore, five-year reviews would be required	No residual risk will remain in the Former Mill Tailrace and along the Neponset River after excavation/dredging Excavated or dredged soils/sediment would be disposed off-Site Asbestos-impacted and potentially hazardous waste contaminated sediments would remain in Lewis Pond Pre-design studies would be necessary to assess if the aqueous cap and institutional controls are adequate to prevent asbestos fibers from becoming airborne and to identify whether elevated sediment contamination exceeds characteristic hazardous waste standards It is estimated that soils/sediments would be excavated/dredged and modifications to the West Street Dam would be completed within approximately three to four months of initiation of excavation/dredging and dam reconstruction activities Asbestos and potential hazardous waste contaminated sediments would remain on-Site at Lewis Pond, therefore, five-year reviews would be required.	No residual risk will remain in the Former Mill Tailrace and along the Neponset River after excavation/dredging. Excavated or dredged soils/sediment would be disposed off-Site Asbestos-impacted and potentially hazardous waste contaminated sediments would remain in Lewis Pond and would be addressed by installing an engineered cap (e g , concrete revetment with vegetated soil/sediment cover) over these sediments to preclude inhalation of asbestos fibers or contact with hazardous waste present in sediment. Institutional controls and long-term monitoring would help ensure the cap remains protective It is estimated that soils/sediments would be excavated/dredged and construction of the cap would be completed within approximately two to four months from initiation of excavation/dredging and cap construction activities. Contaminated sediments would remain on-Site at Lewis Pond, therefore, five-year reviews would be required.	Potential risks to a current or future resident from contaminated soils/sediments would be addressed by excavation Excavated or dredged soils/sediment would be disposed off-Site It is estimated that soil/sediment excavation/dredging would be completed within approximately two to four months of initiation of excavation activities
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative.	Institutional controls can be difficult to implement on residential properties, so are not adequate to ensure the protectiveness of the remedy in this area.	Excavation and off-Site disposal of soil and sediment from the Neponset River Lot 33-257 and Lot 33-360, and the Former Mill Tailrace is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site. The adequacy of preventing inhalation of asbestos fibers present in Lewis Pond sediment by keeping these sediments wet and/or covered with water would need to be further *evaluated as a pre-design measure* Similarly, the reliability of the water level controls provided by the West Street Dam (whether automated or manual) would also need to be further evaluated as a pre-design measure The presence of contaminant levels exceeding hazardous waste standards in Lewis Pond sediments would also need to be assessed	Excavation and off-Site disposal of soil and sediment from the Neponset River Lot 33-257and Lot 33-360, and the Former Mill Tailrace is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site Capping of asbestos-impacted sediments with concrete revetments with vegetated soil/sediment cover is a highly reliable means of preventing inhalation of asbestos fibers and exposure to potential hazardous waste from Lewis Pond sediments, particularly when combined with routine inspections, long-term monitoring, institutional controls, and as necessary, maintenance of the capped areas.	Excavation/dredging and off-Site disposal of lead- and asbestos-contaminated soil/sediment is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	Alternatives				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Treatment Process	None	None	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary Excavated soil/sediment would then be disposed off-Site	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary Excavated soil/sediment would then be disposed off-Site	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary Excavated soil/sediment would then be disposed off-Site
Volume Treated	None	None	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons) and 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace would be excavated/dredged, stabilized, and disposed off-Site	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons) and 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace would be excavated/dredged, stabilized, and disposed off-Site	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons), 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace, and 3,600 cubic yards (6,300 tons) from Lewis Pond would be excavated/dredged, stabilized, and disposed off-Site
Reduction of Toxicity, Mobility and/or Volume through Treatment	None	None	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal There would be no treatment of contaminated sediment in Lewis Pond.	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment disposed off-Site would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal There would be no treatment of contaminated sediment in Lewis Pond.	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment disposed off-Site would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal.
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	The stabilization of soil/sediment from the Former Mill Tailrace and the Neponset River would permanently demobilize characteristic hazardous wastes prior to off-site disposal Remaining contaminated soils and sediments would not be treated	The stabilization of soil/sediment from the Former Mill Tailrace and the Neponset River would permanently demobilize characteristic hazardous wastes prior to off-site disposal Remaining contaminated soils and sediments would not be treated	The stabilization of soil/sediment would permanently demobilize characteristic hazardous wastes prior to off-site disposal Remaining contaminated soils and sediments removed from the Site would not be treated
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	No residuals are expected from the stabilization process	No residuals are expected from the stabilization process	No residuals are expected from the stabilization process
Attainment of Statutory Preference for Treatment	No	No	The degree to which the excavation/dredging with off-Site disposal portion of this alternative would satisfy the statutory preference for treatment depends on the volume of contaminated soil/sediment stabilized Soils/sediments not stabilized prior to off-site disposal and contaminated sediments left in place under an aqueous cap over Lewis Pond would not satisfy the statutory preference for treatment	The degree to which the excavation/dredging with off-Site disposal portion of this alternative would satisfy the statutory preference for treatment depends on the volume of contaminated soil/sediment stabilized Soils/sediments not stabilized prior to off-site disposal and contaminated sediments left in place under a cap in Lewis Pond would not satisfy the statutory preference for treatment	The degree to which this alternative would satisfy the statutory preference for treatment, depends on the volume of contaminated soil/sediment stabilized. Soils/sediments not stabilized prior to off-site disposal would not satisfy the statutory preference for treatment

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
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Criteria: Short-Term Effectiveness	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Community Protection	No additional risks beyond those posed by current conditions	No additional risks beyond those posed by current conditions	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, dam maintenance or construction activities, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soil/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 65 truckloads would be necessary to remove soil/sediment from Lot 33-257, Lot 33-360, and the Former Mill Tailrace. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, construction of the cap, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soils/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 65 truckloads would be necessary to remove soil/sediment from Lot 33-257, Lot 33-360, and the Former Mill Tailrace. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soils/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 380 truckloads would be necessary to remove soil/sediment from the Site. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.
Worker Protection	No additional risks beyond those posed by current conditions	Risks to workers performing fence installation/repair, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, backfilling/wetlands mitigation, long-term monitoring and construction/maintenance of the West Street Dam can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, backfilling/wetlands mitigation, and construction/maintenance of the cap can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, and backfilling/wetlands mitigation can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no environmental impacts would be posed by this alternative	Long-term monitoring and installation/maintenance of fencing would not pose significant environmental impacts.	Approximately 1,200 square feet of wetland in the Former Mill Tailrace would be disturbed or destroyed as part of the excavation/dredging activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. Since the water level that would be maintained in Lewis Pond is generally consistent with typical water levels currently in Lewis Pond, no significant environmental impacts would be posed by maintaining the water level in Lewis Pond at an elevation of 140 ft AMSL. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment. There would be potential environmental impacts if sediments exceeding hazardous waste standards are left in place in Lewis Pond.	Approximately 47,600square feet of wetland in the Former Mill Tailrace and Lewis Pond would be disturbed or destroyed as part of the excavation/dredging /capping activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. The concrete cap would be installed with a soil/sediment cover and re-vegetated, however, potential environmental impacts would need to be further evaluated as part of pre-design investigations. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment.	Approximately 47,600 square feet of wetland in the Former Mill Tailrace and Lewis Pond would be disturbed or destroyed as part of the excavation/dredging activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment.

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	Alternatives				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Time to Achieve RAOs	With no institutional controls or active remedial measures implemented, soil/sediment RAOs would not be achieved.	Institutional controls and installation of fencing would not achieve soil/sediment RAOs since site risks would not be adequately addressed Quarterly inspections, long-term monitoring, and five-year reviews would provide a means of assessing compliance with RAOs	RAOs for soil/sediment on Lot 33-257, Lot 33-360, and the Former Mill Tailrace would be achieved within approximately one month of initiation of excavation/dredging activities, establishment and maintenance of the newly reconstructed wetlands would be on-going after this Maintenance of water levels in Lewis Pond would achieve sediment RAOs in Lewis Pond within approximately three to four months of initiation of construction activities associated with modifying the West Street Dam, as long as no characteristic hazardous wastes are present in Lewis Pond sediments Quarterly inspections, compliance monitoring of institutional controls, five-year reviews, long-term monitoring, and maintenance of the West Street Dam would provide a means of assessing continued compliance with RAOs	RAOs for soil/sediment on Lot 33-257, Lot 33-360, and the Former Mill Tailrace would be achieved within approximately one month of initiation of excavation/dredging activities, establishment and maintenance of the newly reconstructed wetlands would be on-going after this RAOs for Lewis Pond sediment would be achieved within approximately two to four months of initiation of construction activities associated with installing the capping material, establishment and maintenance of the newly reconstructed wetlands would be on-going after this Quarterly inspections, long-term monitoring, compliance monitoring of institutional controls, five-year reviews, and maintenance of the cap would provide a means of assessing continued compliance with RAOs	RAOs for soil/sediment would be achieved within approximately two to four months of initiation of excavation/dredging activities, establishment and maintenance of the newly reconstructed wetlands would be on-going for a period of 1 to 2 years after this

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative	Long-term monitoring and fence installation and repair is a standard activity that is routinely implemented	Long-term monitoring, soil/sediment excavation/dredging, soil/sediment stabilization, and dam construction/modification/maintenance are standard activities that are routinely implemented and/or constructed The ability to adequately operate the West Street Dam in a manner that reliably maintains water levels in Lewis Pond would be further evaluated as a pre-design measure	Soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, and installation of capping materials are standard activities that are routinely implemented and/or constructed.	Soil/sediment excavation/dredging and soil/sediment stabilization are standard activities that are routinely implemented and/or constructed
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative	Long-term monitoring and fence installation and maintenance can be completed with proven reliable technologies	Long-term monitoring, soil/sediment excavation/dredging, (soil/sediment stabilization,) and dam construction/ modification/maintenance can be completed with proven reliable technologies The reliability of maintenance of the Lewis Pond water level at precluding air-borne transport and potential inhalation of asbestos fibers from Lewis Pond sediment would be further evaluated as a pre-design measure.	Soil/sediment excavation/dredging, long-term monitoring, soil/sediment stabilization, and installation of capping materials can be completed with proven reliable technologies	Soil/sediment excavation/dredging and soil/sediment stabilization can be completed with proven reliable technologies.
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken	Additional actions could be readily undertaken.	Additional actions could be readily undertaken, if necessary	Subsequent excavation of soils beneath the engineered cap would be difficult once the cap was constructed	Additional actions could be readily undertaken, if necessary
Monitorability	No monitoring would be undertaken as part of this alternative, except for conducting Five-Year Reviews	Long-term monitoring, quarterly inspections and five-year reviews would ensure that the integrity of the fence be maintained There would be yearly monitoring of compliance with institutional controls.	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/ dredging of soils/sediment Periodic dam inspections, quarterly inspections, long-term monitoring, and five-year reviews would enable the adequacy of the aqueous cap to be effectively monitored There would be yearly monitoring of compliance with institutional controls	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/dredging of soils/sediment. Quarterly inspections, long-term monitoring, and five-year reviews would enable the adequacy of the cap to be effectively monitored There would be yearly monitoring of compliance with institutional controls	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/dredging of soils/sediment.
Administrative Feasibility	There are no administrative issues with this alternative	Establishment of institutional controls and continued access to Site requires the cooperation of affected property owners Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement	Establishment of institutional controls and access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement Work in and around the Neponset River and wetlands and management of water levels on Lewis Pond would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas both on and downstream of the Site	Establishment of institutional controls and access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement Work in and around the Neponset River and wetlands would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site Coordination with management agencies may also be required if management of the Lewis Pond dam is required to construct or maintain the engineered cap	Work in and around the Neponset River and wetlands would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site, and would also require property access to affected properties Coordination with management agencies may also be required if management of the Lewis Pond dam is required to implement the sediment removal

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace: Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative	Several facilities are currently able to accept the relatively minor volume of soil/sediment potentially generated as part of monitoring, fence installation and/or maintenance	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England
Availability of Personnel, Equipment, and Materials	Personnel, equipment, or materials would be available to conduct Five-Year Reviews	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative	Personnel, equipment, and materials are generally available for implementation of this alternative
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative	Technologies that would be implemented as part of this alternative are well established	Technologies that would be implemented as part of this alternative are well established	Technologies that would be implemented as part of this alternative are well established	Technologies that would be implemented as part of this alternative are well established

TABLE K-4
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Alternatives				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Capital Cost	$0	$310,000	$1,000,000	$1,400,000	$3,100,000
Total Annual O&M Cost (7% discount rate)	$0	$190,000	$230,000	$110,000	$0
Total Periodic Costs (7% discount rate)	$32,000	$82,000	$43,000	$46,000	$14,000
Total Present Value (7% discount rate)	$32,000	$580,000	$1,300,000	$1,600,000	$3,100,000

1 The costs are generally rounded to two significant figures

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes

3 "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e g., routine operation, maintenance, and monitoring).

4 "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e g, five-year reviews)

5 "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent

6 Refer to the text and appendices of this report for additional information regarding costs

TABLE K-5

Summary of Costs for Remedial Alternatives SW-1 through SW-3
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Present Worth Analysis**		
	SW-1: No Action	**SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Capital Cost	$0	$90,000	$1,700,000
Total Annual O&M Cost (7% discount rate)	$0	$2,100,000	$5,100,000
Total Periodic Cost (7% discount rate)	$32,000	$160,000	$120,000
Total Present Value (7% discount rate)	$32,000	$2,400,000	$7,000,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SW-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE K-6

Summary of Costs for Remedial Alternatives SO-1 through SO-6
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Present Worth Analysis					
	SO-1: No Action	**SO-2: Limited Action**	**SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**SO-4: Limited Excavation**	**SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**SO-6: Comprehensive Excavation and Off-Site Disposal**
Capital Cost	$0	$240,000	$150,000	$220,000	$1,100,000	$2,010,000
Total Annual O&M Cost (7% discount rate)	$0	$630,000	$200,000	$0	$540,000	$0
Total Periodic Cost (7% discount rate)	$32,000	$89,000	$180,000	$32,000	$32,000	$32,000
Total Present Value (7% discount rate)	$32,000	$960,000	$500,000	$250,000	$1,700,000	$2,040,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SO-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE K-7

Summary of Costs for Remedial Alternatives AOC-1 through AOC-4
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Present Worth Analysis**			
	AOC-1: No Action	**AOC-2: Limited Action**	**AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Capital Cost	$0	$15,000	$500,000	$12,000,000
Total Annual O&M Cost (7% discount rate)	$0	$330,000	$330,000	$330,000
Total Periodic Cost (7% discount rate)	$32,000	$67,000	$67,000	$67,000
Total Present Value (7% discount rate)	$32,000	$412,000	$900,000	$12,000,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for AOC-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE K-8

Summary of Costs for Remedial Alternatives SSW-1 through SSW-5
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Present Worth Analysis**				
	SSW-1: No Action	**SSW-2: Limited Action**	**SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Capital Cost	$0	$310,000	$1,000,000	$1,400,000	$3,100,000
Total Annual O&M Cost (7% discount rate)	$0	$190,000	$230,000	$110,000	$0
Total Periodic Cost (7% discount rate)	$32,000	$82,000	$43,000	$46,000	$14,000
Total Present Value (7% discount rate)	$32,000	$580,000	$1,300,000	$1,600,000	$3,100,000

1. The costs are generally rounded to two significant figures

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6 Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SSW-1 (five-year reviews) taken from those calculated for other alternatives

Table L-1: Soil Cleanup Levels for the Protection of Human Health				
East of South Street On-Facility area (SB-09 area), Soil (0-10')				
Carcinogenic Chemical of Concern	**Cancer Classification**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Risk (4)**
Trichloroethene - vapor intrusion (1, 2)	B1	0.065	risk (3)	0.0000067 (5)
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Hazard Quotient**
Trichloroethene - vapor intrusion (1, 2)	*Neurological; Hepatic; Endocrine*	0.065	risk (3)	0.02 (6)
East of South Street On-Facility and the Old Railroad and Former Lower Mill Pond areas, Soil (0-10')				
Carcinogenic Chemical of Concern	**Cancer Classification**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Risk**
Benzo(a)anthracene	B2	5.1	risk	1E-05
Benzo(a)pyrene	B2	2	Background	4E-05
Benzo(b)fluoranthene	B2	5.1	risk.	1E-05
Dibenz(a,h)anthracene	B2	0.51	risk	1E-05
Indeno(1,2,3-cd)pyrene	B2	5.1	risk	1E-05
Arsenic	A	20	Background	2E-05
Asbestos	A	Less than 1%, would not contribute to a cumulative ILCR > 1E-04 through dust inhalation pathway	ARAR and risk	6E-06
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Hazard Quotient**
Arsenic	Integumental; Cardiovascular	20	Background	0.41
Residential Lot 33-257, Soil (0-10')				
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Hazard Quotient**
Lead	Developmental	400	IEUBK	N/A (7)

Key

1. Based on inhalation of indoor air following modeling from soil gas data. Soil gas concentrations were back-modeled to soil concentrations using the Johnson & Ettinger model and site-specific information
2. Based on the upper range of the unit risk estimates proposed by EPA (1.1E-04 per ug/m^3).
3. Interim Cleanup Level for TCE based on an ILCR of 10^{-5} for the site worker as the most sensitive receptor for indoor air exposures
4. Risk and hazard quotients presented are for a future day care child, unless otherwise noted
5. Risk presented is for a future day care child; risk for future site worker is 10^{-5}
6. Hazard quotient presented is for a future day care child; the hazard quotient for a future site worker is also 0.02.
7. Interim Cleanup Level is protective of a young child (age < 2 years), based on residential use of Lot 33-257

Cancer Classification

A - Human carcinogen

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

B2 - Probable human carcinogen -

Table L-1: Soil Cleanup Levels for the Protection of Human Health	
ARAR - Applicable and Relevant and Appropriate Requirements	indicates sufficient evidence in animals
IEUBK - Integrated Exposure Uptake Biokinetic Model for Lead in Children	and inadequate or no evidence in humans
N/A - Not Applicable	
RME - Reasonable Maximum Exposure	

TABLE L-1A
Well Sampling Locations
Blackburn and Union Privileges Site

Sample Collection Location	Points of Compliance Monitoring Location	Source Area Monitoring Location	Down- or Side-Gradient of Compliance Boundary Monitoring Location	Background Monitoring Location
SHALLOW MONITORING WELLS				
SH-01S		X		
SH-05S			X	
SH-11S			X	
SH-14S			X	
SH-23S				X
SH-24S	X			
SH-25S			X	
SH-27S	X			
SH-28S	X			
WP-03			X	
DEEP MONITORING WELLS				
SH-01D		X		
SH-17D			X	
SH-19D				X
SH-25D			X	
SH-27D	X			
SH-28D	X			
BEDROCK MONITORING WELLS				
SH-01R		X		
SH-17R		X		
SH-19R				X
SH-24 R	X			
SH-27R	X			
SH-28R	X			
SURFACE WATER SAMPLE LOCATIONS				
SW-102				X
SW-103	X			
SW-105	X			
SW-107	X			
SW-108	X			

Table L-2: Groundwater Performance Standards - Residential Scenario				
Carcinogenic Chemical of Concern	**Cancer Classification**	**Performance Standard (ug/L)**	**Basis**	**RME Risk**
Benzene	A	5	MCL	7E-06
Ethylbenzene	Likely	700	MCL	4E-05
Methylene chloride	B2	5	MCL	6E-07
Trichloroethene	B1	5	MCL	6E-05
Benzo(a)anthracene	B2	0.1	PQL	2E-06
Benzo(a)pyrene	B2	0.2	MCL	4E-05
Benzo(b)fluoranthene	B2	0.1	PQL	2E-06
bis(2-Ethylhexyl)phthalate	B2	6	MCL	3E-06
Carbazole	B2	1.8	risk	1E-06
Dibenz(a,h)anthracene	B2	0.1	PQL	2E-05
Indeno(1,2,3-cd)pyrene	B2	0.1	PQL	2E-06
Arsenic	A	10	MCL	3E-04
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Performance Standard (ug/L)**	**Basis**	**RME Hazard Quotient**
Benzene	Hematological; Immunological	5	MCL	2E-01
Ethylbenzene	Hepatic; Renal	700	MCL	1E+00
Toluene [1]	Renal; Hepatic	1000	MCL	8E-01
Trichloroethene	*Hepatic; Renal; Developmental; Immunological*	5	MCL	2E+00
Styrene [1]	Hematological; Hepatic; Renal	100	MCL	6E-02
bis(2-Ethylhexyl)phthalate	Hepatic	6	MCL	6E-02
2-Methylnaphthalene [2]	Respiratory	5	HQ	1E+00
4-Methylphenol	Neurological; Respiratory, Developmental; Whole Body	49	HQ	1E+00
Naphthalene [2]	Whole Body	6	HQ	1E+00
Antimony	Whole Body; Hepatic	6	MCL	1E+00
Arsenic	Integumental, Cardiovascular	10	MCL	3E+00
Chromium	None observed	100	MCL	5E+00
Lead	Developmental	15	MCL	N/A
Manganese	Neurological	300	Health Advisory	1E+00
Nickel	Whole Body; Hepatic	210	HQ	1E+00
Vanadium	Renal	45	HQ	1E+00
Zinc	Blood	3100	HQ	1E+00
pH [3]	N/A	< 8.5	MCL [3]	N/A

Key

Health Advisory - Lifetime Health Advisory presented in EPA-822-R-04-005; Winter 2004

HQ - Hazard Quotient

MCL - Maximum Contaminant Level

NA - Not applicable

RME - Reasonable Maximum Exposure.

1. This contaminant did not exceed a hazard quotient of 1 during calculations However, the maximum detected concentration exceeded its MCL. *Therefore, the performance standard has been established as the MCL.*
2. Performance Standard presented includes ingestion, dermal contact, and inhalation pathways.
3. Unit for pH is s.u. (standard units); Value is secondary MCL (6 5 - 8 5); Because elevated pH conditions are the concern at this site, the PRG is stated as <8.5

<u>Cancer Classification</u>

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

Table L-3: Sediment Cleanup Levels for the Protection of Human Receptors				
Lewis Pond and Former Mill Tailrace				
Carcinogenic Chemical of Concern	**Cancer Classification**	**Interim Cleanup Level (mg/kg)**	**Basis**	**RME Risk**
Asbestos	A	Less than 1%; would not contribute to a cumulative ILCR > 1E-04 through dust inhalation pathway	ARAR and risk	N/A

Key

ARAR - Applicable and Relevant and Appropriate Requirements

RME - Reasonable Maximum Exposure

N/A - Not Applicable

ILCR - Incremental Lifetime Cancer Risk

Cancer Classification

A - Human carcinogen

Table L-4a: Surface Water Cleanup Levels - Wader Scenario				
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Interim Cleanup Level (s.u.)**	**Basis**	**RME Hazard Quotient**
pH	N/A	6.5 - 8.3	Massachusetts Surface Water Quality Regulations	N/A

Key

N/A - Not Applicable

s.u. - standard units

Table L-4b: Surface Water Cleanup Levels for the Protection of Ecological Receptors						
Habitat Type/Name	**Exposure Medium**	**COC**	**Protective Level**	**Units**	**Basis**	**Assessment Endpoint**
Former Mill Tailrace and Lewis Pond	Surface Water	Aluminum	87 (1)	ug/L	NRWQC - Freshwater Aquatic Life	Survival and growth of potential fish and invertebrate communities
		Copper	4.4 (2)	ug/L	NRWQC - Freshwater Aquatic Life	
		Lead	1 (2)	ug/L	NRWQC - Freshwater Aquatic Life	
		pH	6.5 - 8.3	s.u.	Massachusetts Surface Water Quality Regulations	

Notes:

s.u. - standard units
COC - Chemical of Concern
NRWQC - National Recommended Water Quality Criterion
1. Expressed as total recoverable metal.
2. NRWQC is hardness dependent; a hardness of 44 mg/L for the Neponset River is assumed.

TABLE L-5
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	$86,000
Installation of Groundwater Treatment System	
Contractor	
Treatment System Equipment Installation	$210,000
Instrumentation	$54,000
Electrical	$180,000
Water Supply	$16,000
Treatment Building	$120,000
Subtotal, Contractor	$570,000
Engineer	$100,000
Subtotal, Installation of Groundwater Treatment System	$670,000
Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall	
Contractor	
Mobilization/Demobilization	$4,300
Extraction Trench Excavation & Dewatering	$36,000
Extraction Trench Construction & Backfill	$45,000
Underground Piping Excavation	$21,000
Underground Piping Placement & Backfill	$3,100
Surface Water Discharge Outfall	$10,000
Soil Stabilization	$9,243
Transportation/Disposal	$37,000
Site Restoration	$79
Subtotal, Contractor	$170,000
Engineer	$25,000
Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall	$190,000
Post-Construction Submittals/As-Builts	$43,000
Subtotal, Construction Activities	$990,000
Scope Contingency (15% of Construction Activities Subtotal)	$150,000
Bid Contingency (15% of Construction Activities Subtotal)	$150,000
Subtotal, Construction Activities with Contingencies	**$1,300,000**
Professional/Technical Services	
Project Management (6% of Construction Activities Subtotal w/Contingencies)	$78,000
Remedial Design (12% of Construction Activities Subtotal w/Contingencies)	$160,000
Construction Management (8% of Construction Activities Subtotal w/Contingencies)	$100,000
Subtotal, Professional/Technical Services	**$340,000**

TABLE L-5
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Institutional Controls	
Establish Deed Restrictions	$50,000
Subtotal, Institutional Controls	**$50,000**
TOTAL, CAPITAL COSTS	**$1,700,000**
ANNUAL O&M COSTS	
O&M Activities	
Groundwater Treatment System O&M	
Contractor	$89,000
Utilities	$5,000
Engineer	$16,000
Laboratory	$21,000
Subtotal, Groundwater Treatment System O&M	$130,000
Annual Maintenance/Repair Activities	
Contractor	$3,000
Engineer	$1,100
Subtotal, Annual Maintenance/Repair Activities	$4,200
Groundwater and Surface Water Monitoring	
Engineer	
Preparation/Mobilization/Demobilization	$8,600
Water Level Gauging Event	$3,900
Sampling Event	$46,000
Investigation-Derived Waste Disposal	$2,000
Subtotal, Engineer	$60,000
Laboratory	$13,000
Contractor	$9,600
Subtotal, Groundwater and Surface Water Monitoring	$83,000
Subtotal, Annual O&M Activities Costs	$220,000
Scope Contingency (15% Annual O&M Activities Subtotal)	$33,000
Bid Contingency (15% Annual O&M Activities Subtotal)	$33,000
Subtotal, O&M Activities with Contingencies	**$290,000**
Professional/Technical Services	
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)	$29,000
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)	$44,000
Subtotal, Professional/Technical Services	**$73,000**
TOTAL, ANNUAL O&M COSTS	**$360,000**

TABLE L-5
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PERIODIC COSTS	
Construction/O&M	
Every 5 Years O&M Activities	
Periodic Maintenance/Repair Activities (every 5 years)	
Contractor	
Monitoring Well Decommisioning & Replacement	$9,800
Update Elevation Survey	$2,800
Subtotal, Contractor	$13,000
Engineer	$9,900
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)	$22,000
Subtotal, Every 5 Year O&M Activities	$22,000
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)	$3,300
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)	$3,300
Subtotal, Every 5 Year O&M Activities with Contingencies	$29,000
Year 100 Construction/O&M Activities	
Decomissioning of Monitoring Network (year 100 only)	
Contractor	$82,000
Engineer	$68,000
Subtotal, Decomissioning of Monitoring Network (year 100 only)	$150,000
Decomissioning of Groundwater Treatment System (year 100 only)	
Contractor	
Decomission Treatment System Equipment & Building	$65,000
Decomission Utilities	$48,000
Decomission Extraction Trench, Piping & Discharge Outfall	$34,000
Subtotal, Contractor	$150,000
Engineer	$32,000
Subtotal, Decomissioning of Groundwater Treatment System (year 100 only)	$180,000
Subtotal, Year 100 Construction/O&M Activities	$330,000
Scope Contingency (15% of Year 100 O&M Activities Subtotal)	$50,000
Bid Contingency (15% of Year 100 O&M Activities Subtotal)	$50,000
Subtotal, Year 100 Construction/O&M Activities with Contingencies	$430,000
Subtotal, Periodic Construction/O&M Costs	**$460,000**
Professional/Technical Services	
Project Management (10% of Periodic O&M Activities Subtotal w/Contingencies)	$46,000
Technical Support (15% of Periodic O&M Activities Subtotal w/Contingencies)	$69,000
Five-Year Review	$13,000
Subtotal, Professional/Technical Services	**$130,000**
TOTAL, PERIODIC COSTS	**$590,000**

TABLE L-5
Cost Estimate Summary for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

Type of Cost	Year	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	$1,700,000	$1,700,000	1	$1,700,000
Annual O&M Costs	1-100	$36,000,000	$360,000	14.3	$5,140,000
Periodic Costs	5	$49,000	$49,000	0 713	$35,000
Periodic Costs	10	$49,000	$49,000	0.508	$25,000
Periodic Costs	15	$49,000	$49,000	0.362	$17,700
Periodic Costs	20	$49,000	$49,000	0.258	$12,600
Periodic Costs	25	$49,000	$49,000	0.184	$9,000
Periodic Costs	30	$49,000	$49,000	0 131	$6,400
Periodic Costs	35	$49,000	$49,000	0.0937	$4,600
Periodic Costs	40	$49,000	$49,000	0.0668	$3,300
Periodic Costs	45	$49,000	$49,000	0.0476	$2,300
Periodic Costs	50	$49,000	$49,000	0 0339	$1,660
Periodic Costs	55	$49,000	$49,000	0.0242	$1,190
Periodic Costs	60	$49,000	$49,000	0 0173	$850
Periodic Costs	65	$49,000	$49,000	0 0123	$600
Periodic Costs	70	$49,000	$49,000	0.00877	$430
Periodic Costs	75	$49,000	$49,000	0.00625	$310
Periodic Costs	80	$49,000	$49,000	0.00446	$220
Periodic Costs	85	$49,000	$49,000	0.00318	$156
Periodic Costs	90	$49,000	$49,000	0.00227	$111
Periodic Costs	95	$49,000	$49,000	0.00162	$79
Periodic Costs	100	$590,000	$590,000	0.00115	$679

TOTAL PRESENT VALUE OF ALTERNATIVE **$7,000,000**

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555 0-75 (July 2000).

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	$86,000	Ea.	**$86,000**	SHA estimate
Installation of Groundwater Treatment System					
Contractor					
Treatment System Equipment Installation					
Equipment Installation					
Equalization/settling tank	1	$3,530	Ea.	$3,530	Harrington Industrial Plastics, LLC, 2005; Assumes 3,000 gal. XLPE vertical storage tank.
Equalization tank water pump	1	$2,558	Ea.	$2,558	ECHOS 33 29 0117; 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping
Hurricane Cartridge Filters	2	$3,000	Ea.	$6,000	SHA estimate, based on experience.
pH Adjustment					
HCl storage tank	1	$2,657	Ea.	$2,657	Harrington Industrial Plastics, LLC, 2005; Assumes 2,500 gal. XLPE vertical storage tank
HCl feed pump	1	$906	Ea.	$906	Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 44 gpd
Secondary containment for chemical storage	1	$2,565	L.S.	$2,565	SHA estimate; Assume approximately $2/gal.
Static mixer for inline pH adjustment	1	$125	Ea.	$125	Harrington Industrial Plastics, LLC, 2005; Assumes Komac CPS 1-inch PVC Static Mixer
Primary Metals Treatment					
GreenSand filtration system & media, continuous backwash configuration	1	$12,600	L.S.	$12,600	SHA discussions with Siemens Corporation.
KMnO4 storage tank	1	$144	Ea.	$144	Harrington Industrial Plastics, LLC, 2005; Assumes 65 gal. HDLPE vertical storage tank
KMnO4 feed pump	1	$808	Ea.	$808	Harrington Industrial Plastics, LLC, 2005; Assumes PULSAtron® Electric Metering Pump; 12 gpd
VOC Treatment					
Carbon adsorption system; 2 PV 200 fiberglass adsorbers, 400 lbs virgin AC830AW acid washed water treatment carbon	1	$3,500	L.S.	$3,500	SHA discussions with Siemens Corporation.
Secondary Metals Treatment					
Ion Exchange System, (4) 3.5 C.F. vessels, Resin types include: CSO, SCC, ASG	1	$5,120	L.S.	$5,120	SHA discussions with Siemens Corporation.
Backwash Operations					
Backwash Receiving Tank	1	$436	Ea.	$436	Harrington Industrial Plastics, LLC, 2005; Assumes 300 gal. HDLPE vertical storage tank.
Backwash receiving tank water pump	1	$2,558	Ea.	$2,558	ECHOS 33 29 0117; Assumes 15 GPM, 1/2 HP, Transfer Pump with Motor, Valves, Piping.
Hurricane Cartridge Filters	2	$3,000	Ea.	$6,000	SHA estimate, based on experience.
Miscellaneous					
Air compressor for system air supply	1	$15,516	Ea.	$15,516	ECHOS 33 31 0204; Assumes 15 HP, 120 Gallon, 200 PSI, 50 SCFM, Air Compressor.
Equipment delivery, setup, and installation of interconnecting piping and misc. components	1	$148,235	L.S.	$148,235	SHA estimate; Assumes 50% of treatment system equipment costs
Subtotal, Treatment System Equipment Installation				$210,000	*$213,258*

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Instrumentation					
Extraction trench sump instrumentation	1	$4,000	L.S.	$4,000	SHA estimate; Includes pressure gauge, level transducer, flow meter.
Equalization tank level transducer	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
pH probe/controller	2	$6,784	Ea.	$13,568	ECHOS 33 02 1512 through 33 02 1523
NaOH tank level transducer	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
HCl tank level transducer	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
Backwash receiving tank level transducer	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
KMnO4 tank level transducer	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
Differential pressure transducers across filtration/adsorption/exchange systems	2	$1,760	Ea.	$3,520	ECHOS 13273 4164
Misc. high level alarm switches	3	$692	Ea.	$2,076	ECHOS 33 23 1306
Pressure gauges	10	$224	Ea.	$2,240	ECHOS 33 31 0209
Effluent flow meter	1	$4,750	Ea.	$4,750	SHA estimate; Side-mounted, continuous read-out w/ 4-20 mA output signal
		Subtotal, Instrumentation		$54,000	*$53,904*
Electrical					
Service entry to treatment building	1	$10,000	L.S.	$10,000	SHA estimate, based on experience.
Treatment system equipment/instruments	1	$100,000	L.S.	$100,000	SHA estimate, based on experience.
Control panel	1	$50,000	L.S.	$50,000	SHA estimate, based on experience.
Exterior conduit/cable to extraction trench	1	$10,000	L.S.	$10,000	SHA estimate, based on experience.
Lighting	1	$5,000	L.S.	$5,000	SHA estimate, based on experience.
		Subtotal, Electrical		$180,000	*$175,000*
Water Supply					
Excavating Trench, common earth, 4' to 6' deep, 1-1/2 C.Y. excavator with trench box	149	$7	C.Y.	$969	Means 31 23 16.13 1360; Assumes trench of approximately 400' long by 2' wide by 5' deep; Assumes H&S level C.
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	149	$2	C.Y.	$349	Means 31 23 16.13 3080; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	149	$8	C.Y.	$1,241	ECHOS 17 03 0511; Assumes H&S level D.
Black seemless steel pipe, 2", Schedule 80	400	$18	L.F.	$7,200	McMaster-Carr, 2007.
High-Flow Standard Backflow Preventer (BFP) with Relief Valves, 2"	1	$443	Ea.	$443	McMaster-Carr, 2007.
Underground Utility Enclosure	1	$73	Ea.	$73	McMaster-Carr, 2007.
Freeze-Protection Strip Heater, 12"	1	$96	Ea.	$96	McMaster-Carr, 2007.
BFP and Enclosure Installation	8	$99	Hr.	$792	ECHOS Crew Code MPLUA
Utilities Hook-up Fee	1	$5,103	Ea.	$5,103	SHA estimate, based on experience.
		Subtotal, Water Supply		$16,000	*$16,265*
Treatment Building					
12" Structural Slab on Grade	1	$30,000	L.S.	$30,000	SHA estimate, based on experience; Assumes 1,050 S.F.
Pre-Engineered Steel Buildings, 35' long by 30' wide by 16' high (eave height)	1	$70,000	L.S.	$70,000	SHA estimate, based on experience.
Heating system	1	$15,000	L.S.	$15,000	SHA estimate, based on experience.
		Subtotal, Treatment Building		$120,000	*$115,000*
		Subtotal, Contractor		$570,000	*$573,427*
Engineer					
Labor, Oversight	880	$99	hr	$87,120	Assumes 4 month of field work; See Note 3.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$13,068	l.s.	$13,068	Assume 15% of labor cost
		Subtotal, Engineer		$100,000	*$100,188*
		Subtotal, Installation of Groundwater Treatment System		**$670,000**	*$673,615*

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Install Groundwater Extraction Trench, Underground System Piping, & Surface Water Discharge Outfall					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	$417	Ea.	$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	$305	Ea.	$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Medium Equipment	4	$399	Ea.	$1,596	ECHOS 33 17 0802; Includes frac tank & water truck; Assumes H&S level D.
Subtotal, Mobilization/Demobilization				$4,300	*$4,266*
Extraction Trench Excavation & Dewatering					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	44	$12	C.Y.	$533	ECHOS 17 03 0276; Assumes H&S level C.
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	50	$299	Hr.	$14,950	ECHOS 17 03 0231; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Trench Box, Daily Rental	5	$448	Ea.	$2,240	ECHOS 02228 3120; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Water Truck	50	$146	Hr.	$7,300	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	600	$0.06	S.F.	$36	ECHOS 33 08 0585; Assumes H&S level C.
Vacuum Truck	50	$113.00	Hr.	$5,650	ECHOS 33 19 0111; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	1	$261	Month	$261	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	1	$375	Month	$375	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	1	$252	Month	$252	Rain for Rent, Inc. Quote dated 09/24/07
pH Adjustment Chemicals	55	$3	Gal.	$165	SHA discussions with Harcros Chemicals, Inc.; Unit cost includes 20% mark-up for drum delivery; See supporting calculations.
Filtration system, 4-stage tandem unit, 200 gpm	1	$2,800	Month	$2,800	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system hoses	1	$400	Month	$400	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system pumps, 2" submersibles	1	$800	Month	$800	SHA discussions with N.E. Environmental Solutions, Inc.
Filters	40	$8	Ea.	$320	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Extraction Trench Excavation & Dewatering				$36,000	*$36,082*
Extraction Trench Construction & Backfill					
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	333	$2.34	C.Y.	$780	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Pea Gravel	222	$64	C.Y.	$14,222	ECHOS 33 06 1042
Unclassified Fill, Delivered, Off-site	67	$12	C.Y.	$800	ECHOS 02223 1001
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	131	$8.33	C.Y.	$1,092	ECHOS 17 03 0511; Assumes H&S level D.
8" Diameter Perforated PVC Pipe	200	$16	L.F.	$3,200	ECHOS 33 26 0903
Precast, CIP Base, 4' Diameter, 15' Deep, Manhole	1	$4,936	Ea.	$4,936	ECHOS 19 02 0203
Submersible Stainless Steel Effluent Pump	1	$3,000	Ea.	$3,000	SHA estimate, based on experience.
24" Well Finish, Cover, Flush w/Grade, Manhole, Lock Cap	1	$479	Ea.	$479	ECHOS 33 23 2224
80 Mil Polymeric Liner, High-density Polyethylene	2,400	$6	S.F.	$14,400	ECHOS 33 08 0573
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	580	$2	S.Y.	$1,433	ECHOS 33 08 0532
Extraction Trench Development	1	$1,000	L.S.	$1,000	SHA estimate, based on experience.
Subtotal, Extraction Trench Construction & Backfill				$45,000	*$45,342*

TABLE L-5
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Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Underground Piping Excavation					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	56	$12.00	C.Y.	$676	ECHOS 17 03 0276; Assumes H&S level C.
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	50	$299.00	Hr.	$14,950	ECHOS 17 03 0231; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Trench Box, Daily Rental	5	$448	Ea.	$2,240	ECHOS 02228 3120; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Water Truck	24	$146.00	Hr.	$3,504	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	760	$0.06	S.F.	$46	ECHOS 33 08 0585; Assumes H&S level C.
Subtotal, Underground Piping Excavation				$21,000	*$21,415*
Underground Piping Placement & Backfill					
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	141	$2.34	C.Y.	$329	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	140.74	$8.33	C.Y.	$1,172	ECHOS 17 03 0511; Assumes H&S level D.
1" PVC, Schedule 40, Connection Piping	380	$4.29	L.F.	$1,630	ECHOS 33 26 0410
Subtotal, Underground Piping Placement & Backfill				$3,100	*$3,132*
Surface Water Discharge Outfall					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	$215	Hr.	$5,160	ECHOS 17 03 0231; Assumes H&S level D.
926, 2.0 CY, Wheel Loader	24	$144	Hr.	$3,456	ECHOS 17 03 0222; Assumes H&S level D.
Rock Cover, Riprap, Light (10 to 100 Lb Pieces)	10	$50	C.Y.	$500	ECHOS 18 05 0202
Pea Gravel	15	$64.00	C.Y.	$960	ECHOS 33 06 1042
8 oz/sy Erosion Control/Drainage Filter Fabric (80 Mil)	30	$2	S.Y	$74	ECHOS 33 08 0532
Cast-in-place concrete curb, wood forms, 6" x 18", straight	20	$11	L.F.	$220	Means 32 16 13.13 0300
Subtotal, Surface Water Discharge Outfall				$10,000	*$10,370*
Soil Stabilization					
Cement Stabilization, 6%	288.89	$32	B.C.Y.	$9,243	ECHOS 17 03 0602; Assumes 100% of excavated material, excluding cover material/topsoil, require stabilization; Assumes H&S level D.
Subtotal, Soil Stabilization				$9,243	
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	433	$80	Ton	$34,667	SHA discussions with Waste Management, Inc.
Water, Non-Hazardous	10,000	$0.20	Gal.	$2,000	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Transportation/Disposal				$37,000	*$36,667*
Site Restoration					
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	$26	M.S.F.	$79	Means 32 92 19.13 0800
Subtotal, Site Restoration				$79	*$79*
Subtotal, Contractor				$170,000	*$166,596*
Engineer					
Labor, Oversight	220	$99	Hr.	$21,780	Assumes 1 month of field work; See Note 3.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$3,267	L.S.	$3,267	Assume 15% of labor cost
Subtotal, Engineer				$25,000	*$25,047*
Subtotal, Install Extraction Trench, System Piping, & Discharge Outfall				**$190,000**	*$191,643*

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Post-Construction Submittals/As-Builts	1	$43,000	Ea.	**$43,000**	SHA estimate
Subtotal, Construction Activities				**$990,000**	
Scope Contingency (15% of Construction Activities Subtotal)				$150,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Bid Contingency (15% of Construction Activities Subtotal)				$150,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
Subtotal, Construction Activities with Contingencies				**$1,300,000**	
Professional/Technical Services					
Project Management (6% of Construction Activities Subtotal w/Contingencies)				$78,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% of Construction Activities Subtotal w/Contingencies)				$160,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% of Construction Activities Subtotal w/Contingencies)				$100,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				**$340,000**	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	10	$5,000	Ea.	$50,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
Subtotal, Engineer				$50,000	*$50,000*
Subtotal, Establish Deed Restrictions				**$50,000**	*$50,000*
Subtotal, Institutional Controls				**$50,000**	
TOTAL, CAPITAL COSTS				**$1,700,000**	

ANNUAL O&M COSTS
O&M Activities
Groundwater Treatment System O&M

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Contractor					
Ion exchange resin changeouts	1	$8,620	L.S.	$8,620	SHA discussions with Siemens Corporation; Seimens estimated 2.5 changeouts per year.
Liquid-phase carbon changeouts	18	$900	Ea.	$16,200	SHA discussions with Siemens Corporation; Seimens estimated 18 changeouts per year.
pH adjustment chemicals	14000	$2	Gal.	$28,000	SHA discussions with Harcros Chemicals, Inc.; Unit cost assumes bulk delivery; See supporting calculations.
GreenSand regeneration chemicals	1	$534	Ea.	$534	SHA discussions with Harcros Chemicals, Inc.; Unit costs assume 55-gallon drums; See supporting calculations.
Filter cartridge disposal	104	$180	Ea.	$18,720	N.E. Environmental Solutions, Inc. 2006 Fee Schedule; Assumes 2 drums per week required for disposal of cartridges.
Extraction trench sump maintenance	1	$1,500	L.S.	$1,500	SHA estimate, based on experience.
Equipment maintenance	1	$15,000	L.S.	$15,000	SHA estimate, based on experience.
Subtotal, Contractor				$89,000	*$88,574*
Utilities					
Electricity	1	$5,000	L.S.	$5,000	SHA estimate; See supporting calculations.
Subtotal, Utilities				$5,000	*$5,000*

TABLE L-5
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Feasibility Study
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Operator	121	$990	L.S.	$119,790	SHA estimate; Assumes approximately 2 visits per week, with additional time for unscheduled visits; See Note 3.
Labor, Monthly Reporting	12	$1,584	Ea.	$19,008	Unit cost assumes 16 labor hours at an average rate of $124/hr; See Note 3.
Labor, Annual Summary Report Preparation	115	$124	Hr.	$14,260	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	$1,663	L.S.	$1,663	Assume 5% of office support labor cost.
		Subtotal, Engineer		$16,000	*$15,923*
Laboratory					
Chemical analysis, VOCs by 8260B	26	$185	Ea.	$4,810	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, SVOCs by 8270c	26	$360	Ea.	$9,360	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Metals by 200.7	26	$240	Ea.	$6,240	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, pH	26	$13	Ea.	$338	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 monthly influent/effluents samples & 2 semi annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, PCBs by 608	2	$145	Ea.	$290	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, TPH by 1664	2	$150	Ea.	$300	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, TSS by 160.2	2	$2	Ea.	$4	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Total Cyanide by 4500CN	2	$41	Ea.	$82	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
Chemical analysis, Total Residual Chlorine by 330.1	2	$26	Ea.	$52	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 2 semi-annual influent baseline confirmatory samples, consistent with RGP.
		Subtotal, Laboratory		$21,000	*$20,748*
		Subtotal, Groundwater Treatment System O&M		**$130,000**	*$130,245*
Annual Maintenance/Repair Activities					
Contractor					
Clearing, Medium Brush with Average Grub & Some Trees	1	$1,254	Acre	$1,254	ECHOS 17 01 0103; Assumes access paths to/from and areas around monitoring points will be cleared at same level of effort as one acre.
Equipment Mobilization	1	$260	L.S.	$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	1	$1,275	Day	$1,275	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	$20	Ea.	$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	2	$18	Ea.	$36	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	2	$75	Ea.	$150	Environmetal Drilling (EDI) Invoice dated 11/06/03
		Subtotal, Contractor		$3,000	*$3,015*

TABLE L-5
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Feasibility Study
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor, Oversight	10	$99	Ea.	$990	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$149	L.S.	$149	Assume 15% of labor cost
			Subtotal, Engineer	$1,100	*$1,139*
			Subtotal, Annual Maintenance/Repair Activities	**$4,200**	*$4,154*
Groundwater and Surface Water Monitoring					
Engineer					
Preparation/Mobilization/Demobilization					
Labor	52	$99	Hr.	$5,148	SHA estimate, unit cost based on 2006 Site monitoring event
Truck rental	12	$70	Day	$840	Assumes Penskee 16' box truck rental.
Portable Storage Unit Rental	1	$165	Month	$165	SHA estimate, based on experience.
Portable Eyewash Station	1.5	$175	Week	$263	SHA estimate, based on experience.
55-gallon steel drums	4	$55	Ea.	$220	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon poly drums	2	$60	Ea.	$120	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum delivery	2	$225	Ea.	$450	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Dumpster rental	1	$650	Ea.	$650	SHA estimate; Assumes 15 CY dumpster rental for two weeks and a disposal weight of one ton.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$773	L.S.	$773	Assume 15% of labor cost
			Subtotal, Preparation/Mobilization/Demobilization	$8,600	*$8,629*
Water Level Gauging Event					
Labor	34	$99	Ea.	$3,366	Based on 2006 Sampling Round Costs.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$505	L.S.	$505	Assume 15% of labor cost
			Subtotal, Water Level Gauging Event	$3,900	*$3,871*
Sampling Event					
Labor	25	$1,300	Location	$32,500	SHA estimate, unit cost based on 2006 Site monitoring event
Bladder Pump	4.5	$160	Wk.	$720	SHA estimate, based on experience.
Bladder Pump Expendables	20	$45	Ea.	$900	HAS estimate; Includes teflon bladder, check balls, o-rings and grab plates.
YSI Low Flow Multi Meter	4.5	$325	Wk.	$1,463	SHA estimate, Assumes YSI 556 unit.
Controller	4.5	$245	Wk.	$1,103	SHA estimate, based on experience.
Compressor	4.5	$85	Wk.	$383	SHA estimate, based on experience.
Water Level Meter	4.5	$100	Wk.	$450	SHA estimate; Assumes MP30 Drawdown Meter
Turbidity Meter	4.5	$90	Wk.	$405	SHA estimate; Assumes HACH 2100P unit.
Battery	6.5	$25	Wk.	$163	SHA estimate, based on experience.
Photoionization Deetector	4.5	$390	Wk.	$1,755	SHA estimate, based on experience.
Tubing, Bonded 1/8 x 1/4 LDPE to 1/8 x 1/4 teflon lined	1000	$1.00	Ft.	$1,000	SHA estimate, based on experience.
Tubing, 0.17 X 1/4 Teflon lined	20	$0.15	Ft.	$3	SHA estimate, based on experience.
Tubing, 1/16 X 1/8 LDPE	20	$1.45	Ft.	$29	SHA estimate, based on experience.
Lap Top Computer	1.5	$90	Wk.	$135	SHA estimate, based on experience.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$4,875	L.S.	$4,875	Assumes 15% of labor cost.
			Subtotal, Sampling Event	$46,000	*$45,882*

TABLE L-5
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Investigation-Derived Waste Disposal					
55-gallon Non-Regulated rinse water	4	$215	Ea.	$860	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon high pH water	1	$260	Ea.	$260	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
55-gallon Methanol & water	1	$230	Ea.	$230	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Pick-up Fee; (manifests, fuel, insurance)	2	$300	Ea.	$600	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Investigation-Derived Waste Disposal				$2,000	*$1,950*
Subtotal, Engineer				$60,000	*$60,332*
Laboratory					
Chemical analysis, VOC by 8260B	35	$110	Ea.	$3,850	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, SVOC by 8270	35	$155	Ea.	$5,425	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Chemical analysis, Metals	266	$13	Ea.	$3,458	Alpha Woods Hole Labs 2006/2007 lab fees; See Note 4.
Courier	7	$75	Day	$525	Alpha Woods Hole Labs 2006/2007 lab fees.
Misc. (Lab disposal fees)	1	$127	L.S.	$127	Assume 1 percent of total lab fees.
Subtotal, Laboratory				$13,000	*$13,385*
Contractor					
Data Validation	33	$290	Location	$9,570	New Environmental Horizons, Inc. costs from 2006; Unit cost based on number of sampling locations.
Subtotal, Contractor				$9,600	*$9,570*
Subtotal, Groundwater and Surface Water Monitoring				**$83,000**	*$83,287*
Subtotal, Annual O&M Activities Costs				**$220,000**	
Scope Contingency (15% Annual O&M Activities Subtotal)				$33,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Bid Contingency (15% Annual O&M Activities Subtotal)				$33,000	OSWER 5-6: Assume 15% of Annual O&M Activities Subtotal
Subtotal, O&M Activities with Contingencies				**$290,000**	
Professional/Technical Services					
Project Management (10% Annual O&M Activities Subtotal w/Contingencies)				$29,000	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies
Technical Support (15% Annual O&M Activities Subtotal w/Contingencies)				$44,000	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies
Subtotal, Professional/Technical Services				**$73,000**	
TOTAL, ANNUAL O&M COSTS				**$360,000**	

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Construction/O&M					
Every 5 Years O&M Activities					
Periodic Maintenance/Repair Activities (every 5 years)					
Contractor					
Monitoring Well Decommisioning & Replacement					
Equipment Mobilization	1	$260	L.S.	$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	5	$1,275	Day	$6,375	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Screen	20	$5.50	L.F.	$110	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC Well Riser	80	$4.00	L.F.	$320	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" PVC End Point	2	$7.25	Ea.	$15	Environmetal Drilling (EDI) Invoice dated 11/06/03
2" Expansion Plug	2	$20	Ea.	$40	Environmetal Drilling (EDI) Invoice dated 11/06/03
Filter Pack, silica sand	80	$1.10	L.F.	$88	Environmetal Drilling (EDI) Invoice dated 11/06/03
Bentonite	4	$32	L.F.	$128	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	180	$5	L.F.	$900	Environmetal Drilling (EDI) Invoice dated 11/06/03
80# Concrete Mix	6	$18	Ea.	$108	Environmetal Drilling (EDI) Invoice dated 11/06/03
8" Manhole, water-tight, traffic-rated	6	$75	Ea.	$450	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Roller Bit Wear, per foot	30	$25	L.F.	$750	Environmetal Drilling (EDI) Invoice dated 11/06/03
Drum, 55-gallon steel	1	$55	Ea.	$55	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Drum Transportation & Disposal, Non-Regulated Soil Cuttings	1	$180	Ea.	$180	N.E. Environmental Solutions, Inc. 2006 Fee Schedule.
Subtotal, Monitoring Well Replacement				$9,800	*$9,779*
Update Elevation Survey					
Surveying, 2-person Crew	1	$2,023	Day	$2,023	ECHOS 99 04 1201
Summary Survey Report	1	$750	L.S.	$750	SHA estimate, based on experience.
Subtotal, Update Elevation Survey				$2,800	*$2,773*
Subtotal, Contractor				$13,000	*$12,551*
Engineer					
Labor, Oversight	55	$99	Ea.	$5,445	See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$817	L.S.	$817	Assumes 15% of oversight labor cost.
Labor, Summary Report Preparation	28	$124	Hr.	$3,472	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	$174	L.S.	$174	Assumes 5% of report preparation labor cost.
Subtotal, Engineer				$9,900	*$9,908*
Subtotal, Periodic Maintenance/Repair Activities (every 5 years)				**$22,000**	*$22,459*
Subtotal, Every 5 Year O&M Activities				**$22,000**	
Scope Contingency (15% of Every 5 Years O&M Activities Subtotal)				$3,300	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Bid Contingency (15% of Every 5 Years O&M Activities Subtotal)				$3,300	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Year O&M Activities with Contingencies				**$29,000**	

TABLE L-5
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Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Year 100 Construction/O&M Activities					
Decomissioning of Monitoring Network (year 100 only)					
Contractor					
Equipment Mobilization	1	$260	L.S.	$260	Environmetal Drilling (EDI) Invoice dated 11/06/03
Day Rate, Truck-Mounted Drill Rig	54	$1,275	Day	$68,850	Environmetal Drilling (EDI) Invoice dated 11/06/03
4" Grouting	2,700	$5	L.F.	$13,500	Environmetal Drilling (EDI) Invoice dated 11/06/03
		Subtotal, Contractor		$82,000	*$82,350*
Engineer					
Labor, Oversight	594	$99	Hr.	$58,806	See Note 3.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$8,821	L.S.	$8,821	Assume 15% of labor cost
		Subtotal, Engineer		$68,000	*$67,627*
Subtotal, Decomissioning of Monitoring Network (year 100 only)				**$150,000**	*$149,977*
Decomissioning of Groundwater Treatment System (year 100 only)					
Contractor					
Decomission Treatment System Equipment & Building					
Remove/Dispose of treatment system equipment (e.g., tanks, pumps, fliter press, etc,)	1	$53,315	L.S.	$53,315	SHA estimate; assumes approximately 25% of cost for installation & setup.
Small building demolition	13650	$0.36	C.F	$4,914	Means 02 41 16.13 0500; Assumes building dimensions 35'x30'x13' (ave. height)
Transportation and disposal of building debris	30	$70	Tons	$1,632	SHA discussions with Waste Management, Inc.
Remove slab on grade, 9" to 12"	1050	$2	S.F	$2,212	ECHOS 16 01 0124
Load concrete debris, 926, 2.0 CY, Wheel Loader	8	$204	Hr.	$1,632	ECHOS 17 03 0222
Transportation and disposal of concrete demolition debris (with rebar)	59	$70	Tons	$1,632	SHA discussions with Waste Management, Inc.
		Subtotal, Treatment System Equipment & Building		$65,000	*$65,337*
Decomission Utilities					
Dismantle electrical systems	1	$43,750	L.S.	$43,750	SHA estimate; assumes approximately 25% of cost for installation.
Dismantle water supply	1	$4,066	L.S.	$4,066	SHA estimate; assumes approximately 25% of cost for installation.
		Subtotal, Utilities		$48,000	*$47,816*

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DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Decomission Extraction Trench, Piping & Discharge Outfall					
Strip Soil Cap & Stockpile Material, 1-1/2 C.Y. excavator, Medium Material	101	$12	C.Y.	$1,212	ECHOS 17 03 0276; Assumes H&S level C.
Excavating Trench, common earth, 14' to 20' deep, 1-1/2 C.Y. excavator with trench box	50	$7.34	C.Y.	$367	Means 31 23 16.13 1382; Assumes trench of 200' long by 3' wide by 15' deep; Assumes H&S level C.
Excavating Trench, common earth, 4' to 6' deep, 1-1/2 C.Y. excavator with trench box	50	$6.50	C.Y.	$325	Means 31 23 16.13 1360; Assumes approximately 380 feet of trench approximately 3' wide by 5' deep; Assumes H&S level C.
Water Truck	40	$146	Hr.	$5,840	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.
Sprayed Water Dust Suppressant	1,360	$0.06	S.F.	$82	ECHOS 33 08 0585; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	1	$87	Week	$87	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	1	$125	Week	$125	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	1	$84	Week	$84	Rain for Rent, Inc. Quote dated 09/24/07
Remove Plastic Pipe	581	$31	L.F.	$18,011	ECHOS 16 01 0625
Backfill trench, F.E. Loader, wheel mtd, 2-1/4 C.Y. bucket, 100' haul	474	$2.34	C.Y.	$1,109	Means 31 23 16.13 3080; Assumes trench of 200' long by 3' width by 15' deep; Assumes H&S level D.
Compact Backfill, by Hand with Vibrating Plate, 6" (15 cm) Lift	474	$8.33	C.Y.	$3,949	ECHOS 17 03 0511; Assumes H&S level D.
Unclassified Fill, Delivered, Off-site	222	$12	C.Y.	$2,667	ECHOS 02223 1001
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	3	$26	M.S.F.	$79	Means 32 92 19.13 0800
Subtotal, Extraction Trench, Piping & Discharge Outfall				$34,000	*$33,936*
Subtotal, Contractor				$150,000	*$147,089*
Engineer					
Labor, Oversight	220	$99	hr	$21,780	Assumes 1 month of field work; See Note 3.
Misc. Expenses (e.g. mileage. telephone, reproduction, postage, personal protective equipment, etc.)	1	$3,267	l.s.	$3,267	Assume 15% of labor cost
Labor, Groundwater Treatment System Close-out Report Preparation	50	$124	Hr.	$6,200	See Note 3.
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	$310	L.S.	$310	Assume 5% of report preparation labor cost.
Subtotal, Engineer				$32,000	*$31,557*
Subtotal, Decomissioning of Groundwater Treatment System (year 100 only)				**$180,000**	*$178,646*
Subtotal, Year 100 Construction/O&M Activities				**$330,000**	
Scope Contingency (15% of Year 100 O&M Activities Subtotal)				$50,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
Bid Contingency (15% of Year 100 O&M Activities Subtotal)				$50,000	OSWER 5-6: Assume 15% of Year 100 O&M Activities Subtotal
Subtotal, Year 100 Construction/O&M Activities with Contingencies				**$430,000**	
Subtotal, Periodic Construction/O&M Costs				**$460,000**	

TABLE L-5
Detailed Cost Estimate for
Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% of Periodic O&M Activities Subtotal w/Contingencies)				$46,000	OSWER 5-8: Assume 10% of Periodic O&M Subtotal including contingencies
Technical Support (15% of Periodic O&M Activities Subtotal w/Contingencies)				$69,000	OSWER 5-8: Assume 15% of Periodic O&M Subtotal including contingencies
Five-Year Review					
Engineer					
Labor	1	$12,400	L.S.	$12,400	Unit cost assumes 100 labor hours at an average rate of $124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	$620	L.S.	$620	Assume 5% of labor costs.
		Subtotal, Engineer		$13,000	*$13,020*
		Subtotal, Five-Year Review		**$13,000**	*$13,020*
		Subtotal, Professional/Technical Services		**$130,000**	
		TOTAL, PERIODIC COSTS		**$590,000**	

Abbreviations:

B.C.Y. = bank cubic yards	Hr. = hour	L.S. = lump sump	S.F. = square feet
C.Y. = cubic yards	L.C.Y. = loose cubic yards	Mo. = month	S.Y. = square yard
Ea. = each	L.F. = linear feet	M S.F. = thousand square feet	

Notes:

1. "Means" refers to one of the following:
   RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
   RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.

2. "ECHOS" refers to one of the following:
   ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
   ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

3. Average labor rate of $124/hr assumes primarily office-based labor. Average labor rate of $99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.

4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted

5. The following assumptions were used for the former mill tailrace quantity estimates:
   a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C.Y volume.
   b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons

6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value

TABLE L-6
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	$51,000
EOSS Excavation	
Contractor	
Mobilization/Demobilization	$9,900
Site Preparation	$45,000
Excavation	$74,000
Backfill	$145,000
Site Restoration	$207,000
Soil Stabilization	$90,000
Transportation/Disposal	$501,000
Subtotal, Contractor	$1,070,000
Engineer	$37,000
Laboratory	$33,000
Subtotal, EOSS Excavation	$1,140,000
Post-Construction Submittals/As-Builts	$26,000
Subtotal, Construction Activities	$1,217,000
Scope Contingency (15% Construction Activities Subtotal)	$183,000
Bid Contingency (15% Construction Activities Subtotal)	$183,000
Subtotal, Construction Activities with Contingencies	**$1,583,000**
Professional/Technical Services	
Project Management (6% Construction Activities Subtotal w/Contingencies)	$95,000
Remedial Design (12% Construction Activities Subtotal w/Contingencies)	$190,000
Construction Management (8% Construction Activities Subtotal w/Contingencies)	$127,000
Subtotal, Professional/Technical Services	**$412,000**
Institutional Controls	
Establish Deed Restrictions	$15,000
Subtotal, Institutional Controls	**$15,000**
TOTAL, CAPITAL COSTS	**$2,010,000**

TABLE L-6
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

ANNUAL O&M COSTS

O&M Activities

None

PERIODIC COSTS

Professional/Technical Services	
Five-Year Review	$13,000
Subtotal, Professional/Technical Services	**$13,000**
TOTAL, PERIODIC COSTS	**$13,000**

TABLE L-6
Cost Estimate Summary for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

Type of Cost	Year	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	$2,010,000	$2,010,000	1	$2,010,000
Periodic Costs	5	$13,000	$13,000	0.713	$9,000
Periodic Costs	10	$13,000	$13,000	0.508	$7,000
Periodic Costs	15	$13,000	$13,000	0.362	$5,000
Periodic Costs	20	$13,000	$13,000	0.258	$3,400
Periodic Costs	25	$13,000	$13,000	0.184	$2,400
Periodic Costs	30	$13,000	$13,000	0.131	$1,700
Periodic Costs	35	$13,000	$13,000	0.0937	$1,200
Periodic Costs	40	$13,000	$13,000	0.0668	$900
Periodic Costs	45	$13,000	$13,000	0.0476	$600
Periodic Costs	50	$13,000	$13,000	0.0339	$400
Periodic Costs	55	$13,000	$13,000	0.0242	$310
Periodic Costs	60	$13,000	$13,000	0.0173	$220
Periodic Costs	65	$13,000	$13,000	0.0123	$160
Periodic Costs	70	$13,000	$13,000	0.00877	$110
Periodic Costs	75	$13,000	$13,000	0.00625	$80
Periodic Costs	80	$13,000	$13,000	0.00446	$60
Periodic Costs	85	$13,000	$13,000	0.00318	$40
Periodic Costs	90	$13,000	$13,000	0.00227	$30
Periodic Costs	95	$13,000	$13,000	0.00162	$21
Periodic Costs	100	$13,000	$13,000	0.00115	$15

TOTAL PRESENT VALUE OF ALTERNATIVE $\boxed{\$2,040,000}$

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE L-6
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
CAPITAL COSTS					
Construction Activities					
Implementation Plans/Submittals	1	$51,000	Ea	**$51,000**	SHA estimate
EOSS Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, General Equipment and Facilities	1	$5,000	Ea.	$5,000	Assumed allowance
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	$417	Ea.	$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob
Mob/Demob, Excavator, Loader, Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	$104	Ea.	$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Decontaminate Light Equipment	1	$200	Ea	$200	ECHOS 33 17 0801; Assumes H&S level D
Decontaminate Medium Equipment	4	$399	Ea.	$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D
			Subtotal, Mobilization/Demobilization	$9,900	*$9,898*
Site Preparation					
Utility Locating	1	$2,000	Ea.	$2,000	Assumed 1-day allowance
Pavement removal, Bituminous driveways	6346	$5.72	S.Y	$36,299	Means 02 41 13.17 5100
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	1500	$4.28	L.F.	$6,420	ECHOS 18 05 0206
			Subtotal, Site Preparation	$45,000	*$44,719*
Excavation					
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	120	$215	Hr.	$25,800	ECHOS 17 03 0231; Assumes H&S level D
926, 2.0 CY, Wheel Loader	120	$144	Hr.	$17,280	ECHOS 17 03 0222; Assumes H&S level D.
Bobcat	120	$126	Hr.	$15,120	ECHOS Crew Code COBBC; Assumes H&S level D.
Water Truck	120	$103	Hr.	$12,360	ECHOS Crew Code COKBM (Modified); Assumes H&S level D.
Sprayed Water Dust Suppressant	73600	$0.05	S.F.	$3,680	ECHOS 33 08 0585; Assumes H&S level D.
			Subtotal, Excavation	$74,000	*$74,240*
Backfill					
Crawler-mounted, 1.25 C.Y 225 Hydraulic Excavator	80	$199	Hr.	$15,920	ECHOS 17 03 0231
926, 2.0 CY, Wheel Loader	80	$130	Hr.	$10,400	ECHOS 17 03 0222
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	80	$344	Hr	$27,520	ECHOS Crew Code COFCQ (Modified)
Unclassified Fill, Delivered, Off-site	7570	$12	C.Y.	$90,835	ECHOS 02223 1001; Assume 1.2 factor times volume removed
			Subtotal, Backfill	$145,000	*$144,675*
Site Restoration					
Asphaltic Concrete Pavement, Lots & Driveways, 6" stone base, 2" binder course, 1" topping	57118	$2.93	S.F	$167,356	Means 32 12 16.14 0020
Hauling, 20 C.Y. dump truck, 20 mile round trip	1587	$14	C.Y.	$22,218	Means 31 23 23.18 1255
Topsoil, Furnish & Place, 6" Lifts, Off-site	305	$55	C.Y.	$16,775	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader	15	$27	M.S.F.	$405	Means 32 92 19.13 0800
			Subtotal, Subcontractor	$207,000	*$206,754*
Soil Stabilization					
Cement Stabilization, 6%	2800	$32	B.C.Y.	$89,600	ECHOS 17 03 0602; Assumes 1/4 of TCE-impacted soil, 1/2 of the asbestos-impacted soil, & 3/4 of the PAH/As-impacted soil will require stabilization; Assumes H&S level D
			Subtotal, Soil Stabilization	$90,000	*$89,600*

TABLE L-6
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Transportation/Disposal					
Asphalt	793	$25	Ton	$19,825	SHA discussions with Waste Management, Inc.
VOC-Impacted Soils, Non-Hazardous	600	$54	Ton	$32,400	SHA discussions with ESMI, Includes soil stabilization additive
Asbestos-Impacted Soils, Non-Hazardous	90	$80	Ton	$7,200	SHA discussions with Waste Management, Inc.; Includes soil stabilization additive
Non-Asbestos Impacted Soils, Non-Hazardous	11610	$38	Ton	$441,180	SHA discussions with Waste Management, Inc ; Includes soil stabilization additive.
		Subtotal, Transportation/Disposal		$501,000	*$500,605*
		Subtotal, Contractor		$1,070,000	*$1,070,491*
Engineer					
Labor	240	$99	hr	$23,760	Assumes 6 weeks of field work
Misc Field Expenses (e.g., mileage, personal protective equipment, field supplies, telephone, etc)	1	$3,564	L.F.	$3,564	Assumes 15% of labor cost
Air/dust Monitoring	10	$1,000	day	$10,000	Assumed allowance
		Subtotal, Engineer		$37,000	*$37,324*
Laboratory					
Chemical analysis, Soil Management Assessment Package I	22	$965	Ea.	$21,230	2006-2007 Fee Schedule, Alpha Woods Hole Labs; Assumes 15 for soils leaving site and 7 for backfill soils
Chemical analysis, TCE Confirmatory	5	*$185*	*Ea.*	*$925*	*2006-2007 Fee Schedule, Alpha Woods Hole Labs*
Chemical analysis, Asbestos Confirmatory	5	$50	Ea.	$250	SHA discussions with EMSL Analytical, Inc.
Chemical analysis, PAHs Confirmatory	66	$155	Ea.	$10,230	2006-2007 Fee Schedule, Alpha Woods Hole Labs, Assumes 1 sample collected every 50 feet of lateral excavation extents, plus 10 for deeper excavations
Chemical analysis, As Confirmatory	3	$13	Ea.	$39	Assumes 15% of labor cost
		Subtotal, Laboratory		$33,000	*$32,674*
		Subtotal, EOSS Excavation		**$1,140,000**	$1,140,489
Post-Construction Submittals/As-Builts	1	$26,000	Ea.	**$26,000**	SHA estimate
		Subtotal, Construction Activities		**$1,217,000**	
Scope Contingency (15% Construction Activities Subtotal)				$183,000	OSWER 5-6; Assume 15% of Construction Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				$183,000	OSWER 5-6. Assume 15% of Construction Activities Subtotal
		Subtotal, Construction Activities with Contingencies		**$1,583,000**	
Professional/Technical Services					
Project Management (6% Construction Activities Subtotal w/Contingencies)				$95,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Remedial Design (12% Construction Activities Subtotal w/Contingencies)				$190,000	OSWER 5-8: Assume 12% of Construction Activities Subtotal including contingencies
Construction Management (8% Construction Activities Subtotal w/Contingencies)				$127,000	OSWER 5-8 Assume 8% of Construction Activities Subtotal including contingencies
		Subtotal, Professional/Technical Services		**$412,000**	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	$5,000	Ea.	$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions
		Subtotal, Engineer		$15,000	*$15,000*
		Subtotal, Establish Deed Restrictions		**$15,000**	*$15,000*
		Subtotal, Institutional Controls		**$15,000**	
		TOTAL, CAPITAL COSTS		**$2,010,000**	

TABLE L-6
Detailed Cost Estimate for
Alternative SO-6: Excavation and Off-Site Disposal (Comprehensive)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SO-6: Excavation and Off-Site Disposal (Comprehensive)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
PERIODIC COSTS					
Professional/Technical Services					
Five-Year Review					
Engineer					
Labor	1	$12,400	L.S.	$12,400	Unit cost assumes 100 labor hours at an average rate of $124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	$620	L.S.	$620	Assume 5% of labor costs.
		Subtotal, Engineer		$13,000	*$13,020*
		Subtotal, Five-Year Review		$13,000	*$13,020*
		Subtotal, Professional/Technical Services		**$13,000**	
		TOTAL, PERIODIC COSTS		**$13,000**	

Abbreviations:

B.C.Y. = bank cubic yards	Hr. = hour	L.S. = lump sump	S.F. = square feet
C.Y. = cubic yards	L.C.Y. = loose cubic yards	Mo. = month	S.Y. = square yard
Ea. = each	L F = linear feet	M S F. = thousand square feet	

Notes:
1. "Means" refers to one of the following:
   RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
   RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
2. "ECHOS" refers to one of the following.
   ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
   ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition
3. Average labor rate of $124/hr assumes primarily office-based labor. Average labor rate of $99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
4. *For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.*
5. The following assumptions were used for the quantity estimates
   a.) We assumed "swell" factor of 18% for excavated soils.
   b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
7. All subtotals and total are rounded to 2 significant numbers. The number presented in italics to the right of rounded subtotals is the unrounded summed value.
8. Assume no utility lines need to be cut/removed/replaced.
9. Assume backfill can be placed immediately following excavation to required depths.
10. Excavated soil will be loaded directly into vehicles for off-site disposal.

TABLE L-7
Cost Estimate Summary for
Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	$24,000
Settling Basing #2 Excavation	
Contractor	
Mobilization/Demobilization	$3,300
Site Preparation	$1,300
Excavation	$27,000
Backfill	$11,000
Site Restoration	$2,500
Transportation/Disposal	$180,000
Subtotal, Contractor	$230,000
Engineer	$13,000
Laboratory	$4,800
Subtotal, Settling Basin #2 Excavation	$240,000
Post-Construction Submittals/As-Builts	$12,000
Subtotal, Construction Activities	$276,000
Scope Contingency (15% Construction Activities Subtotal)	$40,000
Bid Contingency (15% Construction Activities Subtotal)	$41,000
Subtotal, Construction Activities w/Contingencies	**$360,000**
Professional/Technical Services	
Remedial Design (15% Construction Activities Subtotal w/Contingencies)	$54,000
Project management (8% Construction Activities Subtotal w/Contingencies)	$29,000
Construction Management (10% Construction Activities Subtotal w/Contingencies)	$36,000
Subtotal, Professional/Technical Services	**$120,000**
Institutional Controls	
Establish Deed Restrictions	$15,000
Subtotal, Institutional Controls	**$15,000**
TOTAL CAPITAL COSTS	**$500,000**

TABLE L-7
Cost Estimate Summary for
Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

ANNUAL O&M COSTS	
O&M Activities	
Maintain AOC Cap	
Earthwork Contractor (Assume 1 visit annually)	
Mobilization/Demobilization	$940
Repairs to Soil Cap	$1,600
Pavement Restoration	$3,900
Subtotal, Earthwork Contractor	$6,400
Landscaping Contractor (Assume 2 visits annually)	$560
Engineer	$7,400
Subtotal, Maintain AOC Cap	$14,000
Subtotal, O&M Activities	$14,000
Scope Contingency (15% O&M Subtotal)	$2,100
Bid Contingency (15% O&M Subtotal)	$2,100
Subtotal, O&M Activities w/Contingencies	**$18,000**
Professional/Technical Services	
Project Management (10% O&M Subtotal w/Contingencies)	$1,800
Technical Support (15% O&M Subtotal w/Contingencies)	$2,700
Subtotal, Professional/Technical Services	**$4,500**
TOTAL ANNUAL O&M COST	**$23,000**
PERIODIC COSTS	
Construction/O&M Activities	
Every 5 Years O&M Activities	
Maintain Security Fence (every 5 years)	$8,200
Subtotal, Every 5 Years O&M Activities	$8,200
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)	$1,200
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)	$1,200
Subtotal, Every 5 Years O&M Activities w/Contingencies	$11,000
Subtotal, Construction/O&M Activities	**$11,000**
Professional/Technical Services	
Project Management (10% Construction/O&M Activities Subtotal w/Contingenc	$1,100
Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies	$1,700
Five-Year Review	$13,000
Subtotal, Professional/Technical Services	$16,000
TOTAL PERIODIC COSTS	**$27,000**

TABLE L-7
Cost Estimate Summary for
Alternative AOC-3: Maintain Existing Soil Cap on AOC,
Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

PRESENT VALUE ANALYSIS

Type of Cost	Year	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	$500,000	$500,000	1	$500,000
Annual O&M Costs	1-100	$2,300,000	$23,000	14.3	$330,000
Periodic Costs	5	$27,000	$27,000	0.713	$19,000
Periodic Costs	10	$27,000	$27,000	0.508	$14,000
Periodic Costs	15	$27,000	$27,000	0.362	$9,800
Periodic Costs	20	$27,000	$27,000	0.258	$7,000
Periodic Costs	25	$27,000	$27,000	0.184	$5,000
Periodic Costs	30	$27,000	$27,000	0.131	$3,500
Periodic Costs	35	$27,000	$27,000	0.0937	$2,500
Periodic Costs	40	$27,000	$27,000	0.0668	$1,800
Periodic Costs	45	$27,000	$27,000	0.0476	$1,300
Periodic Costs	50	$27,000	$27,000	0.0339	$920
Periodic Costs	55	$27,000	$27,000	0.0242	$650
Periodic Costs	60	$27,000	$27,000	0.0173	$470
Periodic Costs	65	$27,000	$27,000	0.0123	$330
Periodic Costs	70	$27,000	$27,000	0.00877	$240
Periodic Costs	75	$27,000	$27,000	0.00625	$170
Periodic Costs	80	$27,000	$27,000	0.00446	$120
Periodic Costs	85	$27,000	$27,000	0.00318	$86
Periodic Costs	90	$27,000	$27,000	0.00227	$61
Periodic Costs	95	$27,000	$27,000	0.00162	$44
Periodic Costs	100	$27,000	$27,000	0.00115	$31

TOTAL PRESENT VALUE OF ALTERNATIVE **$900,000**

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE L-7
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE	
CAPITAL COST ELEMENTS						
Construction Activities						
Implementation Plans/Submittals	1	$24,000	Ea.	**$24,000**	SHA estimate.	
Settling Basing #2 Excavation						
Contractor						
Mobilization/Demobilization						
Compactor, 70 to 150 HP	2	$417	Ea.	$834	Means 01 54 36.50 0020; assumes 50 miles per mob/demob	
Excavator Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; assumes 50 miles per mob/demob	
Decontaminate Medium Equipment	3	$399	Ea.	$1,197	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.	
Subtotal, Mobilization/Demobilization				$3,300	*$3,257*	
Site Preparation						
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	300	$4.28	L.F.	$1,284	ECHOS 18 05 0206	
Subtotal, Site Preparation				$1,300	*$1,284*	
Excavation						
Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	48	$409	Hr.	$19,632	ECHOS 17 03 0232; Assumes H&S level C.	
Water Truck	48	$146	Hr.	$7,008	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.	
Sprayed Water Dust Suppressant	14,000	$0.06	S.F.	$840	ECHOS 33 08 0585; Assumes H&S level C.	
Subtotal, Excavation				$27,000	*$27,480*	
Backfill						
Crawler-mounted, 2.0 C.Y. 235 Hydraulic Excavator	16	$282	Hr.	$4,512	ECHOS 17 03 0232	
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	16	$344	Hr.	$5,504	ECHOS Crew Code COFCQ (Modified)	
Compact Backfill, by Machine, Sheepsfoot Roller, 6" Lift	500	$1.31	C.Y.	$655	ECHOS 17 03 0514	
Subtotal, Backfill				$11,000	*$10,671*	
Site Restoration						
Seeding, Vegetative Cover	0.33	$7,632	Acre	$2,519	ECHOS 18 05 0402	
Subtotal, Site-Restoration				$2,500	*$2,519*	
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	2,250	$80	Ton	$180,000	SHA discussions with Waste Management, Inc.; Includes stabilization additive.	
Subtotal, Transportation/Disposal				$180,000	*$180,000*	
Subtotal, Contractor				$230,000	*$225,211*	
Engineer						
Labor,Oversight	110	$99	Hr.	$10,890	Assumes 2 weeks of field work; See Note 3.	
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$1,634	L.S.	$1,634	Assumes 15% of oversight labor cost.	
Subtotal, Engineer				$13,000	*$12,524*	

TABLE L-7
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Laboratory					
Chemical analysis, Soil Management Assessment	5	$965	Ea.	$4,825	2006-2007 Fee Schedule, Alpha Woods Hole Labs
		Subtotal, Laboratory		$4,800	*$4,825*
		Subtotal, Settling Basin #2 Excavation		**$240,000**	*$242,560*
Post-Construction Submittals/As-Builts	1	$12,000	Ea.	**$12,000**	SHA estimate
		Subtotal, Construction Activities		**$276,000**	
Scope Contingency (15% Construction Activities Subtotal)				$40,000	OSWER 5-6: Assume 15% of Constrcution Activities Subtotal
Bid Contingency (15% Construction Activities Subtotal)				$41,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal
		Subtotal, Construction Activities w/Contingencies		**$360,000**	
Professional/Technical Services					
Remedial Design (15% Construction Activities Subtotal w/Contingencies)				$54,000	OSWER 5-8: Assume 15% of Construction Activities Subtotal (including contingencies)
Project management (8% Construction Activities Subtotal w/Contingencies)				$29,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal (including contingencies)
Construction Management (10% Construction Activities Subtotal w/Contingencies)				$36,000	OSWER 5-8: Assume 10% of Construction Activities Subtotal (including contingencies)
		Subtotal, Professional/Technical Services		**$120,000**	
Institutional Controls					
Establish Deed Restrictions					
Engineer					
Establish Institutional Controls in the form of Deed Restrictions	3	$5,000	Ea.	$15,000	SHA estimate; Costs estimated based on number of properties requiring deed restrictions.
		Subtotal, Engineer		$15,000	
		Subtotal, Establish Deed Restrictions		**$15,000**	
		Subtotal, Institutional Controls		**$15,000**	
		TOTAL CAPITAL COSTS		$500,000	

ANNUAL O&M COST ELEMENTS

O&M Activities

Maintain AOC Cap

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Earthwork Contractor (Assume 1 visit annually)					
Mobilization/Demobilization					
Equipment, Truck 2 Axle, Highway, 33,000 GVW, 6x2,2	1	$452	Day	$452	ECHOS 33 01 0111
Crew, 100 miles, per person	2	$192	Ea.	$384	ECHOS 33 01 0204
Small Equipment	1	$104	Ea.	$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
		Subtotal, Mobilization/Demobilization		$940	*$940*
Repairs to Soil Cap					
Bobcat	8	$126	Hr.	$1,008	ECHOS Crew Code COBBC; Assumes H&S level D.
Topsoil, Furnish & Place, 6" Lifts, Off-site	10	$55	C.Y.	$550	ECHOS 08 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	1	$27	M.S.F.	$27	Means 32 92 19.13 0800; Assumes 5% of soil capped AOC is re-seeded annually.
		Subtotal, Repairs to Soil Cap		$1,600	*$1,558*

TABLE L-7
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE	
Pavement Restoration						
Pavement Removal, Bituminous driveway	106	$5.71	S.Y.	$606	Means 02 41 13.17 5100; Assumes 5% of paved AOC is replaced annually.	
Transportation and Disposal, Asphalt	14	$25	Ton	$350	SHA discussions with Waste Management, Inc.	
Asphaltic Concrete Pavement, Lots & Driveways, *6" stone base, 2" binder course, 1" topping*	950	$2.93	S.F.	$2,784	Means 32 12 16.14 0020; Assumes 5% of paved AOC is replaced annually.	
Hauling, 20 C.Y. dump truck, 20 mile round trip	9	$14	L.C.Y	$123	Means 31 23 23.18 1255	
		Subtotal, Pavement Restoration		$3,900	*$3,863*	
		Subtotal, Earthwork Contractor		$6,400	*$6,361*	
Landscaping Contractor (Assume 2 visits annually)						
Mowing soil capped AOC, 1st event	93	$3.00	M.S.F.	$279	Means 32 01 90.19 4160	
Mowing soil capped AOC, 2nd event	93	$3.00	M.S.F.	$279	Means 32 01 90.19 4160	
		Subtotal, Landscaping Contractor		$560	*$558*	
Engineer						
Labor, Quarterly Inspections	4	$990	Ea.	$3,960	Unit cost assumes 10 labor hours at an average rate of $99/hr. See Note 3.	
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$594	L.S.	$594	Assume 15% of labor cost for quarterly inspections.	
Labor, Annual Summary Report Preparation	22	$124	Hr.	$2,728	See Note 3.	
Misc. Office Expenses (e.g., reproduction, supplies, telephone/fax, postage, etc.)	1	$137	L.S.	$137	Assume 5% of labor cost for report preparation.	
		Subtotal, Engineer		$7,400	*$7,419*	
		Subtotal, Maintain AOC Cap		**$14,000**	*$14,338*	
		Subtotal, O&M Activities		**$14,000**		
Scope Contingency (15% O&M Subtotal)				$2,100	OSWER 5-6: Assume 15% of O&M Subtotal	
Bid Contingency (15% O&M Subtotal)				$2,100	OSWER 5-6: Assume 15% of O&M Subtotal	
		Subtotal, O&M Activities w/Contingencies		**$18,000**		
Professional/Technical Services						
Project Management (10% O&M Subtotal w/Contingencies)				$1,800	OSWER 5-8: Assume 10% of Annual O&M Subtotal including contingencies	
Technical Support (15% O&M Subtotal w/Contingencies)				$2,700	OSWER 5-8: Assume 15% of Annual O&M Subtotal including contingencies	
		Subtotal, Professional/Technical Services		**$4,500**		
		TOTAL ANNUAL O&M COST		**$23,000**		

PERIODIC COSTS

Construction/O&M Activities

Every 5 Years O&M Activities

Maintain Security Fence (every 5 years)

Earthwork Contractor

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE	
Security Fence						
Fence, chain link industrial, schedule 40, 2" posts @ 10' O.C., set in concrete, 6' H, 3 strands barb wire, 6 ga. wire, galv. steel	228	$36	L.F.	$8,208	Means 32 31 13.20 0500; Assumes 10% of security fence is repaired every 5 years.	
		Subtotal, Earthwork Contractor		$8,200	*$8,208*	
		Subtotal, Maintain Security Fence (every 5 years)		$8,200	*$8,208*	

TABLE L-7
Detailed Cost Estimate for
Alternative AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AOC-3: Maintain Existing Soil Cap on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Subtotal, Every 5 Years O&M Activities				**$8,200**	
Scope Contingency (15% Every 5 Years O&M Activities Subtotal)				$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Bid Contingency (15% Every 5 Years O&M Activities Subtotal)				$1,200	OSWER 5-6: Assume 15% of Every 5 Years O&M Activities Subtotal
Subtotal, Every 5 Years O&M Activities w/Contingencies				**$11,000**	
Subtotal, Construction/O&M Activities				**$11,000**	
Professional/Technical Services					
Project Management (10% Construction/O&M Activities Subtotal w/Contingencies)				$1,100	OSWER 5-8: Assume 10% of Construction/O&M Activities Subtotal including contingencies
Technical Support (15% Construction/O&M Activities Subtotal w/Contingencies)				$1,700	OSWER 5-8: Assume 15% of Construction/O&M Activities Subtotal including contingencies
Five-Year Review					
Engineer					
Labor	1	$12,400	L.S.	$12,400	Unit cost assumes 100 labor hours at an average rate of $124/hr. See Note 3.
Misc Expenses (e.g., reproduction, telephone, postage, etc.)	1	$620	L.S.	$620	Assume 5% of labor costs.
Subtotal, Engineer				$13,000	*$13,020*
Subtotal, Five Year Review				$13,000	
Subtotal, Professional/Technical Services				**$16,000**	
TOTAL PERIODIC COSTS				**$27,000**	

Abbreviations:

B.C.Y. = bank cubic yards	Hr. = hour	L.S = lump sump	S.F. = square feet
C Y. = cubic yards	L.C Y = loose cubic yards	Mo = month	S.Y. = square yard
Ea. = each	L.F. = linear feet	M S.F. = thousand square feet	

Notes

1. "Means" refers to one of the following:
   RS Means, 2007, Heavy Construction Cost Data, 21st Annual Edition.
   RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition.
2. "ECHOS" refers to one of the following:
   ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
   ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.
3. Average labor rate of $124/hr assumes primarily office-based labor Average labor rate of $99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.
4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.
5 The following assumptions were used for the quantity estimates associated with excavation remedial process options:
   a.) We assumed "swell" factor of 18% for excavated soils.
   b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
6. "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).
7. All subtotals and total are rounded to 2 significant numbers The number in presented italics to the right of rounded subtotals is the unrounded summed value.

TABLE L-8
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
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CAPITAL COSTS	
Construction Activities	
Implementation Plans/Submittals	$100,000
Residential Soil/Sediment Excavations	
Contractor	
Mobilization/Demobilization	$4,900
Site Preparation	$2,600
Excavation	$34,000
Backfill	$21,000
Site Restoration	$22,000
Soil Stabilization	$28,000
Transportation/Disposal	$100,000
Subtotal, Contractor	$220,000
Engineer	$13,000
Laboratory	$4,400
Subtotal, Residential Soil/Sediment Excavations	$230,000
Former Mill Tailrace Excavation	
Contractor	
Mobilization/Demobilization	$4,700
Site Preparation	$20,000
Dredging & Dewatering	$17,000
Wetlands Restoration	$25,000
Soil Stabilization	$1,600
Transportation/Disposal	$16,000
Subtotal, Contractor	$85,000
Engineer	$13,000
Laboratory	$1,200
Subtotal, Former Mill Tailrace Excavation	$100,000
Lewis Pond Dredging	
Contractor	
Mobilization/Demobilization	$14,000
Site Preparation	$18,000
Dredging & Dewatering	$290,000
Site Restoration (Temporary Access Road Removal/Restoration)	$14,000
Wetlands Restoration	$130,000
Soil Stabilization	$120,000
Transportation/Disposal	$920,000
Subtotal, Contractor	$1,500,000

TABLE L-8
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
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Engineer	$38,000
Laboratory	$15,000
Subtotal, Lewis Pond Dredging	$1,500,000
Post-Construction Submittals/As-Builts	$50,000
Subtotal, Construction Activities	$2,000,000
Scope Contingency (15% Construction Activities Subtotal)	$300,000
Bid Contingency (15% Construction Activities Subtotal)	$300,000
Subtotal, Construction Activities with Contingencies	**$2,600,000**
Professional/Technical Services	
Project Management (5% Construction Activities Subtotal w/Contingencies)	$130,000
Remedial Design (8% Construction Activities Subtotal w/Contingencies)	$210,000
Construction Management (6% Construction Activities Subtotal w/Contingencies)	$160,000
Subtotal, Professional/Technical Services	**$500,000**
TOTAL, CAPITAL COSTS	**$3,100,000**
PERIODIC COSTS	
O&M Activities	
Year 1 Only O&M Activities	
Post-Reconstruction Wetlands Monitoring (year 1 only)	$9,600
Subtotal, Year 1 Only O&M Activities	$9,600
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)	$1,400
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)	$1,400
Subtotal, Year 1 Only O&M Activities with Contingencies	$12,000
Subtotal, O&M Activities	**$12,000**
Professional/Technical Services	
Project Management (10% O&M Activities Subtotal w/Contingencies)	$1,200
Technical Support (15% O&M Activities Subtotal w/Contingencies)	$1,800
Subtotal, Professional/Technical Services	**$3,000**
TOTAL, PERIODIC COSTS	**$15,000**

TABLE L-8
Cost Estimate Summary for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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PRESENT VALUE ANALYSIS

Type of Cost	Year	Total Cost	Total Cost Per Year	Discount Factor	Present Value
Capital Costs	0	$3,100,000	$3,100,000	1	$3,100,000
Periodic Costs	1	$15,000	$15,000	0.935	$14,000

TOTAL PRESENT VALUE OF ALTERNATIVE $\boxed{\$3,100,000}$

Note: Discount Rate of 7% used to calculate discount rate, consistent with "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

TABLE L-8
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE	
CAPITAL COSTS						
Construction Activities						
Implementation Plans/Submittals	1	$100,000	Ea.	$100,000	SHA estimate	
Residential Soil/Sediment Excavations						
Contractor						
Mobilization/Demobilization						
Mob/Demob, Loader, Compactor 70 to 150 HP	4	$417	Ea.	$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.	
Mob/Demob, Excavator, Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.	
Mob/Demob, Small Equipment	2	$104	Ea.	$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.	
Decontaminate Light Equipment	1	$199	Ea.	$199	ECHOS 33 17 0801; Assumes H&S level D.	
Decontaminate Medium Equipment	4	$399	Ea.	$1,596	ECHOS 33 17 0802; Includes water truck; Assumes H&S level D.	
Subtotal, Mobilization/Demobilization				$4,900	*$4,897*	
Site Preparation						
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	600	$4.28	L.F.	$2,568	ECHOS 18 05 0206	
Subtotal, Site Preparation				$2,600	*$2,568*	
Excavation						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	40	$299	Hr.	$11,960	ECHOS 17 03 0231; Assumes H&S level C.	
926, 2.0 CY, Wheel Loader	40	$204	Hr.	$8,160	ECHOS 17 03 0222; Assumes H&S level C.	
Bobcat	40	$180	Hr.	$7,200	ECHOS Crew Code COBBC; Assumes H&S level C.	
Water Truck	40	$103	Hr.	$4,896	ECHOS Crew Code COKBM (Modified); Assumes H&S level C.	
Sprayed Water Dust Suppressant	21,400	$0.06	S.F.	$1,284	ECHOS 33 08 0585; Assumes H&S level C.	
Subtotal, Excavation				$34,000	*$33,500*	
Backfill						
Crawler-mounted, 1.25 C.Y. 225 Hydraulic Excavator	24	$199	Hr.	$4,776	ECHOS 17 03 0231	
926, 2.0 CY, Wheel Loader	24	$130	Hr.	$3,120	ECHOS 17 03 0222	
Roller, Vibratory, Sheepsfoot, 13 Ton, 66" Wide	24	$344	Hr.	$8,256	ECHOS Crew Code COFCQ (Modified)	
Unclassified Fill, Delivered, Off-site	424	$12	C.Y.	$5,088	ECHOS 02223 1001	
Subtotal, Backfill				$21,000	*$21,240*	
Site Restoration						
Topsoil, Furnish & Place, 6" Lifts, Off-site	397	$55	C.Y.	$21,835	ECHOS 18 05 0301	
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	22	$27	M.S.F.	$594	Means 32 92 19.13 0800	
Subtotal, Site Restoration				$22,000	*$22,429*	
Soil Stabilization						
In-Situ Cement Stabilization, 6%	820	$34	B.C.Y.	$27,880	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.	
Subtotal, Soil Stabilization				$28,000	*$27,880*	
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	1,304	$80	Ton	$104,320	SHA discussions with Waste Management, Inc.; Includes excavated material plus stabilizing additive at 6%.	
Subtotal, Transportation & Disposal				$100,000	*$104,320*	
Subtotal, Contractor				$220,000	*$216,834*	

TABLE L-8
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Engineer					
Labor	110	$99	Hr.	$10,890	Assumes 2 weeks of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$1,634	L.S.	$1,634	Assumes 15% of labor cost
		Subtotal, Engineer		$13,000	*$12,524*
Laboratory					
Chemical analysis, Soil Management Assessment Package I	4	$965	Ea.	$3,860	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Lead Confirmatory	5	$13	Ea.	$65	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	10	$50	Ea.	$500	SHA discussions with EMSL Analytical, Inc.
		Subtotal, Laboratory		$4,400	*$4,425*
		Subtotal, Residential Soil/Sediment Excavations		**$230,000**	*$233,783*
Former Mill Tailrace Excavation					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader 70 to 150 HP	2	$417	Ea.	$834	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Clamshell, Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	2	$104	Ea.	$208	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	2	$305	Ea.	$610	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	$200	Ea.	$200	ECHOS 33 17 0801; Assumes H&S level D.
Decontaminate Medium Equipment	4	$399	Ea.	$1,596	ECHOS 33 17 0802; Includes frac tank; Assumes H&S level D.
		Subtotal, Mobilization/Demobilization		$4,700	*$4,674*
Site Preparation					
Erosion Control, Silt Fences, Vinyl, 3' high with 7.5' posts	150	$4.28	L.F.	$642	ECHOS 18 05 0206
Turbidity Curtains including Deployment	100	$190	L.F.	$19,000	SHA discussions with Gunderboom, Inc.
		Subtotal, Site Preparation		$20,000	*$19,642*
Dredging & Dewatering					
1.5 CY Clamshell, with 60' Boom	16	$642	Hr.	$10,272	ECHOS 17 03 0252; Assumes H&S level C.
926, 2.0 CY, Wheel Loader	16	$204	Hr.	$3,264	ECHOS 17 03 0222; Assumes H&S level C.
Bobcat	16	$180	Hr.	$2,880	ECHOS Crew Code COBBC; Assumes H&S level C.
10,000 gal Fractionation Tank (coated interior)	2	$87	Week	$174	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings	2	$125	Week	$250	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet	2	$84	Week	$168	Rain for Rent, Inc. Quote dated 09/24/07
		Subtotal, Dredging & Dewatering		$17,000	*$17,008*

TABLE L-8
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Wetlands Restoration					
1.5 CY Clamshell, with 60' Boom	16	$435	Hr.	$6,960	ECHOS 17 03 0252
926, 2.0 CY, Wheel Loader	16	$130	Hr.	$2,080	ECHOS 17 03 0222
Bobcat	16	$112	Hr.	$1,792	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	33	$55	C.Y.	$1,815	ECHOS 18 05 0301
Screened Leaf Compost, Delivered	25	$17	C.Y.	$425	SHA discussions with Agresource, Inc.
Trees, 2-3' CG - 15' on center, 5/M.S.F.	2	$50	Ea.	$100	SHA discussions with Normandeau Associates, Inc.
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	6	$20	Ea.	$120	SHA discussions with Normandeau Associates, Inc.
Fertilizer Tablets, 1/plant, 250 count per box	1	$30	Ea.	$30	SHA discussions with Normandeau Associates, Inc.
Wetland Seed Mix	*2*	*$75*	*Pounds*	*$150*	*SHA discussions with Normandeau Associates, Inc.*
Conservation Seed Mix	1	$50	Pounds	$50	SHA discussions with Normandeau Associates, Inc.
Annual Rye Grass	1	$1.00	Pounds	$1	SHA discussions with Normandeau Associates, Inc.
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	275	$5.00	Ea.	$1,375	SHA discussions with Normandeau Associates, Inc.
Planting/Seeding Labor	8	$66	Hr.	$528	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA
Wetlands Specialist, Construction Oversight	40	$100	Hr.	$4,000	SHA discussions with Normandeau Associates, Inc.; Assumes upto 5 site visits during and immediately following construction/restoration activities.
Surveying, 2-person Crew	2	$2,950	Day	$5,899	ECHOS 99 04 1201; Assumes H&S level C.
		Subtotal, Wetlands Restoration		$25,000	*$25,325*
Soil Stabilization					
Cement Stabilization, 6%	50	$32	B.C.Y.	$1,600	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization; Assumes H&S level C.
		Subtotal, Soil Stabilization		$1,600	*$1,600*
Transportation/Disposal					
Asbestos-Impacted Soils, Non-Hazardous	93	$125	Ton	$11,625	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to dewatering activities; Includes dewatered dredged material plus stabilizing additive at 6%.
Water, Asbestos-Impacted, Non-Hazardous	5,000	$0.95	Gal.	$4,750	SHA discussions with N.E. Environmental Solutions, Inc.; Assumes no pre-treatment of water.
		Subtotal, Transportation & Disposal		$16,000	*$16,375*
		Subtotal, Contractor		$85,000	*$84,624*
Engineer					
Labor	110	$99	hr	$10,890	Assumes 10 days of field work; See Note 3.
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$1,634	l.s.	$1,634	Assumes 15% of labor cost
		Subtotal, Engineer		$13,000	*$12,524*
Laboratory					
Chemical analysis, Soil Management Assessment Package I	1	$965	Ea.	$965	2006-2007 Fee Schedule, Alpha Woods Hole Labs
Chemical analysis, Asbestos Confirmatory	5	$50	Ea.	$250	SHA discussions with EMSL Analytical, Inc.
		Subtotal, Laboratory		$1,200	*$1,215*
		Subtotal, Former Mill Tailrace Excavation		**$100,000**	*$98,363*

TABLE L-8
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Lewis Pond Dredging					
Contractor					
Mobilization/Demobilization					
Mob/Demob, Loader, Compactor, 70 to 150 HP	4	$417	Ea.	$1,668	Means 01 54 36.50 0020; Assumes 50 miles per mob/demob.
Mob/Demob, Excavator, Above 150 HP	2	$613	Ea.	$1,226	Means 01 54 36.50 0100; Assumes 50 miles per mob/demob.
Mob/Demob, Small Equipment	1	$104	Ea.	$104	Means 01 54 36.50 1100; Assumes 50 miles per mob/demob.
Mob/Demob, Fractionation Tank	18	$305	Ea.	$5,490	Rain for Rent, Inc. Quote dated 09/20/07
Decontaminate Light Equipment	1	$200	Ea.	$200	ECHOS 33 17 0801
Decontaminate Medium Equipment	12	$399	Ea.	$4,788	ECHOS 33 17 0802; Includes frac tanks
Crew, 100 miles, per person	5	$192	Ea.	$960	ECHOS 33 01 0204
Subtotal, Mobilization/Demobilization				$14,000	*$14,436*
Site Preparation					
Clearing, Medium Brush with Average Grub & Some Trees	0.3	$1,254	Acre	$376	ECHOS 17 01 0103; Assumes 9,670 S.F. will be cleared at same level of effort as 0.3 acre.
Temporary Roads, gravel fill, no surfacing, 8" gravel depth	1,075	$16	S.Y.	$17,200	Means 01 55 23.50 0100
Subtotal, Site Preparation				$18,000	*$17,576*
Dredging & Dewatering					
Mechanical Dredging, 2 CY Hydraulic Excavator with RTK GPS, 950 3.0 CY, Wheel Loader, Bobcat, & Small Equipment	1	$270,000	L.S.	$270,000	J.F. Brennan Co., Inc. Cost Estimate dated July 2007; Includes erosion and sediment controls
21,000 gal Fractionation Tanks (coated interior); 2-Month Rental	9	$648	Ea.	$5,832	Rain for Rent, Inc. Quote dated 09/20/07
3" Trash Pump with Fittings; 2-Month Rental	2	$750	Ea.	$1,500	Rain for Rent, Inc. Quote dated 09/24/07
Additional Hose, 90 feet; 2-Month Rental	2	$504	Ea.	$1,008	Rain for Rent, Inc. Quote dated 09/24/07
Filtration system, 4-stage tandem unit, 200 gpm	2	$2,800	Month	$5,600	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system hoses	2	$400	Month	$800	SHA discussions with N.E. Environmental Solutions, Inc.
Filtration system pumps, 2" submersibles	2	$800	Month	$1,600	SHA discussions with N.E. Environmental Solutions, Inc.
Filters	240	$8.00	Ea.	$1,920	SHA discussions with N.E. Environmental Solutions, Inc.
Subtotal, Excavation				$290,000	*$288,260*
Site Restoration (Temporary Access Road Removal/Restoration)					
Crawler-mounted, 2.0 C.Y. 225 Hydraulic Excavator	8	$282	Hr.	$2,256	ECHOS 17 03 0232
926, 2.0 CY, Wheel Loader	8	$130	Hr.	$1,040	ECHOS 17 03 0222
Bobcat	8	$112	Hr.	$896	ECHOS Crew Code COBBC
Topsoil, Furnish & Place, 6" Lifts, Off-site	180	$55	C.Y.	$9,900	ECHOS 18 05 0301
Mechanical Seeding, Grass seed hand push spreader, 4.5 lbs per M.S.F.	10	$27	M.S.F.	$270	Means 32 92 19.13 0800
Subtotal, Site Restoration				$14,000	*$14,362*

TABLE L-8
Detailed Cost Estimate for
Alternative SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace
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Walpole, Massachusetts

SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE	
Wetlands Restoration						
Crawler-mounted, 2.0 C.Y. 225 Hydraulic Excavator	36	$282	Hr.	$10,152	ECHOS 17 03 0232	
950, 3.0 CY, Wheel Loader	36	$135	Hr.	$4,860	ECHOS 17 03 0223	
Bobcat	36	$112	Hr.	$4,032	ECHOS Crew Code COBBC	
Unclassified Fill, Delivered, Off-site	2,174	$12	C.Y.	$26,088	ECHOS 02223 1001	
Topsoil, Furnish & Place, 6" Lifts, Off-site	566	$55	C.Y.	$31,130	ECHOS 18 05 0301	
Screened Leaf Compost, Delivered	*566*	*$17*	*C.Y.*	*$9,622*	*SHA discussions with Agresource, Inc.*	
Sand/Gravel Fill for Streambed	294	$23	C.Y.	$6,762	ECHOS 17 03 0430	
Trees, 2-3' CG - 15' on center, 5/M.S.F.	22	$50	Ea.	$1,100	SHA discussions with Normandeau Associates, Inc.	
Shrubs, 18-24" CG - 8' on center, 15/M.S.F.	64	$20	Ea.	$1,280	SHA discussions with Normandeau Associates, Inc.	
Fertilizer Tablets, 1/plant, 250 count per box	1	$30	Ea.	$30	SHA discussions with Normandeau Associates, Inc.	
Wetland Seed Mix	41	$75	Pounds	$3,075	SHA discussions with Normandeau Associates, Inc.	
Annual Rye Grass	28	$1.00	Pounds	$28	SHA discussions with Normandeau Associates, Inc.	
Aquatic Plants, 2' on center, wetland, 250/M.S.F.	3,390	$5.00	Ea.	$16,950	SHA discussions with Normandeau Associates, Inc.	
Planting/Seeding Labor	48	$66	Hr.	$3,168	SHA discussions with Normandeau Associates, Inc.; ECHOS Crew Code ULABA	
Wetlands Specialist, Construction Oversight	96	$100	Hr.	$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 12 site visits during and immediately following construction/restoration activities.	
Surveying, 2-person Crew	5	$2,023	Day	$10,114	ECHOS 99 04 1201	
		Subtotal, Wetlands Restoration		$130,000	*$127,839*	
Soil Stabilization						
Cement Stabilization, 6%	3,600	$32	B.C.Y.	$115,200	ECHOS 17 03 0602; Assumes 100% of excavated soil/sediment will require stabilization.	
		Subtotal, Soil Stabilization		$120,000	*$115,200*	
Transportation/Disposal						
Asbestos-Impacted Soils, Non-Hazardous	6,678	$125	Ton	$834,750	SHA discussions with Waste Management, Inc.; Includes additional roll-off delivery/pickup costs due to dewatering activities; Includes dewatered dredged material plus stabilizing additive at 6%.	
Water, Asbestos-Impacted, Non-Hazardous	361,000	$0.20	Gal.	$72,200	SHA discussions with N.E. Environmental Solutions, Inc.	
Temporary Road Fill Material	358	$25	Ton	$8,954	SHA discussions with Waste Management, Inc.	
		Subtotal, Transportation & Disposal		$920,000	*$915,904*	
		Subtotal, Contractor		$1,500,000	*$1,479,215*	
Engineer						
Labor	330	$99	hr	$32,670	Assumes 6 weeks of field work; See Note 3.	
Misc. Field Expenses (e.g. mileage, personal protective equipment, field supplies, telephone, etc.)	1	$4,901	l.s.	$4,901	Assumes 15% of labor cost	
		Subtotal, Engineer		$38,000	*$37,571*	
Laboratory						
Chemical analysis, Soil Management Assessment Package 1	13	$965	Ea.	$12,545	2006-2007 Fee Schedule, Alpha Woods Hole Labs	
Chemical analysis, Asbestos Confirmatory	50	$50	Ea.	$2,500	SHA discussions with EMSL Analytical, Inc.	
		Subtotal, Laboratory		$15,000	*$15,045*	
		Subtotal, Lewis Pond Dredging		**$1,500,000**	*$1,531,831*	
Post-Construction Submittals/As-Builts	1	$50,000	Ea.	**$50,000**	SHA estimate	
		Subtotal, Construction Activities		**$2,000,000**		
Scope Contingency (15% Construction Activities Subtotal)				$300,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal	
Bid Contingency (15% Construction Activities Subtotal)				$300,000	OSWER 5-6: Assume 15% of Construction Activities Subtotal	
		Subtotal, Construction Activities with Contingencies		***$2,600,000***		

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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (5% Construction Activities Subtotal w/Contingencies)				$130,000	OSWER 5-8: Assume 5% of Construction Activities Subtotal including contingencies
Remedial Design (8% Construction Activities Subtotal w/Contingencies)				$210,000	OSWER 5-8: Assume 8% of Construction Activities Subtotal including contingencies
Construction Management (6% Construction Activities Subtotal w/Contingencies)				$160,000	OSWER 5-8: Assume 6% of Construction Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				**$500,000**	
TOTAL, CAPITAL COSTS				**$3,100,000**	

PERIODIC COSTS

O&M Activities

Year 1 Only O&M Activities

Post-Reconstruction Wetlands Monitoring (year 1 only)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Contractor					
Post-Construction Wetlands Monitoring	1	$9,600	L.S.	$9,600	SHA discussions with Normandeau Associates, Inc.; Assumes up to 3 post-reconstruction site visits to occur during the following two growing seasons and summary report preparation.
Subtotal, Contractor				$9,600	*$9,600*
Subtotal, Post-Reconstruction Wetlands Monitoring (year 1 only)				**$9,600**	*$9,600*
Subtotal, Year 1 Only O&M Activities				**$9,600**	
Scope Contingency (15% Year 1 Only O&M Activities Subtotal)				$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
Bid Contingency (15% Year 1 Only O&M Activities Subtotal)				$1,400	OSWER 5-6: Assume 15% of Periodic O&M Activities Subtotal
Subtotal, Year 1 Only O&M Activities with Contingencies				**$12,000**	
Subtotal, O&M Activities				**$12,000**	

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SSW-5: Excavation of Soil and Sediment on Lots 33-257, 33-360, and the Former Mill Tailrace (Asbestos ≥ 1%, and Pb on Lot 33-257), and Dredging of Sediment in Lewis Pond (Asbestos ≥ 1%)

DESCRIPTION	QTY	UNIT COSTS	UNITS	COST	COMMENTS/REFERENCE
Professional/Technical Services					
Project Management (10% O&M Activities Subtotal w/Contingencies)				$1,200	OSWER 5-8: Assume 10% of O&M Activities Subtotal including contingencies
Technical Support (15% O&M Activities Subtotal w/Contingencies)				$1,800	OSWER 5-8: Assume 15% of O&M Activities Subtotal including contingencies
Subtotal, Professional/Technical Services				**$3,000**	
TOTAL, PERIODIC COSTS				**$15,000**	

Abbreviations:

B.C.Y. = bank cubic yards; Hr. = hour; L.S. = lump sump; S.F. = square feet
C.Y. = cubic yards; L C.Y. = loose cubic yards; Mo. = month; S.Y. = square yard
Ea. = each; L.F = linear feet; M S.F. = thousand square feet

Notes:

1 "Means" refers to one of the following.
RS Means, 2007, Heavy Construction Cost Data, 21th Annual Edition.
RS Means, 2007, Site Work & Landscape Cost Data, 26th Annual Edition

2. "ECHOS" refers to one of the following:
ECHOS, 2006, Environmental Remediation Cost Data - Assemblies, 12th Annual Edition.
ECHOS, 2006, Environmental Remediation Cost Data - Unit Price, 12th Annual Edition.

3. Average labor rate of $124/hr assumes primarily office-based labor. Average labor rate of $99/hr assumes primarily field labor; personnel hours for field tasks include oversight/project management and support time, in addition to time for staff in field.

4. For those units costs estimated using Means or ECHOS, the H&S level is assumed to be level E, unless otherwise noted.

5. The following assumptions were used for the former mill tailrace quantity estimates:
a.) We assumed "swell" factor of 18% for excavated soils, when estimating L.C Y. volume.
b.) We assumed 1 cubic yard of excavation and backfill materials (existing pavement, excavated soil, unclassified fill, topsoil, and asphaltic concrete pavement) weighs approximately 1.5 tons.
c) We assumed 1 cubic yard of dredged and dewatered sediments weighs approximately 1 75 tons

6 "OSWER" refers to exhibits from the USEPA Office of Solid Waste and Emergency Response (OSWER) "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study," EPA 540-R-00-002, OSWER 93555.0-75 (July 2000).

7. All subtotals and total are rounded to 2 significant numbers. The number presented in *italics* to the right of rounded subtotals is the unrounded summed value

APPENDIX A
STATE CONCURRENCE LETTER

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

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

Post-it® Fax Note 7671	Date 9/29/08 # of pages ▸ 2
To DAVE LEDERER	From Bob Campbell
Co./Dept. US EPA	Co. Mass DEP
Phone # 617-918-1325	Phone # 617-292-5732
Fax # 617-918-2294	Fax # 617-292-5530

September 29, 2008

Mr. James T. Owens III, Director
Office of Site Remediation
U.S. EPA
JFK Federal Building
Boston, MA 02203

Re: State Concurrence with Selected Remedy
Blackburn & Union Privileges Superfund Site
Walpole, MA

Dear Mr. Owens:

The Department of Environmental Protection (MassDEP) has reviewed EPA's selected remedy for the cleanup of the Blackburn & Union Privileges site. MassDEP concurs with selected remedy as described below.

The selected remedy addresses four units: site Groundwater and Surface Water; the East of South Street Soil; the Area of Containment Soil West of South Street; and impacted areas of the Neponset River flood plain including both sediment and soil.

The remedy includes a combination of treatment, excavation, off-site disposal, long-term monitoring and long-term institutional controls. For the Groundwater and Surface Water, the remedy includes collection and treatment of groundwater on-site, institutional controls and long-term monitoring; for the East of South Street Soil, the remedy includes a comprehensive excavation of contaminated soil, off-site disposal and institutional controls; for the Area of Containment West of South Street, the remedy includes maintenance of existing soil and asphalt covers, excavation of the Settling Basin #2 Containment Cell upon determination of existing contamination, off-site disposal, and institutional controls; for the Sediment and Floodplain Soils, the remedy includes excavation and dredging of Neponset River floodplain soil and sediment, the excavation of the Former Mill Tailrace, and impacted areas of Lewis Pond, offsite disposal, restoration of wetland areas and long-term monitoring.

MassDEP looks forward to continued cooperation with EPA as work progresses on the remedial pre-design and design phases of the project.

If you have any questions regarding this letter, please contact the Project Manager, Robert Campbell, at 617-292-5732.

Sincerely,

Janine Commerford, Assistant Commissioner
Bureau of Waste Site Cleanup
Massachusetts Department of Environmental Protection

APPENDIX B
REFERENCES

REFERENCES

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APPENDIX C
GLOSSARY OF TERMS AND ACRNONYMS

ABBREVIATION AND ACRONYM LIST

%	Percent
>	Greater Than
AMSL	Above Mean Sea Level
AOC	Area of Containment
ARARs	Applicable or Relevant and Appropriate Requirements
AST	Above Ground Storage Tank
AVOCs	Aromatic Volatile Organic Compounds
BERA	Baseline Ecological Risk Assessment
bgs	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, and (m,p,o) Xylenes
BVW	Bordering Vegetated Wetland
CARB 435	Method 435 of the California Environmental Protection Agency Air Resources Board Determination of Asbestos Content of Serpentine Aggregate
Canonie	Canonie Environmental Services Corporation
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
cfs	Cubic Feet per Second
CMA	Contaminated Media Management Area
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
COPEC	Contaminant of Potential Ecological Concern
Cosmec	Cosmec, Inc.
DAPL	Dense Aqueous Phase Liquid
EDRA	Existing Data Review and Analysis Report
°F	Degrees Fahrenheit
FS	Feasibility Study
ft	Feet
ft^2	Square Feet
ft^3	Cubic Feet
gpm	Gallons per Minute
GPR	Goldsmith, Prest & Ringwall, Inc.
GWCB	Groundwater Compliance Boundary
HDPE	High Density Polyethylene
HI	Hazard Index
ILCR	Incremental Lifetime Cancer Risks
Kendall	The Kendall Company
LELs	Lowest Effect Levels
LM	Limited Manufacturing
LOAEL	Lowest Observed Adverse Effects Level

LOED	Lowest Observed Effects Dose
LUW	Land Under Water
M&E	Metcalf & Eddy, Inc.
MADEP	Massachusetts Department of Environmental Protection
MCLs	USEPA National Primary Drinking Water Standards Maximum Contaminant Levels
MSWQSs	Massachusetts Surface Water Quality Standards
MTBE	Methyl Tertiary Butyl Ether
NCDC	National Climatic Data Center
NCP	National Oil and Hazardous Substances Contingency Plan
ND	Not Detected (Above Laboratory Detection Limits)
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effects Level
NOED	No Observed Effects Dose
NRWQC	National Recommended Water Quality Criteria
Order	Administrative Order by Consent
OSWER	USEPA Office of Solid Waste and Emergency Response
PAHs	Polycyclic Aromatic Hydrocarbons
PBL	Probability
PLM	Polarized Light Microscopy
POCs	Points of Compliance
ppm	Parts per Million
PRGs	Preliminary Remediation Goals
RA	Removal Action
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation / Feasibility Study
ROW	Right of Way
s.u.	Standard Units (pH)
SHA	Sanborn, Head & Associates, Inc.
Shaffers	The Shaffer Realty Nominee Trust and BIM Corporation
Site	Blackburn & Union Privileges Superfund Site
SSD	Sub-Slab Depressurization
SVOCs	Semi-Volatile Organic Compounds
TBCs	To-be-Considered Guidelines
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEM	Transmission Electron Microscopy
Tyco	Tyco Healthcare Group, LP
µg/dL	Micrograms per Deciliter
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

VOCs	Volatile Organic Compounds
Work Plan	Work Plan for The Phase IA Remedial Investigation for the Blackburn and Union Privileges Superfund Site, Walpole, Massachusetts

APPENDIX D
ARARs TABLES

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	NRWQC establish water quality standards for the protection of human health and aquatic life.	This alternative will meet these standards through collection and treatment of contaminated groundwater that might otherwise contribute to exceedances of these water quality standards in the tailrace, leading to the Neponset River.
State Requirements	Massachusetts Surface Water Quality Standards (314 CMR 4.00)	Relevant and Appropriate	Designates minimum water quality criteria for sustaining state designated uses for surface waters in the Commonwealth. Allows for site-specific criteria where federal water quality criteria are invalid due to site-specific characteristics.	This alternative will meet these standards through collection and treatment of contaminated groundwater that might otherwise contribute to exceedances of these water quality standards in the tailrace, leading to the Neponset River.
Federal 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 these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential non-carcinogenic hazards caused by exposure to contaminants in groundwater.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 300 ppb.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	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.	This alternative includes work to be performed in or near a wetland. Construction of any collection trench or other remedial activities that will alter wetlands will be conducted in accordance with these standards. This is the least damaging practicable alternative for protecting wetland resources from site contamination.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.); Fish and wildlife protection (40 C.F.R. § 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.	This alternative includes work to be performed in or near wetland and floodplain areas. EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practicable alternative to siting the collection trench and other remedial activities within the 100-year floodplain, all practicable means will be taken to limit harm to and preserve beneficial values of floodplains.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. 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 there is no practicable alternative to siting the collection trench and other remedial activities within wetlands or if removal of groundwater will negatively alter downgradient wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release during a 100-year flood.	In the event that the system treats hazardous waste, remedial structures, including the collection trench, within the 100-year floodplain, will be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards (such as the mill tailrace), activities will be coordinated with the Department of the Interior.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards (such as the mill tailrace), activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include streambanks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to siting the collection trench and other remedial activities within wetland resource areas or their buffer zones, or if removal of groundwater will negatively alter downgradient wetland resources, then measures will be taken to limit impacts.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	In the event that the system treats hazardous waste, remedial structures, including the collection trench, within Land Subject to Flooding and potential public water supply area, will be designed, constructed, operated and maintained to prevent a release of hazardous waste within the protected resource area.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§ 26-27); Massachusetts Historical Commission (950 CMR § 70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR § 71.00)	Relevant and Appropriate	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards (such as the mill tailrace), whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remediation wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if treated water from the remedial action is discharged to surface waters, including the tailrace and adjacent wetlands.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if treated water from the remedial action is discharged to a POTW.

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ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Hazardous waste includes an aqueous waste with a pH greater than or equal to 12.5. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of collection, treatment, or monitoring activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. The Alternative will meet the closure/post closure standards because collection, treatment and discharge of contaminated groundwater will prevent migration of contamination to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	RCRA Interim Status: Chemical, Physical, or Biological Treatment (40 C.F.R. Part 265, Subpart Q)	Relevant and Appropriate	Standards for using chemical, physical, or biological treatment at hazardous waste facilities.	If a component of an ex-situ treatment system utilizes chemical, physical, or biological treatment to treat hazardous waste, then these standards will be met.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards are set for air strippers, dust control and other release sources.	If a component of the ex-situ treatment system generates regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	This ARAR 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.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing materials excavated and handled as part of this remedial alternative (in particular from installation of the groundwater collection system). Excavation and off-site disposal of all soil with asbestos exceeding PRGs will meet these standards.

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Federal Requirements	RCRA, Air Emissions from Process Vents, 40 C.F.R. Part 264, Subpart AA	Relevant and Appropriate	Establishes air emission controls for process vents, closed-vent systems, and control devices at hazardous waste facilities; and applies to distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping operations that "manage hazardous wastes with organic concentrations of a least 10 ppmv." Massachusetts has not yet adopted these regulations so these federal regulations are the applicable standard.	If a component of an ex-situ treatment system treats hazardous waste and utilizes a process regulated by this section, air emission controls will be implemented if the applicability threshold is met.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	RCRA, Air Emissions for Tanks, Surface Impoundments and Containers, 40 C.F.R. Part 265, Subpart CC	Relevant and Appropriate	Establishes air emission controls for tanks, surface impoundments or containers at hazardous waste facilities involving hazardous waste which meets the applicability threshold. Massachusetts has not yet adopted these regulations so these federal regulations are the applicable standard.	If ex-situ treatment system treats hazardous waste and utilizes tanks or other structures regulated under these regulations, then they will be operated in compliance with these standards.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. Part 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs; MCLGs set at zero are To Be Considered	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

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ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters from the ex-situ treatment facilities will be designed and operated so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges (314 CMR 12.03(8); 12.04(2),(3),(5),(8-12), 12.05(1),(6),(12), 12.06(1-3)	Relevant and Appropriate	Establishes operation and maintenance standards for treatment works.	The ex-situ treatment system, although not "treatment works", will not allow waste to bypass system, will have an alarm system in place, and will be maintained properly and safely with adequate tools, equipment, parts, personnel, etc. Sampling and analysis will be conducted according to the site plan.

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ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the US within the Commonwealth (314 CMR 9.00)	Applicable	Establishes criteria and standards for protecting water quality from dredging, handling and disposal of fill material and dredged material in state regulated wetland resource areas and their buffer zones.	Activities will be conducted in accordance with these requirements to protect State wetland resources
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This regulation establishes requirements for determining whether wastes are hazardous. 310 CMR 30.123 specifically addresses identification of characteristic hazardous waste based on corrosivity.	Waste generated as part of the remedial action will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal.	Hazardous wastes generated as a part of a remedial action will be handled in compliance with the requirements of these regulations

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Applicable	General facility requirements for waste analysis, security measures, inspections, personnel training, and closure/post-closure.	If the ex-situ treatment system treats hazardous waste, it will be constructed and operated in accordance with this requirement. All workers will be properly trained. Closure/post-closure standards will be met since collection, treatment and discharge of groundwater will address the migration of contaminants to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Applicable	Standards for wastewater treatment units for the treatment of hazardous waste.	If the ex-situ treatment system treats groundwater with hazardous characteristics prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the ex-situ treatment system or for monitoring-generated waste will comply with these requirements.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This ARAR specifies requirements for tank systems used to store or treat hazardous waste. 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 on-site treatment or storage of hazardous wastes in tanks. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Hazardous Waste Rules - Groundwater protection (310 CMR 660)	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 CMR 669)	A "contaminated media area compliance zone" for groundwater will be established for the Site. Groundwater outside of this area is expected to meet USEPA MCLs.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	The ex-situ treatment system will meet these regulations through a monitoring program and engineering controls if necessary.

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ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Ex-situ treatment will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial treatment will cause ambient air quality standards to be exceeded. Dust standards will be complied with during any and all excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Construction activities and the operation of the ex-situ treatment system will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), and noise (310 CMR 7.10).
State Requirements	Massachusetts Contingency Plan, Rules for Remedial Air Emissions (310 CMR 40.0049	Relevant and Appropriate	The rules set forth standards for emissions from remedial activities, including a general requirement for 95% control over emissions from the remedial system	This alternative will be designed and operated so that remedial air emissions will meet these requirements.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Drinking Water Standards (310 CMR 22.00)	Relevant and Appropriate	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Contingency Plan (MCP) Method 1 GW-1 Standards (310 CMR 40.0974)	Relevant and Appropriate	These are promulgated standards for characterizing the risk posed by COCs in groundwater under the MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Relevant and Appropriate	Establishes groundwater quality criteria necessary to sustain the designated uses, and regulations necessary to achieve the designated uses or maintain the existing groundwater quality.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	Relevant standards of these regulations will be followed to the extent that the alternative involves decommissioning of monitoring wells.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Threshold Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for Ambient Air	To Be Considered	DEP has issued guidance setting out permissible concentrations of air toxics in ambient air. The TELs and AALs are used to guide permitting decisions for sources of air toxics.	This alternative will be designed and operated so that remedial air emissions from ex-situ treatment do not cause any exceedances of TELs or AALs.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal 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 all asbestos areas will be addressed through excavation, off-site disposal, and a soil management plan for all unexcavated areas.
Federal 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 since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential non-carcinogenic hazards caused by exposure to contaminants,
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. 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.	Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	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.	There will be consultation with the U.S. Fish and Wildlife Service, as this alternative includes work to be performed in or near a wetland. Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to conducting remedial activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. 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 there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b))	Relevant and Applicable	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	While hazardous waste is not anticipated to remain following excavation, the remedial action will be performed in a manner as to prevent a release of hazardous waste in the 100-year floodplain.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to performing remedial activities within wetland resource areas or their buffer zones, then measures will be taken to limit impacts.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to a POTW.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials excavated/handled of as part of this remedial alternative. Excavation and off-site disposal of all asbestos-contaminated soil will meet standards for preventing risk from educational use of the site.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	This ARAR 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.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing materials excavated and handled as part of this remedial alternative. Excavation and off-site disposal of all soil with asbestos exceeding PRGs will meet these standards.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Confirmatory testing within the excavations will assess whether all hazardous waste contaminated media have been removed. Relevant and appropriate requirements of these standards will apply to contaminated media remaining in place under existing structures.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or other remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable for waste generated pursuant to this alternative	These standards establish requirements for determining whether wastes are hazardous.	Wastes generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. Confirmatory testing within the excavation will assess whether all contaminated media have been removed.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable for waste generated pursuant to this alternative	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If it is necessary to treat water from excavations contaminated with hazardous wastes prior to discharge to surface waters or a POTW, then the requirements of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that hold field-generated hazardous wastes.	Any hazardous waste containers used for holding waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This regulation specifies requirements for tank systems used to store or treat hazardous waste. 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 on-site treatment or storage of hazardous waste in tanks. Specifications will include secondary containment, if necessary.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any excavation water treatment facilities will meet these regulations through a monitoring program and engineering controls if necessary
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	Excavation and off-site disposal of contaminated media, backfilling, monitoring, and institutional controls will meet relevant and appropriate standards for closure/post-closure and monitoring.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Excavation and other remedial measures will be implemented in accordance with these rules. No air emissions will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Excavation and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning monitoring wells.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	EPA Alternative Cap Guidance	To Be Considered	Provides standards for alternative cap design to address potential risks to human health, ecological receptors, and surface water and groundwater from wastes left in place.	If hazardous waste is left in place below existing structures,, these standards will be met because the pathway of direct contact to human receptors is eliminated.
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal 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 potential risks from asbestos will be controlled by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal 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 since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance on assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard since potential lead hazards will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	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.	This alternative includes maintenance of the existing cover and Neponset River culvert to be performed in or near a wetland. If there are no practical alternatives to locating long-term monitoring, fencing, maintenance and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 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.	This alternative includes long-term monitoring, fencing, and maintenance of the existing cover and Neponset River culvert to be performed in or near fish and wildlife habitat. There will be consultation with the U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to locating fencing, monitoring, maintenance of the existing cover and Neponset River culvert and other activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. 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 there are no practical alternatives to locating fencing, monitoring, maintenance of the cover and Neponset River culvert, and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 et seq.), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures within the 100-year floodplain, including the cover and Neponset River culvert will be monitored and maintained to prevent the release of contaminated media during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 et seq.); National historic landmarks (36 C.F.R. Part 65)	Applicable	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.	This alternative includes work near the potentially historic mill tail race, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	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.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	Remedial structures, including the cover and Neponset River culvert, within the 100-year floodplain will be monitored and maintained to prevent the release of contaminated media within the protected resource area.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practical alternative to locating fencing, monitoring, maintenance of the cover and Neponset River culvert and other activities within wetland resources and their buffer zones, then measures will be taken to limit impacts.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities, including monitoring, fencing, and maintenance of the cover and Neponset River culvert in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	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.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations during long-term maintenance of the cover or Neponset River culvert, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations during long-term maintenance of the Neponset River culvert or cover, is discharged to a POTW.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials handled/covered at the site. Furthermore, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and the Neponset River culvert will meet these standards in order to prevent exposure to children.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	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.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing >= 1% materials handled/disposed of at the Site. Furthermore, institutional controls, long-term monitoring, fencing and security measures, along with maintenance and monitoring of the cover and Neponset River culvert, will meet these standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized and disposed of off-site in accordance with these standards. Maintenance of the existing cover will meet relevant and appropriate closure/post-closure standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water from long-term maintenance, or other remedial activity, will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of remedial action, including long-term maintenance of the cover and Neponset River culvert and monitoring, will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate	General facility requirements for closure, post closure, groundwater monitoring, waste analysis, security measures, inspections, and training requirements	Any remedial action completed on contaminated media, including monitoring institutional controls, and long-term maintenance of the cover or Neponset River culvert, will be conducted in accordance with this requirement. All workers will be properly trained. Any hazardous wastes generated will be stabilized and disposed of off-site.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Landfill Regulations (310 CMR 30.620)	Relevant and Appropriate	Standards for closure and post-closure of hazardous waste landfills. Since the wastes on Site have been covered in place, certain design and operating requirements listed in 310 CMR 30.622, are not relevant and appropriate to the remedy: a) 310 CMR 30.622(1) & (2) - requirement for a bottom liner; b) 310 CMR 30.622(3) - leak detection, collection, and removal system; and c) 310 CMR 30.622(4) - standards for an upper liner.	All non-asbestos wastes have been covered under the relevant and appropriate standards established under these regulations for: a protective cover, run-on and run-off control, monitoring, and closure and post-closure standards (except for liner and leak detection closure/post-closure standards that are not relevant and appropriate). Long-term monitoring and institutional controls will ensure that the remedy remains protective.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers generated as part of this alternative will comply with these requirements.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Excavation water treatment facilities used in conjunction with long-term maintenance of the cover or Neponset River culvert, or other remedial activities, will meet these regulations through a monitoring program and engineering controls, if necessary.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	The cover and Neponset River culvert long-term maintenance, and other remedial measures, will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	The cover and Neponset River culvert long-term maintenance, and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning any monitoring wells.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State 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	The existing cover will meet the closure/post closure standards to prevent direct human contact with contaminants. Long-term monitoring and institutional controls will ensure that the remedy remains protective.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal 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 all asbestos in Settling Basin #2 Containment Cell will be excavated and disposed off-site; and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal 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 since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.. .
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-3

ARAR Summary for Alternative AOC-3

AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls

Feasibility Study

Blackburn & Union Privileges Superfund Site

Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard since potential hazards caused by exposure to lead contaminated soil will be addressed by excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	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.	This alternative includes excavation and off-site disposal of the Settling Basin #2 Containment Cell, and long-term monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near a wetland. If there are no practical alternatives to locating fencing, maintenance and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 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.	This alternative includes excavation and off-site disposal of the Settling Basin #2 Containment Cell, and long-term monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near fish and wildlife habitat. There will be consultation with the U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to excavation and off-site disposal of the Settling Basin #2 Containment Cell wastes and locating monitoring, fencing, maintenance of the cover and Neponset River culvert and other activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. 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 there are no practical alternatives to excavation and off-site disposal of Settling Basin #2 Containment Cell wastes and locating monitoring, fencing, maintenance of the cover and Neponset River culvert and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures within the 100-year floodplain, including the cover and Neponset River culvert will be monitored and maintained to prevent the release of contaminated media during a 100-year flood.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	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.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, or the South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	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.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	Remedial structures, including the cover and Neponset River culvert, within the 100-year floodplain will be maintained to prevent the release of contaminated media within the protected resource area. .

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to excavation and off-site disposal of the Settling Basin #2 Containment Cell, and monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near state wetland resource areas and their buffer zones, then measures will be taken to limit impacts.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	This alternative includes monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near a regulated waterway. If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	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.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations during removal of the Settling Basin #2 Containment Cell and long-term maintenance of the cover or Neponset River culvert, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations during removal of the Settling Basin #2 Containment Cell and long-term maintenance of the Neponset River culvert or cover, is discharged to a POTW.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials handled/covered at the Site. Furthermore, excavation and off-site disposal of wastes, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and the Neponset River culvert will meet these standards.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	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.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing >= 1% materials handled/disposed of at the Site. Furthermore, excavation and off-site disposal of wastes, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and Neponset River culvert, will meet these standards.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized, and disposed off-site in accordance with these standards. Maintenance of the existing soil and pavement covers on the AOC will meet relevant and appropriate closure/post-closure standards. The clean soil placed at the former location of the Settling Basin #2 Containment Cell will meet relevant and appropriate standards. High pH (i.e., > 12.5) saturated soils and groundwater will remain at depth below the water table and the potential zone of direct contact. Maintaining a protective cover in the area of the excavated Settling Basin #2 Containment Cell, long-term monitoring, and institutional controls will be established to prevent contact with high pH soils and groundwater.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water from removal of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activity will be carried out so that it will not cause or contribute to an exceedance of the MSWQS. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as a part of remedial action including excavation of the Settling Basin #2 Containment Cell, long-term maintenance of the cover and Neponset River culvert, or monitoring, will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate	General facility requirements for closure, post closure, groundwater monitoring, waste analysis, security measures, inspections, and training requirements	Any remedial action completed on hazardous waste, including excavation and backfilling of the Settling Basin #2 Containment Cell, or monitoring, institutional controls, and long-term maintenance of the cover or Neponset River culvert, will meet relevant and appropriate standards. Long-term monitoring and institutional controls will be established to prevent contact with inaccessible hazardous wastes under buildings and in addition to maintaining a protective cover in the area of the excavated Settling Basin #2 Containment Cell. Any hazardous wastes generated will be stabilized and disposed of off-site. All workers will be properly trained.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If, as part of excavation of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activities, it is necessary to treat water from excavations contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the requirements of these regulations will be met.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Landfill Regulations (310 CMR 30.620)	Relevant and Appropriate	Standards for closure and post-closure of hazardous waste landfills. Since the wastes on Site have been covered in place, certain design and operating requirements listed in 310 CMR 30.622, are not relevant and appropriate to the remedy: a) 310 CMR 30.622(1) & (2) - requirement for a bottom liner; b) 310 CMR 30.622(3) - leak detection, collection, and removal system; and c) 310 CMR 30.622(4) - standards for an upper liner.	Wastes within the Settling Basin #2 Containment Cell will be excavated and disposed of off-site. All other non-asbestos contaminated media throughout the rest of the AOC are under a cover which meets relevant and appropriate standards established under these regulations for: a protective cover, run-on and run-off control, monitoring, and closure and post-closure standards (except for the liner and leak detection closure/post-closure standards that aren't relevant and appropriate).
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers generated as part of this alternative will comply with these requirements.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Excavation water treatment facilities used in conjunction with the removal of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activities will meet these regulations through a monitoring program and engineering controls, if necessary.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	The Settling Basin #2 Containment Cell excavation, cover and Neponset River culvert long-term maintenance, and other remedial measures will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	The Settling Basin #2 Containment Cell excavation, cover and Neponset River culvert long-term maintenance, and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning any monitoring wells.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.
State 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.	The backfill in the area of the excavated Settling Basin #2 Containment Cell and maintenance and institutional controls over the existing cover over the rest of the AOC will meet the closure/post closure standards to prevent direct human contact with contaminants.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal 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 all asbestos contaminated sediments and wetland soils will be addressed by excavation/dredging and off-Site disposal
Federal 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 since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal).
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard by excavation of lead-impacted soil on residential Lot #33-257, and off-Site disposal.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	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 limited to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands, particularly the excavation of contaminated wetland soils and sediments, will be conducted in accordance with these standards. Since all contaminants will be removed under this alternative, this is the least damaging practicable alternative to the long-term protection of wetland resources at the Site.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and Wildlife Protection (40 C.F.R. § 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.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service since excavation of contaminated soils in sediments will involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to remedial activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. 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 limited to the maximum extent.	Since there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts, including potential restoration.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 et seq.); National Historic Landmarks (36 C.F.R. Part 65)	Applicable	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.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	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.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the Site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Any remedial activities that will alter wetlands and their buffer zones, particularly excavation of contaminated soils and sediments along the Neponset River and within Lewis Pond, will be conducted in accordance with these standards.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, 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.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to a POTW.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Standards to be used for monitoring water quality in Lewis Pond and the Neponset River during the remedial activities, including excavation/dredging of soil/sediment.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	Relevant and appropriate standards will be complied with for any asbestos-containing materials excavated and disposed of either on or off-site as part of this remedial alternative in order to prevent exposure to children.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	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 excavated/handled at the Site. In particular, dewatering of any sediment or wetland soils will be conducted so as to not release asbestos back into the environment.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities, including excavation/dredging or processing of contaminated soil/sediment, generates regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste-Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place. Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Soils/sediments will be evaluated prior to their dredging/excavation to ensure all hazardous waste contaminated soils/sediments will be removed. Wastes generated as part of remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized, transported, and disposed of in accordance with these standards.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation/dredging or process water from the remedial action will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	MA Surface Water Quality Standards (314 CMR 4.00)	Applicable	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Water quality standards to be used for monitoring water quality in Lewis Pond and the Neponset River during remedial activities, including excavation/dredging of soil/sediment.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	MA Water Quality Certification for Discharge of Dredged or Fill Material (314 CMR 9.00)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a reasonable alternative with lesser effects is available. If activity takes place, adverse impacts must be limited. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Remedial activities, including excavation/dredging and handling of soil/sediment, will occur in and around Site wetlands. These actions will be designed to limit adverse effects and to preserve, mitigate, and restore disturbed areas.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Sampling will identify all hazardous waste on site that will be excavated and disposed of offsite. Wastes generated as part of remedial activities will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-Site disposal (or on-Site consolidation in the AOC).	Hazardous wastes generated as part of remedial activation, will be handled in compliance with the requirements of these regulations
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Applicable	General facility requirements for waste analysis, security measures, inspections, and training requirements	Any remedial action completed on hazardous waste will be conducted in accordance with this requirement. All workers would be properly trained. If excavated soil/sediment is considered hazardous waste, it will be stabilized and disposed of off-Site.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If as part of this remedial action, it is necessary to treat water contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the holding contaminated soil/sediment, water or other waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. 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 if tanks are used to store or treat hazardous wastes generated as part of this alternative. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any water treatment facilities used as part of this remedial alternative will meet these regulations through a monitoring program and engineering controls, if necessary.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment in the Neponset River and its Floodplain, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation/dredging and processing of soil/sediment, will be implemented in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Remedial activities, including excavation/dredging and processing of soil/sediment, will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

APPENDIX E: ADMINISTRATIVE RECORD INDEX

Blackburn & Union Privileges
NPL Site Administrative Record
Record of Decision (ROD)

Index

ROD Dated September 2008
Released: October 2008

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record for the Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts, Operable Unit 1 - Sitewide, Record of Decision (ROD), released September 2008. 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 record replaces the Proposed Plan Administrative Record File distributed in June 2008. This record includes, by reference, the administrative record for the South Street (Blackburn & Union Privileges) Removal Site, May 10, 1990.

The administrative record file is available for review at:

EPA New England Office of
Site Remediation & Restoration
1 Congress Street, Suite 1100 (HSC)
Boston, MA 02114
(by appointment)
617-918-1440 (phone)
617-918-0440 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Walpole Public Library
65 Common Street
Walpole, MA 02081
508-660-7340 (phone)
508-660-2714 (fax)
www.walpole.ma.us/library.htm

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).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this administrative record file should be directed to the EPA New England site manager.

01: SITE ASSESSMENT

File Break: 01.03

288382 **INSPECTION CHECKLIST FOR THE SOUTH STREET SITE**

Author: MICHAEL BURNS CERTIFIED ENGINEERING AND TESTING COMPANY INC
Addressee: TIMOTHY WOODWARD CERTIFIED ENGINEERING AND TESTING COMPANY INC
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Bates Number:
Weston Number:

288383 **MONTHLY INSPECTION OF THE SOUTH STREET SITE WITH PHOTOGRAPHS**

Author: TIMOTHY WOODWARD CERTIFIED ENGINEERING AND TESTING COMPANY INC
Addressee: M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
Doc Type: LETTER
PHOTOGRAPH

Doc Date: 03/17/1992 # of Pages: 6
Bates Number:
Weston Number:

288384 **LONG-TERM INSPECTION AND MAINTENANCE PLAN, SOUTH STREET SITE (DRAFT)**

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: SITE INSPECTION (SI)
REPORT

Doc Date: 09/01/1992 # of Pages: 13
Bates Number:
Weston Number:

01: SITE ASSESSMENT

File Break: 01.03

288385 STATUS REPORT ON THE SOUTH STREET SITE (TRANSMITTAL DATED 5/27/1993 ATTACHED)

Author: R.R. MARRIAM W R GRACE & CO
Addressee: L.E. INGRAM W R GRACE & CO
Doc Type: REPORT
SITE INSPECTION (SI)

Doc Date: 05/24/1993 # of Pages: 7
Bates Number:
Weston Number:

288386 INSPECTION OF THE SOUTH STREET SITE

Author: R.R. MARRIAM W R GRACE & CO
Addressee: L.E. INGRAM W R GRACE & CO
Doc Type: LETTER

Doc Date: 05/28/1993 # of Pages: 2
Bates Number:
Weston Number:

288387 MEMO ON A VISIT FROM NORMANDEAU ASSOCIATES TO THE SOUTH STREET SITE

Author: R.R. MARRIAM W R GRACE & CO
Addressee: L.E. INGRAM W R GRACE & CO
Doc Type: MEMO

Doc Date: 07/20/1993 # of Pages: 2
Bates Number:
Weston Number:

01: SITE ASSESSMENT

File Break: 01.03

288388 **MEMO ON A JULY 19 1993 VISIT TO THE SOUTH STREET SITE□**

Author: LEE CARBONNEAU NORMANDEAU ASSOCIATES INC
Addressee: R.R. MARRIAM W R GRACE & CO
M MITCH OBRADOVIC W R GRACE & CO
Doc Type: MEMO

Doc Date: 08/12/1993 # of Pages: 1
Bates Number:
Weston Number:

288392 **INSPECTION AND MAINTENANCE TRIP - SOUTH STREET SITE □**

Author: R.R. MARRIAM W R GRACE & CO
Addressee: L.E. INGRAM W R GRACE & CO
Doc Type: MEMO

Doc Date: 09/08/1993 # of Pages: 4
Bates Number:
Weston Number:

288393 **LETTER ON INSPECTION ACTIVITIES AT WALPOLE SITE (SOUTH STREET) - 1993**

Author: R.R. MARRIAM W R GRACE & CO
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: LETTER

Doc Date: 02/23/1994 # of Pages: 2
Bates Number:
Weston Number:

01: SITE ASSESSMENT

File Break: 01.06

288395 **NATIONAL PRIORITIES LIST HAZARDOUS RANKING SYSTEM (HRS) REPORT**

Author: US EPA - HEADQUARTERS
Addressee:
Doc Type: REPORT

Doc Date: 01/01/1994 # of Pages: 54
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break:

289425 **MEMO ON SOUTH STREET SITE ASBESTOS REMOVAL ACTION FROM THE ENGINEERING EVALUATION / COST ANALYSIS (EE/CA)**

Author: EDWARD L REINER US EPA REGION 1
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: MEMO

Doc Date: 02/20/1991 # of Pages: 2
Bates Number:
Weston Number:

289426 **WETLAND MITIGATION MONITORING REPORT #5 (FINAL) SOUTH STREET SITE**

Author: NORMANDEAU ASSOCIATES INC
Addressee: W.R. GRACE
Doc Type: REPORT

Doc Date: 10/01/1997 # of Pages: 87
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.01

288396 **LETTER ABOUT THE SHAFFER REALTY TRUST SITE ASSESSMENT**

Author: RICHARD CHALPIN MA DEPT OF ENVIRONMENTAL QUALITY AND ENGINEERING
Doc Date: 09/02/1987 # of Pages: 2
Addressee: DONALD F BERGER US EPA REGION 1
Bates Number:
Weston Number:
Doc Type: LETTER

288398 **TRANSMITTAL OF FINAL REMOVAL ACTION WORK PLANS**

Author: M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
Doc Date: 08/28/1992 # of Pages: 2
Addressee: THOMAS C CONDON US EPA REGION 1
Bates Number:
Weston Number:
Doc Type: LETTER

288399 **COMMENTS ON SHORT-TERM MEASURE RESPONSE PLAN, ENGINEERING EVALUATION AND COST ANALYSIS (EE/CA), ASBESTOS REMOVAL ACTION FOR THE SOUTH STREET SITE**

Author: JAMES DURAND WALPOLE (MA) CONSERVATION COMMISSION
Doc Date: 10/02/1990 # of Pages: 3
Addressee: THOMAS C CONDON US EPA REGION 1
Bates Number:
Weston Number:
Doc Type: LETTER

02: REMOVAL RESPONSE

File Break: 02.01

288400 LETTER ABOUT MILL TAIL RACE SAMPLING ON THE SOUTH STREET SITE

Author: M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
Addressee: THOMAS C CONDON US EPA REGION I
Doc Type: LETTER
Doc Date: 07/03/1991 # of Pages: 3
Bates Number:
Weston Number:

288401 LETTER ABOUT THE EPA REMOVAL ACTION (ARARS DETERMINATION FOR REMOVAL ACTION ATTACHED)

Author: ANDREW RAUBVOGEL US EPA REGION I
Addressee: WALPOLE (MA) WATER AND SEWER COMMISSION
Doc Type: LETTER
Doc Date: 07/24/1992 # of Pages: 11
Bates Number:
Weston Number:

288426 TRANSMITTAL OF 1996 WETLANDS MONITORING REPORT

Author: PAULA SULLIVAN W R GRACE & CO
Addressee: DAN COUGHLIN US EPA REGION I
Doc Type: LETTER
Doc Date: 09/26/1996 # of Pages: 1
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.01

288427 TRANSMITTAL OF 1996 INSPECTION ACTIVITIES (CHECKLIST ATTACHED)

Author: PAULA SULLIVAN W R GRACE & CO
Addressee: DAN COUGHLIN US EPA REGION I
Doc Type: LETTER

Doc Date: 02/14/1997 # of Pages: 3
Bates Number:
Weston Number:

File Break: 02.02

287751 SITE ASSESSMENT REPORT, SOUTH STREET SITE

Author: DAMES & MOORE
Addressee:
Doc Type: REPORT

Doc Date: 08/18/1989 # of Pages: 203
Bates Number:
Weston Number:

288402 QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR THE SOUTH STREET REMOVAL ACTION

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT

Doc Date: 08/01/1992 # of Pages: 128
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.02

288403 **VACANT BUILDING INVENTORY□**

Author: STEVEN CORR WESTON & SAMPSON ENGINEERS INC
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: REPORT
Doc Date: 02/16/1990 **# of Pages:** 14
Bates Number:
Weston Number:

288404 **GEOPHYSICAL SURVEY□**

Author: STEVEN CORR WESTON & SAMPSON ENGINEERS INC
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: REPORT
Doc Date: 04/27/1990 **# of Pages:** 55
Bates Number:
Weston Number:

288405 **HEALTH AND SAFETY AND AIR MONITORING PLAN, SOUTH STREET SITE REMOVAL ACTION□**

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT
Doc Date: 07/01/1992 **# of Pages:** 210
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.02

289435 **SHORT-TERM MEASURE RESPONSE PLAN, ENGINEERING EVALUATION AND COST ANALYSIS (EE/CA), ASBESTOS REMOVAL ACTION**

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT

Doc Date: 08/01/1990 # of Pages: 219
Bates Number:
Weston Number:

File Break: 02.03

287754 **DESIGN CALCULATIONS, SOUTH STREET SITE REMOVAL ACTION, VOLUME 1 OF 2**

Author: CANONIE ENVIRONMENTAL
Addressee: SOUTH STREET SITE POTENTIALLY RESPONSIBLE PARTIES
Doc Type: SAMPLING DATA

Doc Date: 08/01/1992 # of Pages: 415
Bates Number:
Weston Number:

287755 **DESIGN CALCULATIONS, SOUTH STREET SITE REMOVAL ACTION, VOLUME 2 OF 2**

Author: CANONIE ENVIRONMENTAL
Addressee: SOUTH STREET SITE POTENTIALLY RESPONSIBLE PARTIES
Doc Type: SAMPLING DATA

Doc Date: 08/01/1992 # of Pages: 249
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288406 **WETLAND MITIGATION MONITORING REPORT #2, SOUTH STREET SITE (TRANSMITTAL LETTER FROM GRACE TO EPA DATED 9/28/94 ATTACHED)**

Author: NORMANDEAU ASSOCIATES INC
Addressee: THOMAS C CONDON US EPA REGION 1
W R GRACE & CO
Doc Type: REPORT

Doc Date: 08/01/1994 # of Pages: 53
Bates Number:
Weston Number:

288407 **LETTER ABOUT OIL-CONTAMINATED SOIL PILE SAMPLING□**

Author: PAUL C NIGHTINGALE GOODWIN PROCTER & HOAR
Addressee: SOLOMON FELDMAN NONE
Doc Type: LETTER

Doc Date: 10/09/1992 # of Pages: 2
Bates Number:
Weston Number:

288408 **WETLAND MITIGATION MONITORING REPORT #1, SOUTH STREET SITE□**

Author: NORMANDEAU ASSOCIATES INC
Addressee: W R GRACE & CO
Doc Type: REPORT

Doc Date: 10/01/1993 # of Pages: 50
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288409 WETLAND MITIGATION DESIGN, SOUTH STREET SITE□

Author: NORMANDEAU ASSOCIATES INC
Addressee: CANONIE ENVIRONMENTAL
Doc Type: REPORT

Doc Date: 07/01/1992 # of Pages: 58
Bates Number:
Weston Number:

288410 TANK INVESTIGATION AT THE SOUTH STREET SITE□

Author: MARK SUTTON WESTON & SAMPSON ENGINEERS INC
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: LETTER

Doc Date: 05/30/1990 # of Pages: 2
Bates Number:
Weston Number:

288411 WETLAND MITIGATION MONITORING AND REPORTING PLAN, SOUTH STREET SITE□

Author: NORMANDEAU ASSOCIATES INC
Addressee: CANONIE ENVIRONMENTAL
Doc Type: REPORT

Doc Date: 10/01/1992 # of Pages: 14
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288425 WETLAND MITIGATION MONITORING REPORT #4, SOUTH STREET SITE

Author: NORMANDEAU ASSOCIATES INC
Addressee: W R GRACE & CO
Doc Type: REPORT
Doc Date: 09/01/1996 # of Pages: 67
Bates Number:
Weston Number:

288473 ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 03/20/1989 # of Pages: 12
Bates Number:
Weston Number:

288475 ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 03/22/1989 # of Pages: 10
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288485 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 04/28/1989 # of Pages: 48
Bates Number:
Weston Number:

288486 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 05/09/1989 # of Pages: 22
Bates Number:
Weston Number:

288487 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 05/18/1989 # of Pages: 14
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288488 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 05/24/1989 # of Pages: 26
Bates Number:
Weston Number:

288489 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 06/02/1989 # of Pages: 36
Bates Number:
Weston Number:

288490 **ANALYSIS OF BULK (SOIL) SAMPLES FOR ASBESTOS□**

Author: JOHN PILLING HYGEIA INC.
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 06/08/1989 # of Pages: 17
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288491 RESULTS OF 4 SAMPLES TESTED FOR THE SOUTH STREET SITE, ERCO PROJECT # 2796

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 04/17/1989 # of Pages: 284
Bates Number:
Weston Number:

288492 RESULTS OF 6 SAMPLES TESTED FOR THE SOUTH STREET SITE, ERCO PROJECT # 2823□

Author: JAY MACKAY ENSECO
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 04/24/1989 # of Pages: 34
Bates Number:
Weston Number:

288493 RESULTS OF 9 SAMPLES TESTED FOR THE SOUTH STREET SITE, ERCO PROJECT # 3140□

Author: ROBERT WATKINS ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 05/23/1989 # of Pages: 33
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288494 **RESULTS OF 3 SAMPLES TESTED FROM THE SOUTH STREET SITE, ERCO PROJECT # 2836□**

Author: JAY MACKAY ENSECO
Addressee: CRIS GRILL DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 04/24/1989 **# of Pages:** 342
Bates Number:
Weston Number:

288495 **RESULTS OF 16 SAMPLES TESTED AT THE SOUTH STREET SITE, ERCO PROJECT # 2881□**

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 04/28/1989 **# of Pages:** 31
Bates Number:
Weston Number:

288496 **RESULTS OF 6 SAMPLES TESTED AT THE SOUTH STREET SITE, ERCO PROJECT # 2921□**

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA
Doc Date: 04/28/1989 **# of Pages:** 35
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

288497 RESULTS OF 13 SAMPLES TESTED AT THE SOUTH STREET SITE, ERCO PROJECT # 2888□

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 04/28/1989 # of Pages: 454
Bates Number:
Weston Number:

288498 RESULTS OF 10 SAMPLES TESTED, ERCO PROJECT # 2960□

Author: LESLIE CHAN ENSECO
Addressee:
Doc Type: SAMPLING DATA

Doc Date: 05/09/1989 # of Pages: 657
Bates Number:
Weston Number:

288499 RESULTS OF 4 SAMPLES TESTED AT THE SOUTH STREET SITE, ERCO PROJECT # 3073

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 05/15/1989 # of Pages: 336
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.03

289400 **RESULTS OF 10 SAMPLES TESTED AT THE SOUTH STREET SITE, ERCO PROJECT # 3034**

Author: JAY MACKAY ENSECO
Addressee: ANTHONY KAUFMAN DAMES & MOORE
Doc Type: SAMPLING DATA

Doc Date: 05/16/1989 # of Pages: 6
Bates Number:
Weston Number:

File Break: 02.06

288412 **PROPOSED DESIGN CHANGES, SOUTH STREET REMOVAL ACTION (CALCULATION INDEX FINAL CAP DRAINAGE PATTERN ANALYSIS ATTACHED)**

Author: M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
Addressee: THOMAS C CONDON US EPA REGION 1
Doc Type: LETTER

Doc Date: 12/17/1992 # of Pages: 4
Bates Number:
Weston Number:

288413 **REVISED FINAL CAP DRAINAGE PATTERN**

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT

Doc Date: 12/07/1992 # of Pages: 47
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.06

288414 WETLAND MITIGATION MONITORING REPORT #3 (TRANSMITTAL LETTER FROM GRACE TO EPA ATTACHED)

Author: NORMANDEAU ASSOCIATES INC
Addressee: W R GRACE & CO
Doc Type: REPORT
Doc Date: 10/01/1995
# of Pages: 54
Bates Number:
Weston Number:

288415 REMOVAL ACTION PLAN MAPS

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: MAP
Doc Date: 07/16/1992
# of Pages: 24
Bates Number:
Weston Number:

288416 PROJECT SPECIFICATIONS, SOUTH STREET SITE REMOVAL ACTION

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT
Doc Date: 08/01/1992
# of Pages: 219
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.06

288417 **CONDITIONAL APPROVAL OF A DESIGN CHANGE□**

Author: THOMAS C CONDON US EPA REGION I
Addressee: PAUL C NIGHTINGALE GOODWIN PROCTER & HOAR
M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
IRVING SHAFFER BIM INVESTMENT TRUST AND SHAFFER REALTY
Doc Type: LETTER

Doc Date: 06/30/1992 **# of Pages:** 2
Bates Number:
Weston Number:

288418 **REMOVAL ACTION PLAN, SOUTH STREET SITE□**

Author: CANONIE ENVIRONMENTAL
Addressee:
Doc Type: REPORT

Doc Date: 08/01/1992 **# of Pages:** 180
Bates Number:
Weston Number:

289428 **SUPPLEMENTAL INVESTIGATION REPORT--SOUTH STREET SITE□**

Author: DAMES & MOORE
Addressee:
Doc Type: REPORT

Doc Date: 08/30/1990 **# of Pages:** 74
Bates Number:
Weston Number:

02: REMOVAL RESPONSE

File Break: 02.08

289430 **LETTER ABOUT OUTSTANDING ISSUES AT THE SOUTH STREET SITE (ARARS DETERMINATION SHEET ATTACHED)**

Author: THOMAS C CONDON US EPA REGION 1
Doc Date: 09/06/1991 # of Pages: 9
Addressee: PAUL C NIGHTINGALE GOODWIN PROCTER & HOAR
M MITCH OBRADOVIC CANONIE ENVIRONMENTAL
IRVING SHAFFER TRUSTEE OF THE SHAFFER REALTY NOMINEE TRUST
Bates Number:
Weston Number:
Doc Type: LETTER

File Break: 02.09

287757 **ACTION MEMORANDUM - IMMEDIATE REMOVAL REQUEST FOR THE SOUTH STREET SITE**

Author: US EPA REGION 1
Doc Date: 09/28/1987 # of Pages: 5
Addressee:
Bates Number:
Weston Number:
Doc Type: MEMO
ACTION MEMORANDUM
DECISION DOCUMENT

287758 **ACTION MEMORANDUM - REQUEST FOR A ONE YEAR EXTENSION FOR THE SOUTH STREET SITE**

Author: US EPA REGION 1
Doc Date: 10/05/1988 # of Pages: 3
Addressee:
Bates Number:
Weston Number:
Doc Type: MEMO
ACTION MEMORANDUM
DECISION DOCUMENT

03: REMEDIAL INVESTIGATION (RI)

File Break: 03.02

288423 SAMPLING AND ANALYSIS PLAN FOR SUPPLEMENTAL REMEDIAL INVESTIGATION (RI), ASBESTOS SAMPLING IN SOIL, REVISION 00

Author: AECOM
Addressee: METCALF AND EDDY
Doc Type: REPORT

Doc Date: 06/01/2006 # of Pages: 528
Bates Number:
Weston Number:

288424 DATA EVALUATION REPORT FOR ADDITIONAL ASBESTOS INVESTIGATIONS

Author: AECOM
Addressee: METCALF & EDDY
Doc Type: SAMPLING DATA REPORT

Doc Date: 09/01/2006 # of Pages: 227
Bates Number:
Weston Number:

File Break: 03.06

287770 REMEDIAL INVESTIGATION (RI) REPORT, VERSION 03F DRAFT

Author: SANBORN HEAD & ASSOCIATES INC
Addressee: TYCO HEALTHCARE GROUP LP
Doc Type: REMEDIAL INVESTIGATION (RI)

Doc Date: 03/01/2007 # of Pages: 2146
Bates Number:
Weston Number:

03: REMEDIAL INVESTIGATION (RI)

File Break: 03.06

287799 **ADDENDUM TO THE REMEDIAL INVESTIGATION (RI) REPORT, VERSION 02F DRAFT, PHASE 1B-4 AND PHASE 1B-5 INVESTIGATIONS (12/7/2007 TRANSMITTAL ATTACHED)**

Author: SANBORN HEAD & ASSOCIATES INC
Addressee: TYCO HEALTHCARE GROUP LP
Doc Type: REMEDIAL INVESTIGATION (RI)
Doc Date: 12/01/2007 **# of Pages:** 2801
Bates Number:
Weston Number:

File Break: 03.07

289427 **DRAFT SUBMITTAL/EXISTING DATA REVIEW AND ANALYSIS REPORT (TRANSMITTAL LETTER ATTACHED)□**

Author: SANBORN HEAD & ASSOCIATES INC
Addressee: KENDALL COMPANY
W.R. GRACE
Doc Type: REPORT
Doc Date: 01/14/2000 **# of Pages:** 317
Bates Number:
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: 04.06

289617 **DRAFT FINAL FEASIBILITY STUDY (FS) REPORT**

Author: METCALF AND EDDY INC
Addressee:
Doc Type: FEASIBILITY STUDY (FS)
REPORT
Doc Date: 06/01/2008 **# of Pages:** 1062
Bates Number:
Weston Number:

04: FEASIBILITY STUDY (FS)

File Break: 04.09

288677 **PROPOSED PLAN**

Author: US EPA REGION 1
Addressee:
Doc Type: PROPOSED PLAN REPORT

Doc Date: 06/01/2008 **# of Pages:** 24
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293451 **COMMENTS ON PROPOSED REMEDIATION PLAN AND DISCUSSION OF MUNICIPAL LIEN CERTIFICATES (MLC)**

Author: MARK GOOD WALPOLE (MA) TOWN OF
Addressee: DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO

Doc Date: 06/19/2008 **# of Pages:** 1
Bates Number:
Weston Number:

293452 **MEMO OF TELEPHONE CONVERSATION WITH THOMAS SHEA OF 112 MAIN STREET, WALPOLE**

Author: DAVID O LEDERER US EPA REGION 1
Addressee:
Doc Type: MEMO

Doc Date: 06/27/2008 **# of Pages:** 1
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293453 COMMENT ON PROPOSED PLAN

Author: STEVE PEARLMAN NEPONSET RIVER WATERSHED ASSOCIATION
Addressee: DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO
Doc Date: 07/03/2008 # of Pages: 1
Bates Number:
Weston Number:

293454 REPLY TO COMMENT ON PROPOSED PLAN

Author: DAVID O LEDERER US EPA REGION 1
Addressee: STEVE PEARLMAN NEPONSET RIVER WATERSHED ASSOCIATION
Doc Type: MEMO
Doc Date: 07/03/2008 # of Pages: 1
Bates Number:
Weston Number:

293455 COMMENTS ON PROPOSED PLAN AND PUBLIC MEETING

Author: ROGER TURNER WALPOLE (MA) RESIDENT
Addressee:
Doc Type: MEMO
Doc Date: 07/14/2008 # of Pages: 2
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293456 **REQUEST FOR EXTENSION OF THE COMMENT PERIOD FOR PROPOSED PLAN AND REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS) REPORTS, ON BEHALF OF W.R. GRACE AND CO. - CONN AND TYCO HEALTHCARE GROUP (WITH E-MAIL TRANSMITTAL)**

Author: CRAIG H CAMPBELL TYCO HEALTHCARE GROUP LP
Addressee: SETH JAFFE WR GRACE & CO - CONN
DAVID O LEDERER US EPA REGION I
Doc Type: LETTER

Doc Date: 07/16/2008 **# of Pages:** 2
Bates Number:
Weston Number:

293457 **FORMAL COMMENT REGARDING PROPOSED PLAN**

Author: SOLOMON FELDMAN BIM INVESTMENT TRUST AND SHAFFER REALTY
Addressee: DAVID O LEDERER US EPA REGION I
Doc Type: MEMO

Doc Date: 07/16/2008 **# of Pages:** 1
Bates Number:
Weston Number:

293458 **PUBLIC COMMENT ON PROPOSED PLAN (WITH FAX TRANSMITTAL)**

Author: MICHAEL E BOYNTON WALPOLE (MA) TOWN OF
Addressee: ROBIN CHAPELL WALPOLE (MA) TOWN OF
CATHERINE WINSTON WALPOLE (MA) TOWN OF
DAVID O LEDERER US EPA REGION I
Doc Type: LETTER

Doc Date: 07/16/2008 **# of Pages:** 3
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293459 **COMMENT ON PROPOSED PLAN**

Author: TOM MACOMBER WALPOLE (MA) RESIDENT
Addressee: STACY GREENDLINGER US EPA REGION 1
DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO
Doc Date: 07/17/2008 **# of Pages:** 2
Bates Number:
Weston Number:

293460 **COMMENT ON PROPOSED PLAN**

Author: THOMAS SCHNEIDER WALPOLE (MA) RESIDENT
Addressee: STACY GREENDLINGER US EPA REGION 1
DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO
Doc Date: 07/17/2008 **# of Pages:** 1
Bates Number:
Weston Number:

293461 **COMMENT ON PROPOSED PLAN**

Author: STEVE PEARLMAN NEPONSET RIVER WATERSHED ASSOCIATION
Addressee: DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO
Doc Date: 07/18/2008 **# of Pages:** 2
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293462 **COMMENT ON PROPOSED PLAN**

Author: JANE SHEA WALPOLE (MA) RESIDENT
Addressee: THOMAS SHEA WALPOLE (MA) RESIDENT
DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO

Doc Date: 07/18/2008 **# of Pages:** 6
Bates Number:
Weston Number:

293463 **COMMENT ON PROPOSED PLAN**

Author: SCOTT REILLY WALPOLE (MA) RESIDENT
Addressee: DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO

Doc Date: 07/22/2008 **# of Pages:** 1
Bates Number:
Weston Number:

293464 **COMMENT ON PROPOSED PLAN, CONCERNS REGARDING ASBESTOS BREAK LINERS**

Author: JOSETTE BURKE WALPOLE (MA) RESIDENT
Addressee: RICHARD BURKE WALPOLE (MA) RESIDENT
DAVID O LEDERER US EPA REGION 1
Doc Type: MEMO

Doc Date: 07/22/2008 **# of Pages:** 1
Bates Number:
Weston Number:

05: RECORD OF DECISION (ROD)

File Break: 05.03

293465 COMMENT ON DRAFT FINAL FEASIBILITY STUDY (FS) AND PROPOSED PLAN

Author: BADLEY GREEN SANBORN HEAD & ASSOCIATES INC
Addressee: CHARLES HEAD SANBORN HEAD & ASSOCIATES INC
TIMOTHY M WHITE SANBORN HEAD & ASSOCIATES INC
DAVID O LEDERER US EPA REGION I

Doc Date: 08/18/2008 **# of Pages:** 84
Bates Number:
Weston Number:

Doc Type: LETTER

293466 COMMENT ON PROPOSED PLAN INCLUDING PICTURES OF LEWES POND

Author: CHARLES HARCOVITZ WALPOLE (MA) RESIDENT
Addressee: LINDA HARCOVITZ WALPOLE (MA) RESIDENT
DAVID O LEDERER US EPA REGION I

Doc Date: 08/15/2008 **# of Pages:** 9
Bates Number:
Weston Number:

Doc Type: LETTER

293467 COMMENT ON PROPOSED PLAN

Author: K G FETTIG WALPOLE (MA) RESIDENT
Addressee: DAVID O LEDERER US EPA REGION I

Doc Date: 07/18/2008 **# of Pages:** 3
Bates Number:
Weston Number:

Doc Type: LETTER

05: RECORD OF DECISION (ROD)

File Break: 05.04

293498 **RECORD OF DECISION (ROD)**

Author: US EPA REGION 1
Addressee:
Doc Type: DECISION DOCUMENT
REPORT

Doc Date: 09/30/2008 **# of Pages:** 424
Bates Number:
Weston Number:

08: POST REMEDIAL ACTION

File Break: 08.03

288428 **1999 INSPECTION ACTIVITIES - SOUTH STREET□**

Author: PAUL BUCENS W R GRACE & CO
Addressee: DAN COUGHLIN US EPA REGION 1
Doc Type: LETTER

Doc Date: 09/29/1999 **# of Pages:** 3
Bates Number:
Weston Number:

288429 **2000 INSPECTION ACTIVITIES - SOUTH STREET□**

Author: PAUL BUCENS REMEDIUM GROUP INC
Addressee: PAUL BUCENS W R GRACE & CO
MELISSA TAYLOR US EPA REGION 1
Doc Type: LETTER

Doc Date: 10/16/2000 **# of Pages:** 3
Bates Number:
Weston Number:

08: POST REMEDIAL ACTION

File Break: 08.03

288430 **2001 INSPECTION ACTIVITIES - SOUTH STREET□**

Author: PAUL BUCENS REMEDIUM GROUP INC
Doc Date: 10/03/2001 **# of Pages:** 3
Addressee: MELISSA TAYLOR US EPA REGION 1
Bates Number:
Weston Number:
Doc Type: LETTER

288431 **INSPECTION AND MAINTENANCE (TWO LETTERS AND THE LONG-TERM INSPECTION AND MAINTENANCE PLAN ATTACHED)**

Author: PAUL BUCENS REMEDIUM GROUP INC
Doc Date: 12/13/2001 **# of Pages:** 17
Addressee: SOLOMON FELDMAN BIM INVESTMENT TRUST AND SHAFFER REALTY
Bates Number:
Weston Number:
Doc Type: LETTER
REPORT

288432 **ANNUAL INSPECTION REPORT□**

Author: JOEL LOITHERSTEIN LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
Doc Date: 06/04/2003 **# of Pages:** 2
Addressee: MELISSA TAYLOR US EPA REGION 1
Bates Number:
Weston Number:
Doc Type: LETTER

08: POST REMEDIAL ACTION

File Break: 08.03

288433 **2003 ANNUAL INSPECTION ACTIVITIES**

Author: JAMES DEANGELIS LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
Addressee: JOEL LOITHERSTEIN LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
MELISSA TAYLOR US EPA REGION 1
Doc Date: 03/26/2004 **# of Pages:** 10
Bates Number:
Weston Number:
Doc Type: LETTER

288434 **2004 ANNUAL INSPECTION ACTIVITIES**

Author: JAMES DEANGELIS LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
Addressee: JOEL LOITHERSTEIN LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
MELISSA TAYLOR US EPA REGION 1
Doc Date: 01/04/2005 **# of Pages:** 8
Bates Number:
Weston Number:
Doc Type: LETTER

288435 **2006 ANNUAL INSPECTION ACTIVITIES**

Author: JAMES DEANGELIS LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
Addressee: JOEL LOITHERSTEIN LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
MELISSA TAYLOR US EPA REGION 1
Doc Date: 12/12/2006 **# of Pages:** 6
Bates Number:
Weston Number:
Doc Type: LETTER

08: POST REMEDIAL ACTION

File Break: 08.03

288436 **2007 ANNUAL INSPECTION ACTIVITIES**

Author: JAMES DEANGELIS LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
Addressee: JOEL LOITHERSTEIN LOITHERSTEIN ENVIRONMENTAL ENGINEERING INC
MELISSA TAYLOR US EPA REGION 1
Doc Type: LETTER

Doc Date: 12/31/2007 **# of Pages:** 6
Bates Number:
Weston Number:

File Break: 08.07

288437 **NOTIFICATION AND GRANT OF USE RESTRICTIONS AND EASEMENT**

Author:
Addressee:
Doc Type: REPORT

Doc Date: 12/03/1993 **# of Pages:** 20
Bates Number:
Weston Number:

289429 **PRELIMINARY REUSE ASSESSMENT**

Author: US EPA REGION 1
Addressee:
Doc Type: INSTITUTIONAL CONTROL(S)

Doc Date: 09/01/2006 **# of Pages:** 89
Bates Number:
Weston Number:

10: ENFORCEMENT/NEGOTIATION

File Break: 10.05

288438 122 (H) AGREEMENT FOR RECOVERY OF PAST RESPONSE COSTS, DOCKET NO. 1-99-0027

Author:
Addressee:
Doc Type: ENFORCEMENT SETTLEMENT REPORT

Doc Date: 09/29/1999 # of Pages: 18
Bates Number:
Weston Number:

File Break: 10.07

264445 SECOND ADMINISTRATIVE ORDER FOR REMOVAL ACTION DOCKET N0. I-92-1033

Author: JULIE BELAGA US EPA REGION 1
Addressee: IRVING SHAFFER BIM INVESTMENT TRUST AND SHAFFER REALTY
BURTON SHAFFER BIM INVESTMENT TRUST AND SHAFFER REALTY
MILTON SHAFFER BIM INVESTMENT TRUST AND SHAFFER REALTY
W R GRACE & CO
Doc Type: ENFORCEMENT SETTLEMENT
Organization: W R GRACE & CO
BIM INVESTMENT TRUST AND SHAFFER REALTY

Doc Date: 01/31/1992 # of Pages: 42
Bates Number:
Weston Number:

289410 ADMINISTRATIVE ORDER FOR REMOVAL ACTION, DOCKET NO. I-89-1000

Author: US EPA REGION 1
Addressee: BIM INVESTMENT TRUST AND SHAFFER REALTY
Doc Type: ADMIN ORDER ON CONSENT
Organization: BIM INVESTMENT TRUST AND SHAFFER REALTY

Doc Date: 12/15/1988 # of Pages: 110
Bates Number:
Weston Number:

10: ENFORCEMENT/NEGOTIATION

File Break: 10.07

289418 **ADMINISTRATIVE ORDER BY CONSENT (AOC) FOR REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)**

Author:
Addressee:
Doc Type: ADMIN ORDER ON CONSENT
ENFORCEMENT SETTLEMENT

Doc Date: 09/29/1999 # of Pages: 128
Bates Number:
Weston Number:

11: POTENTIALLY RESPONSIBLE PARTY

File Break: 11.09

288439 **NOTICE OF POTENTIAL LIABILITY AND REQUEST FOR PARTICIPATION IN CLEANUP ACTIVITIES**

Author: PATRICIA L MEANEY US EPA REGION 1
Addressee: M MITCH OBRADOVIC W R GRACE & CO
Doc Type: NOTICE LETTER
LETTER

Doc Date: 07/15/1998 # of Pages: 5
Bates Number:
Weston Number:

288440 **NOTICE OF POTENTIAL LIABILITY - KENDALL COMPANY**

Author: EDWARD J CONLEY US EPA REGION 1
Addressee: DAVID A SISKIND KENDALL COMPANY
Doc Type: NOTICE LETTER
LETTER
Organization: KENDALL COMPANY

Doc Date: 11/18/1987 # of Pages: 3
Bates Number:
Weston Number:

11: POTENTIALLY RESPONSIBLE PARTY

File Break: 11.09

288441 NOTICE OF POTENTIAL LIABILITY AND REQUEST FOR PARTICIPATION IN CLEANUP ACTIVITIES

Author: PATRICIA L MEANEY US EPA REGION 1
Addressee: DAVID A SISKIND KENDALL COMPANY
Doc Type: NOTICE LETTER
LETTER

Doc Date: 07/15/1998 **# of Pages:** 5
Bates Number:
Weston Number:

288442 NOTICE OF POTENTIAL LIABILITY - SHAFFER REALTY CORPORATION□

Author: EDWARD J CONLEY US EPA REGION 1
Addressee: SHAFFER REALTY CORPORATION
Doc Type: NOTICE LETTER
LETTER
Organization: SHAFFER REALTY CORPORATION

Doc Date: 11/23/1987 **# of Pages:** 3
Bates Number:
Weston Number:

288443 NOTICE OF POTENTIAL LIABILITY - W.R. GRACE & COMPANY INC□

Author: EDWARD J CONLEY US EPA REGION 1
Addressee: W R GRACE & CO
Doc Type: LETTER
NOTICE LETTER
Organization: W R GRACE & CO

Doc Date: 12/15/1987 **# of Pages:** 3
Bates Number:
Weston Number:

11: POTENTIALLY RESPONSIBLE PARTY

File Break: 11.09

289419 **SPECIAL NOTICE LETTER FOR A REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)□**

Author: PATRICIA L MEANEY US EPA REGION 1
Addressee: MILTON SHAFFER TRUSTEE OF THE SHAFFER REALTY NOMINEE TRUST
Doc Type: LETTER
NOTICE LETTER
Organization: SHAFFER REALTY NOMINEE TRUST

Doc Date: 03/31/1999 **# of Pages:** 5
Bates Number:
Weston Number:

289420 **SPECIAL NOTICE LETTER FOR A REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)□**

Author: PATRICIA L MEANEY US EPA REGION 1
Addressee: IRVING SHAFFER TRUSTEE OF THE SHAFFER REALTY NOMINEE TRUST
Doc Type: SPECIAL NOTICE LETTER
LETTER

Doc Date: 03/31/1999 **# of Pages:** 5
Bates Number:
Weston Number:

289421 **SPECIAL NOTICE LETTER FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)□**

Author: PATRICIA L MEANEY US EPA REGION 1
Addressee: BURTON SHAFFER TRUSTEE OF THE SHAFFER REALTY NOMINEE TRUST
Doc Type: SPECIAL NOTICE LETTER
LETTER

Doc Date: 03/31/1999 **# of Pages:** 5
Bates Number:
Weston Number:

11: POTENTIALLY RESPONSIBLE PARTY

File Break: 11.09

289422 **SPECIAL NOTICE LETTER FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)**

Author: PATRICIA L MEANEY US EPA REGION I
Doc Date: 03/31/1999 **# of Pages:** 5
Addressee: IRVING SHAFFER BIM INVESTMENT TRUST AND SHAFFER REALTY
Bates Number:
Weston Number:
Doc Type: LETTER
SPECIAL NOTICE LETTER

289423 **SPECIAL NOTICE LETTER FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)**

Author: PATRICIA L MEANEY US EPA REGION I
Doc Date: 03/31/1999 **# of Pages:** 5
Addressee: DAVID M CLEARY WR GRACE & CO - CONN
Bates Number:
Weston Number:
Doc Type: SPECIAL NOTICE LETTER
LETTER

289424 **SPECIAL NOTICE LETTER FOR THE REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)**

Author: PATRICIA L MEANEY US EPA REGION I
Doc Date: 03/31/1999 **# of Pages:** 5
Addressee: DAVID A SISKIND KENDALL COMPANY
Bates Number:
Weston Number:
Doc Type: SPECIAL NOTICE LETTER
LETTER

13: COMMUNITY RELATIONS

File Break: 13.01

288446 **LETTER ABOUT THE EPA REMOVAL ACTION□**

Author: ANDREW RAUBVOGEL US EPA REGION 1
Addressee: WALPOLE (MA) WATER AND SEWER COMMISSION
Doc Type: LETTER
Doc Date: 07/24/1992 **# of Pages:** 3
Bates Number:
Weston Number:

File Break: 13.02

288447 **COMMUNITY RELATIONS PLAN□**

Author: US EPA REGION 1
Addressee:
Doc Type: REPORT
Doc Date: 04/10/2000 **# of Pages:** 65
Bates Number:
Weston Number:

File Break: 13.03

262192 **EPA SCHEDULES HEARING FOR SUPERFUND SITE**

Author: OLIVIA BEAM WALPOLE TIMES
Addressee:
Doc Type: NEWS CLIPPING
Doc Date: 07/06/2000 **# of Pages:** 1
Bates Number:
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.03

262193 EPA SCHEDULES MEETING ABOUT WALPOLE SITE

Author: JENNIFER KOVALICH NEPONSET VALLEY DAILY NEWS
Doc Date: 07/12/2000 # of Pages: 2
Addressee:
Bates Number:
Doc Type: NEWS CLIPPING
Weston Number:

262194 MATERIAL BEING REMOVED FROM SUPERFUND SITE

Author: OLIVIA BEAM WALPOLE TIMES
Doc Date: 07/20/2000 # of Pages: 2
Addressee:
Bates Number:
Doc Type: NEWS CLIPPING
Weston Number:

288454 NEWS CLIPPING: TESTING BEGINS AT ASBESTOS DUMP□

Author: SONDRA FAULKNER WALPOLE TIMES
Doc Date: 02/02/1989 # of Pages: 1
Addressee:
Bates Number:
Doc Type: NEWS CLIPPING
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.03

288455 NEWS CLIPPING: ASBESTOS DUMP FOUND ON BANKS OF NEPONSET

Author: CAROLYN RYAN PATRIOT LEDGER (QUINCY MA)
Doc Date: 11/03/1986
# of Pages: 1
Addressee:
Bates Number:
Doc Type: NEWS CLIPPING
Weston Number:

289431 EPA FINALIZES SEVEN NEW ENGLAND SITES TO THE SUPERFUND LIST

Author: US EPA REGION 1
Doc Date: 05/31/1994
# of Pages: 4
Addressee:
Bates Number:
Doc Type: PRESS RELEASE
Weston Number:

293449 CLEAN UP PLAN PROPOSED FOR BLACKBURN AND UNION PRIVILEGES SITE IN WALPOLE, MASS

Author: US EPA REGION 1
Doc Date: 07/10/2008
# of Pages: 2
Addressee:
Bates Number:
Doc Type: PRESS RELEASE
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.03

293492 **PUBLIC NOTICE OF PRESENTATION ON APRIL 12, 2006 ON REMEDIAL INVESTIGATION (RI) CLOSE - AS PUBLISHED IN WALPOLE TIMES - 3/30/2006, AND DAILY NEWS TRANSCRIPT - 4/5/2006**

Author: DAILY NEWS TRANSCRIPT
Addressee: US EPA REGION 1
WALPOLE TIMES
Doc Type: PRESS RELEASE
PUBLIC NOTICE

Doc Date: 04/05/2006 **# of Pages:** 1
Bates Number:
Weston Number:

293493 **PUBLIC NOTICE OF PRESENTATION ON JUNE 9, 2008 ON PROPOSED PLAN - AS PUBLISHED IN WALPOLE TIMES**

Author: US EPA REGION 1
Addressee: WALPOLE TIMES
Doc Type: PRESS RELEASE
PUBLIC NOTICE

Doc Date: 05/29/2008 **# of Pages:** 1
Bates Number:
Weston Number:

293494 **PUBLIC NOTICE OF PRESENTATION ON JUNE 9, 2008 ON PROPOSED PLAN - AS PUBLISHED IN WALPOLE TIMES**

Author: US EPA REGION 1
Addressee: WALPOLE TIMES
Doc Type: PRESS RELEASE
PUBLIC NOTICE

Doc Date: 06/05/2008 **# of Pages:** 1
Bates Number:
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.03

293495 **PUBLIC NOTICE OF PRESENTATION ON JULY 14, 2008 ON PROPOSED PLAN - AS PUBLISHED IN WALPOLE TIMES**

Author: US EPA REGION 1
Addressee: WALPOLE TIMES
Doc Type: PRESS RELEASE
PUBLIC NOTICE

Doc Date: 07/03/2008 **# of Pages:** 1
Bates Number:
Weston Number:

File Break: 13.04

262414 **INVITATION TO INFORMATIONAL MEETING**

Author: US EPA REGION 1
Addressee:
Doc Type: FACT SHEET

Doc Date: 01/01/9999 **# of Pages:** 1
Bates Number:
Weston Number:

262416 **PUBLIC MEETING PRESENTATION [MARGINALIA]**

Author: US EPA REGION 1
Addressee:
Doc Type: REPORT

Doc Date: 01/01/9999 **# of Pages:** 9
Bates Number:
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.04

288457 **AGENDA FOR A PUBLIC INFORMATION SESSION**

Author:
Addressee:
Doc Type: MEETING NOTES

Doc Date: 08/18/1992 **# of Pages:** 1
Bates Number:
Weston Number:

288458 **NEWS AND OUTLINE FOR AN INFORMATION SESSION TO BE HELD 8/18/92**

Author: US EPA REGION 1
Addressee:
Doc Type: MEETING NOTES

Doc Date: 08/13/1992 **# of Pages:** 12
Bates Number:
Weston Number:

293450 **PUBLIC HEARING AND COMMENTS, PROPOSED CLEANUP PLAN**

Author: PAULINE L BAILEY CATUOGNO COURT REPORTING SERVICES
Addressee:
Doc Type: REPORT
PUBLIC MEETING RECORD

Doc Date: 07/14/2008 **# of Pages:** 24
Bates Number:
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.05

262403 **FACT SHEET, VOLUME 1 NO. 1 - JULY 2000**

Author: US EPA REGION 1
Doc Date: 07/01/2000 # of Pages: 4
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

262410 **FACT SHEET, VOLUME 1 NO. 2 - OCTOBER 2003**

Author: US EPA REGION 1
Doc Date: 10/01/2003 # of Pages: 4
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

262411 **FACT SHEET: EXPLORING REDEVELOPMENT OPTIONS**

Author: US EPA REGION 1
Doc Date: 04/01/2001 # of Pages: 1
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

13: COMMUNITY RELATIONS

File Break: 13.05

262415 FACT SHEET: DEED RESTRICTED ACTIVITIES

Author: US EPA REGION I
Doc Date: 07/13/2000
# of Pages: 1
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

284804 FACT SHEET: ACTIVITY UPDATE

Author: US EPA REGION I
Doc Date: 04/01/2008
# of Pages: 4
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

288449 FACT SHEET ON WATER LEVELS IN LEWIS POND AND CONTAMINATED SEDIMENT FROM BLACKBURN AND UNION□

Author: US EPA REGION I
Doc Date: 06/28/2007
# of Pages: 1
Addressee:
Bates Number:
Doc Type: FACT SHEET
Weston Number:

Number of Documents in Collection: 138

EPA Region 1 Listing of Guidance Documents

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records & Information Center

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER	PAGES
INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA.	01-Oct-88	OSWER #9355.3-01	2002	390
POLICY ON FLOOD PLAINS AND WETLAND ASSESSMENTS FOR CERCLA ACTIONS	01-Aug-85	OSWER #9280.0-02	2005	9
GETTING READY - SCOPING THE RI/FS [QUICK REFERENCE FACT SHEET]	01-Nov-89	OSWER #9355.3-01FS1	2013	6
FEASIBILITY STUDY - DEVELOPMENT AND SCREENING OF REMEDIAL ACTION ALTERNATIVES [QUICK REFERENCE FACT SHEET]	01-Nov-89	OSWER #9355.3-01FS3	2018	4
FEASIBILITY STUDY: DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES [QUICK REFERENCE FACT SHEET]	01-Mar-90	OSWER #9355.3-01FS4	2019	4
SUPERFUND LDR GUIDE #5 DETERMINING WHEN LAND DISPOSAL RESTRICTIONS (LDRs) ARE APPLICABLE TO CERCLA RESPONSE ACTIONS	01-Jul-89	OSWER #9347.3-O5FS	2218	4
GROUND-WATER PROTECTION STRATEGY	01-Aug-84	EPA/440/6-84-002	2403	65
GUIDELINES FOR GROUND-WATER CLASSIFICATION UNDER THE EPA GROUND-WATER PROTECTION STRATEGY (DRAFT)	01-Dec-86		2404	600
CONSIDERATIONS IN GROUND WATER REMEDIATION AT SUPERFUND SITES	18-Oct-89	OSWER #9355.4-03	2410	8
GUIDANCE ON REMEDIAL ACTIONS FOR CONTAMINATED GROUND WATER AT SUPERFUND SITES	01-Dec-88	OSWER #9283.1-2	2413	125
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL (DRAFT)	08-Aug-88	OSWER #9234.1-01	3002	245
ARARs Q'S & A'S [QUICK REFERENCE FACT SHEET]	01-May-89	OSWER #9234.2-01FS	3006	4
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL - CERCLA COMPLIANCE WITH STATE REQUIREMENTS [QUICK REFERENCE FACT SHEET]	01-Dec-89	OSWER #9234.2-05FS	3009	5
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL - CERCLA COMPLIANCE WITH THE CWA AND SDWA [QUICK REFERENCE FACT SHEET]	01-Feb-90	OSWER #9234.2-06FS	3010	7
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL - OVERVIEW OF ARARs - FOCUS ON ARAR WAIVERS [QUICK REFERENCE FACT SHEET]	01-Dec-89	OSWER #9234.2-03FS	3011	5
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL - SUMMARY OF PART II - CAA, TSCA, AND OTHER STATUTES [QUICK REFERENCE FACT SHEET]	01-Apr-90	OSWER #9234.2-07FS	3012	8
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL PART II: CLEAN AIR ACT AND OTHER ENVIRONMENTAL STATUTES AND STATE REQUIREMENTS	01-Aug-89	OSWER #9234.1-02	3013	175
LAND DISPOSAL RESTRICTIONS AS RELEVANT AND APPROPRIATE REQUIREMENTS FOR CERCLA CONTAMINATED SOIL AND DEBRIS	05-Jun-89	OSWER #9347.2-01	3016	8

EPA Region 1 Listing of Guidance Documents

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records & Information Center

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER	PAGES
CERCLA COMPLIANCE WITH OTHER LAWS MANUAL. RCRA ARARS: FOCUS ON CLOSURE REQUIREMENTS.	01-Oct-89	OSWER #9234.2-04FS	3017	6
REMEDIAL INVESTIGATION - SITE CHARACTERIZATION AND TREATABILITY STUDIES [QUICK REFERENCE FACT SHEET]	01-Nov-89	OSWER #9355.3-01FS2	5025	4
INTERIM GUIDANCE ON SUPERFUND SELECTION OF REMEDY	24-Dec-86	OSWER #9355.0-19	9000	10
GUIDE TO SELECTING SUPERFUND REMEDIAL ACTIONS	01-Apr-90	OSWER #9355.0-27FS	9002	6
PROTECTION OF WETLANDS: EXECUTIVE ORDER 11990. 42 FED. REG. 26961 (1977).	24-May-77		C003	5
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980. AMENDED BY PL 99-499, 10/17/86.	17-Oct-86		C018	82
DRAFT GUIDANCE ON REMEDIAL ACTIONS FOR CONTAMINATED GROUND WATER AT SUPERFUND SITES.	01-Oct-86	OSWER 9283.1-2	C022	160
POLICY FOR SUPERFUND COMPLIANCE WITH THE RCRA LAND DISPOSAL RESTRICTIONS.	17-Apr-89	OSWER 9347.1-02	C058	9
NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN.	01-Jan-92	OSWER 9200.2-14	C063	0
CODE OF FEDERAL REGULATIONS. TITLE 40. PARTS 190 TO 299. PROTECTION OF ENVIRONMENT. REVISED AS OF JULY 1, 1989.	01-Jul-89	OLD 40 CFRs	C129	0
GROUND WATER ISSUE. PERFORMANCE EVALUATIONS OF PUMP-AND-TREAT REMEDIATIONS.	01-Oct-89	EPA 540/4-89/005	C134	20
GUIDANCE FOR EVALUATING THE TECHNICAL IMPRACTICABILITY OF GROUND WATER RESTORATION.	04-Oct-93	OSWER 9234.2-25	C158	5
GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS: THE PROPOSED PLAN, THE RECORD OF DECISION, E.S.D.'S, R.O.D. AMENDMENT. INTERIM FINAL.	01-Jul-89	OSWER 9355.3-02	C179	198
ARARs Q's & A's: STATE GROUND-WATER ANTIDEGRADATION ISSUES.	01-Jul-90	OSWER 9234.2-11FS	C191	9
ARARs Q's & A's: COMPLIANCE WITH FEDERAL WATER QUALITY CRITERIA.	01-Jun-90	OSWER 9234.2-09/FS	C192	8
ARARs Q's & A's. COMPLIANCE WITH THE TOXICITY CHARACTERISTICS RULE: PART I.	01-May-90	OSWER 9234.2-08/FS	C193	3
BASICS OF PUMP-AND-TREAT GROUND-WATER REMEDIATION TECHNOLOGY.	01-Mar-90	EPA 600/8-90/003	C194	64
RISK ASSESSMENT IN SUPERFUND: A PRIMER. FIRST EDITION. SEPTEMBER 1990.	01-Apr-91	EPA 540/X-91/002	C235	83

EPA Region 1 Listing of Guidance Documents

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records & Information Center

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER	PAGES
INTERIM FINAL GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS: PROPOSED PLAN, RECORD OF DECISION, ESD'S, RECORD OF DECISION AMENDMENT.	01-Jun-89	OSWER 9355.3-02	C249	204
COMPLIANCE WITH THE CLEAN AIR ACT AND ASSOCIATED AIR QUALITY REQUIREMENTS. ARARS FACT SHEET.	01-Sep-92	OSWER 9234.2-22FS	C256	28
COMMUNITY RELATIONS IN SUPERFUND: A HANDBOOK.	01-Mar-86	OSWER 9230.0-3A	C260	169
GROUNDWATER USE AND VALUE DETERMINATION GUIDANCE. A RESOURCE-BASED APPROACH TO DECISION MAKING. FINAL DRAFT.	03-Apr-96		C273	27
ROLE OF THE BASELINE RISK ASSESSMENT IN SUPERFUND REMEDY SELECTION DECISIONS	22-Apr-91	OSWER 9355.0-30	C276	
FINAL GROUND WATER USE AND VALUE DETERMINATION GUIDANCE	04-Apr-96		C278	
ASSOCIATED AIR QUALITY REQUIREMENTS	01-Sep-92		C281	
SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986		PL 99-499	C282	
LAND USE IN THE CERCLA REMEDY SELECTION PROCESS	01-Jan-95	OSWER 9355.7-04	C317	
EXECUTIVE ORDER 11988 - FLOODPLAIN MANAGEMENT	24-May-77		C471	
EXECUTIVE ORDER 11990 - PROTECTION OF WETLANDS	24-May-77		C472	
RULES OF THUMB FOR SUPERFUND REMEDY SELECTION (EPA 540-R-97-013)	01-Aug-97	OSWER 9355.0-69	C473	
TRANSMITTAL OF OSWER DIRECTIVE ON COMPREHENSIVE STATE GROUND WATER PPROTECTION PROGRAMS (CSGWPPS)	14-Apr-97	OSWER 9283.1-09	C476	15
LETTER AND ATTACHED MEMORADUM OF AGREEMENT BETWEEN U.S. EPA AND MASS DEP FOR IMPLEMENTATION OF GROUND WATER USE AND VALUE DETERMINATION GUIDANCE	23-Mar-98		C477	4
MANAGEMENT OF REMEDIATION WASTE UNDER RCRA	14-Oct-98	EPA 530-F-98-026	C486	10
ALTERNATIVE CAP DESIGN GUIDANCE PROPOSED FOR UNLINED, HAZARDOUS WASTE LANDFILLS IN EPA REGION I	30-Sep-97		C495	10
MASSACHUSETTS CONTINGENCY PLAN; CODE OF MASSACHUSETTS REGULATIONS, 310 CMR 40.0000	29-May-98	WEB SITE	C500	574
REVISED ALTERNATIVE CAP DESIGN GUIDANCE PROPOSED FOR UNLINED HAZARDOUS WASTE LANDFILLS IN THE EPA REGION I	05-Feb-01		C524	17

EPA guidance documents may be reviewed at the EPA Region 1 OSRR Records & Information Center

TITLE	DOCDATE	OSWEREPAID	DOCNUMBER	PAGES
INSTITUTIONAL CONTROLS: A SITE MANAGER'S GUIDE TO IDENTIFYING, EVALUATING AND SELECTING INSTITUTIONAL CONTROLS AT SUPERFUND AND RCRA CORRECTIVE ACTION CLEANUPS.	01-Sep-00	OSWER 9355.0-74 FS-P	C531	
STRATEGY TO ENSURE INSTITUTIONAL CONTROL IMPLEMENTATION AT SUPERFUND SITES	01-Sep-04	OSWER NO. 9355.0-106	C575	17
CLARIFYING CLEANUP GOALS AND IDENTIFICATION OF NEW ASSESSMENT TOOLS FOR EVALUATION ASBESTOS AT SUPERFUND CLEANUPS	10-Aug-04	OSWER 9345.4-05	C657	4

APPENDIX F: MEMO FROM METCALF AND EDDY REGARDING AOC AND CULVERT

METCALF & EDDY | AECOM

Metcalf & Eddy Inc.
701 Edgewater Drive, Wakefield Massachusetts 01880-5371
T 781 246 5200 F 781 245 6293 www.m-e.aecom.com

September 25, 2008

Mr. David Lederer
Remedial Project Manager
USEPA Region 1
Suite 1100 (HBO)
Boston, MA 02114-2023

Subject: Contract No. EP-S1-06-01
Blackburn and Union Privileges Superfund Site RI/FS OS
Task Order No. 0005-RS-BD-01B3
Transmittal of Responses to Culvert Comments for ROD Responsiveness Summary

Dear Dave:

Please find enclosed one printed copy containing the responses to comments pertaining to the culvert at the Blackburn and Union Privileges Superfund Site. An electronic version of these responses will also be forwarded to you via email.

If you have any questions please don't hesitate to call.

Sincerely,

METCALF & EDDY

Donald M. Dwight, P.E.
Project Manager

cc:
D. King, EPA (letter only)
S. Czarniecki, M&E
Task Order No. 0005-RS-BD-01B3

September 25, 2008

Response to Comments on the AOC Culvert Received During the Proposed Plan Comment Period
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Responses to concerns that have been raised in comments regarding long term issues with leaving the aluminum culvert and asbestos-contaminated soils in place are presented below. These comments are based in part on the information about the aluminum corrugated plate arch culvert contained in the August 1992 Removal Action Plan South Street Site, Walpole Massachusetts prepared by Canonie Environmental. Additional information was drawn from the September 1992 Revised Draft Inspection and Maintenance Plan, also developed by Canonie Environmental. This plan calls for the inspection and maintenance of the grass and vegetated areas, asphalt cap, site fencing, aluminum plate arch culvert, and warning signs in the fenced area.

For ease of discussion, some of the comments involving similar concerns have been combined and will be addressed jointly.

Concern 1 - It was stated that the inside of the culvert will be inspected annually, however, what about the integrity of the outside of the culvert?

Response - Potential failure mechanisms for culverts include abrasion caused by sediment and debris carried by the flowing water, corrosion, and collapse due to excessive loading.

1. Abrasion occurs on the inside of the culvert.
2. Aluminum arch culverts are highly resistant to corrosion provided that marine alloy with hot-dipped galvanized (HDG) fasteners are used and contact soils are not corrosive. Although not stated in the Canonie report, marine alloys and HDG fasteners are typically used for aluminum plate arch culverts. The soil in contact with the arch per the Canonie report is sand borrow which is not corrosive. If corrosion were to occur, it will likely happen on the inside due to removal by abrasion of the protective aluminum oxide coating that forms on the aluminum surface.
3. Signs of collapse can be detected equally well from inside or outside the culvert.

For these reasons, inspection of the culvert from the inside is sufficient to detect early signs of problems.

Concern 2 - Should the culvert require repairs how would it be done? What effect would placing an internal lining or patch have on overall performance? Would this reduce capacity?

Response - Minor repairs are typically done by patching with similar aluminum plates, which would have negligible effect on structural or hydraulic performance.

Major damage can be repaired by lining the entire section with a structural element such as HOBAS-brand centrifugally cast, fiberglass-reinforced, polymer mortar (CCFRPM) pipe or *stainless steel arch plates and grouting the in-between space.* Lining would reduce the culvert cross-sectional area, but the smooth interior surface would be more hydraulically efficient than the corrugated aluminum culvert.

Concern 3 - What is the normal life of this culvert?

Response - The specified service life for aluminum arch culverts by most state's DOT is 50 years. Several manufacturers have claimed 70 years of service life for their products. Provided that the culvert was properly installed per the manufacturer's recommendations, marine grade alloy and hot-dipped galvanized (HDG) fasteners were specified and proper inspection and maintenance procedures are implemented, South Side Street culvert should last at least 50 years without requiring major repairs.

Concern 4 - What is the long-term impact of contaminants within the soil and in the groundwater on the culvert?

Response - Highly organic soils and borrow or native soils with pH less than 4.5 or more than 8.5 are considered corrosive to aluminum. Based on the Canonie report and *Version 03F Draft Remedial Investigation Report* (SHA, March 2007), none of these, including high pH groundwater, are in contact with the culvert. Contaminants in the asbestos-containing soil (ACS) and groundwater should have no effect on the culvert.

Concern 5 - Will the culvert handle weather events as experienced in 1938, 1954 and 1955?

Response - According to the Canonie report, the culvert was designed in 1992 for the 100-year flow using HEC-2 hydraulic model developed by the US Army Corps of Engineers, which was considered standard of practice at that time. The floods from 1938, 1954 and 1955 are part of the database used to establish the 100-year flood elevations.

Concern 6 - Will increases in truck size and weight, and number of trips result in increased vibrations and loads on the culvert?

Response – There are no road crossings over the culvert. Increased traffic in nearby roads should have no impact on the culvert.

Concern 7 - Was the culvert designed to withstand an earthquake, and if so, what magnitude?

Response - The Canonie report does not mention earthquake design considerations. However, aluminum culverts are relatively flexible structures and should move with the soil without major distresses. Corrugated metal pipe culverts have reportedly performed very well during earthquakes.