DECLARATION

ATLAS TACK CORP. SUPERFUND SITE

Fairhaven, Massachusetts

(CERCLIS Number MAD001026319)

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for the Atlas Tack Corp. Superfund Site, in Fairhaven, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP). This decision is based on the Administrative Record file for this Site.

This decision is based on the Administrative Record which has been developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Millicent Public Library in Fairhaven, Massachusetts and at the US EPA - Region I Office of Site Remediation and Restoration Records Center in Boston, Massachusetts. The Administrative Record Index identifies each of the items comprising the Administrative Record and is included as Appendix B of the Record of Decision (ROD).

The Commonwealth of Massachusetts concurs with the Selected Remedy.

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.

DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy consists of the following activities:

- Site Setup, Clearing, Sampling, and Contamination Delineation - The first step in the remedial process will be to establish an on-site office and mobile laboratory to support the field activities. After field facilities are set up, the soils and sediments will be sampled to better define the remediation areas and amounts. A bioavailability study in the Marsh Area will be performed to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland or riverfront area. A treatability study will be performed to determine the most appropriate treatment for the contaminated materials that can and need to be treated. Debris and vegetation will be excavated from the work areas. The power plant, metal building, and rear section of the main building will be demolished to make room for the remedial activities. Cleared vegetation, debris, and building materials will be disposed of in the appropriate off-site facilities.

- Excavation, Treatment, and Disposal - Approximately 54,000 yds^3 of contaminated soils and sediments will be excavated wherever heavy metals, cyanide, PCBs, PAHs, and pesticides are present above the cleanup levels. Once removed, the contaminated soils and sediments will be separated from any solid wastes and debris. Materials will be tested to determine if they contain contamination at levels above the cleanup goals. The contaminated materials will be tested and further separated into materials that will be treated and not treated. The solid waste, debris, and treated and un-treated soils and sediments will be disposed in the appropriate off-site disposal facilities.

  The on-site treatment will be for materials requiring treatment for off-site disposal (estimated to be 6,000 yds^3 treated). The most appropriate treatment method(s) will be determined from the treatability studies. The treatment will eliminate the potential for contaminants to leach from these materials. The treatment selected will reduce the contamination leaching from the soils and sediments. The treatment technology(ies) will most probably be some form of solidification/stabilization. The treatment of the contaminated materials will be done in a temporary enclosure to the extent practicable to ensure that workers and residents in the area are not impacted by airborne dust and contaminants. Appropriate engineering controls will be used to reduce all other dust emissions from excavation and storage of materials, and truck traffic on-site.

  Soils and sediments with contaminant concentrations that do not exceed the cleanup goals will be placed back into the areas that have been excavated. Additional fill will be brought onto the Site to properly contour the Site. Once the contamination is removed from the various Site areas, each area will be regraded and revegetated to its original pre-contamination condition to the extent possible. Salt marsh areas that are excavated to remove contamination will be regraded and revegetated to approximate the original conditions of the area remediated. Erosion protection will be provided in each area, as appropriate, to prevent bank scouring and erosion.

- Monitored Natural Attenuation with Phytoremediation of the Site Groundwater - The risks from the groundwater contaminants will be significantly reduced by removing contamination sources. The groundwater contamination will be further reduced by natural attenuation. Additional measures to control the groundwater elevation will be by phytoremediation (trees will be planted to lower the groundwater). This should limit the flow of groundwater through areas where residual contamination still remains at the Site. The groundwater should meet the cleanup goals approximately ten years after the removal of the contamination sources.

- Monitoring and Institutional Controls - A long-term monitoring program will be undertaken to assess the effectiveness of the remedy over the long term. Soils, sediments, groundwater, surface water, and vegetation will be sampled and analyzed. Institutional controls will be established on the Site properties to ensure that the remedy is protective of human health and the environment. Typically, institutional controls will be restrictive covenants running with the land in perpetuity, and may include easements. Institutional controls will be established to prevent any future use of the groundwater at the Site for drinking water. Also, institutional controls will be established to limit other activities at the Site. Such limits include restricting the types of use and construction within portions of the Commercial Area to only commercial and industrial uses (i.e., no residential use). Institutional controls may also be established in the Non-Commercial Area to limit the use of that area to certain recreational uses consistent with the risk assessment and response actions conducted in that area.

- Review of the Completed Remedy - Because residual contamination will remain at the Site above levels that allow for unlimited use and unrestricted exposure, the Superfund statute requires that EPA review the remedial action no less often than each five years after the cleanup process begins. The purpose of this review is to ensure that human health and the environment are protected These periodic reviews will continue until no hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure.

The overall Site cleanup strategy is to address the principal and low level threats at the Site. The Selected Remedy addresses these threats by removing the sources of contamination, monitoring the groundwater, and establishing limits to certain activities through institutional controls.

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, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy.

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 remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

See attached ROD data certification checklist.

AUTHORIZING SIGNATURE

3/10/00
Date

Patricia L. Meaney, Director
Office of Site Remediation and Restoration
EPA - New England

ATLAS TACK CORPORATION
SUPERFUND SITE 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 of this site.

- Chemicals of concern and their respective concentrations.

- Baseline risk represented by the chemicals of concern.

- Cleanup levels established for chemicals of concern and the basis for these levels.

- How source materials constituting principal threats are addressed.

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.

- Potential land and ground-water use that will be available at the site as a result of the Selected Remedy.

- Estimated capital, annual 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.

- Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

ATLAS TACK CORP. SUPERFUND SITE

DECISION SUMMARY

FOR

RECORD OF DECISION

March 2000

U.S. Environmental Protection Agency - Region I

New England

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ATLAS TACK CORP. SUPERFUND SITE
RECORD OF DECISION
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I. Site Name, Location and Description

The Atlas Tack Corp. Superfund Site (the Site) is located at 83 Pleasant St., Fairhaven, Bristol County, Massachusetts, as shown on Figure 1. This Site's CERCLIS identification number is MAD001026319. The United States Environmental Protection Agency (EPA) is the lead entity at this Site. The Site is a former industrial manufacturing facility whose soils, sediments, groundwater, and surface water are contaminated with heavy metals, volatile organic compounds and other contaminants. The Site's wetlands are filled with wastes from the former manufacturing processes.

The Site includes the entire Atlas Tack Corp. property (owned by the Atlas Tack Corp.), a disposal area at the end of Church Street on the Hathaway Braley Wharf Company property, and a portion of Boys Creek and its tidal marsh. The Site is located in primarily a residential area with a tidal marsh bordering the back of the property to the east as shown on Figure 2. The Fairhaven hurricane barrier, constructed in the mid-1960s, cuts through the tidal marsh. There is a bike path and a boat-related industry just north of the Site and an elementary school about 200 feet northwest of the Site. The Atlas Tack property comprises approximately 13.6 acres of commercial area and 7.2 acres of wetland area. The disposal area on the Hathaway Braley Wharf Company property is approximately 3.2 acres in size and abuts the Atlas Tack property on the southeast. The total Site area covers about 24 acres.

II. Site History and Enforcement Activity

The Atlas Tack Corp. facility was built in 1901 by Fairhaven resident Henry Huttleston Rogers to provide employment in Fairhaven. In 1967, the current owner, Great Northern Industries of Boston, purchased the company and operated it until 1985 when the plant shut down.

Between 1901 and 1985 the Atlas Tack Corp. manufactured wire tacks, steel nails, rivets, bolts, and similar items. The facility's operation included electroplating, acid-washing, enameling, and painting. From at least the early 1940's to the 1970's, process wastes containing acids, metals such as copper and nickel, and solvents were discharged into drains in the floor of the main building. As a result, some of these chemicals have permeated the floors and timbers of the building and migrated to adjacent soils and groundwater.

The plating area, located in the eastern part of the building, included a cyanide treatment pit.

Sludge and liquid from this operation contained cyanide, and the surrounding building materials may have residual cyanide contamination. The wastewater from these operations was discharged to an on-site lagoon from approximately 1940 through 1973, and wastewater from the electroplating and pickling operations was also discharged to the lagoon until 1974. From 1978 to 1985, the remaining industrial discharge from manufacturing operations was piped to an outfall from the Fairhaven municipal sewer system where it was assimilated into the outfall discharge.

The 1984 discharge permit application from Atlas Tack showed that 400 gallons from the wash process and 100 gallons from the rinse process were generated daily and apparently discharged to the Fairhaven sewer. Wastes from the cleaning process were reportedly disposed of off-site. Sludge from the neutralization process was reportedly stored on-site in 55-gallon drums until proper off-site disposal was arranged.

Since the closing of the facility in 1985, some RCRA hazardous wastes in drums were removed by truck from the Site and by excavation of the lagoon as the result of a Massachusetts Department of Environmental Protection (DEP) action. Containerized chemicals remaining in and around the buildings were removed in November 1986.

In addition, EPA has identified a dump area on the Hathaway Braley Wharf Company property that may have received wastes from the Atlas Tack Corp. through 1974. Known as the Church Street disposal area, it is located approximately 500 feet southeast of the main Atlas Tack Corp. building.

In 1984, analysis of environmental media samples (e.g., soil, sediment, surface water) detected contaminants in the marsh and surface water south of the lagoon. Groundwater monitoring conducted in 1987 revealed elevated levels of benzene, toluene, chromium, and cyanide at the Site.

In June 1988, the Atlas Tack Corp. Site was proposed for inclusion on EPA's National Priorities List (NPL), a list of the top priority hazardous waste sites. In February 1990, the Site was placed on the NPL, making it eligible for federal funding for investigation and cleanup. Prior to being placed on the NPL, the Site was (and still is) listed on the DEP hazardous waste sites list in January 1987. In 1985, the DEP took legal action against Atlas Tack Corp. for violations under Massachusetts law, which resulted in the removal of sludge and contaminated soil from the lagoon, and drums of waste material from the main building. In 1991, the DEP settled with the Atlas Tack Corp. for over $877,000 to cover past costs, penalties, and interest for this cleanup action.

EPA issued an Order in 1992 to place and maintain a fence around the Site. The Atlas Tack Corp. placed a fence around the Site, but has had problems maintaining the fence.

On April 27, 1998, EPA issued a General Notice of responsibility and potential liability to the Atlas Tack Corp. On July 31, 1998, EPA issued a General Notice of responsibility and potential liability to the Hathaway Braley Wharf Company. Special Notices will be issued after the signing of the ROD.

On August 13, 1998, the Bristol County Superior Court in the Commonwealth of Massachusetts entered a judgment against the Atlas Tack Corp. in an action against it by the Fire Chief for the Town of Fairhaven. This lawsuit was initiated by the Fairhaven Fire Department in order to compel the Atlas Tack Corp. to abate the fire hazards at the Site. By assenting to entry of this judgment, the Atlas Tack Corp. agreed to perform work, including the following: 1) restore, if necessary, and maintain in good working order the sprinkler and fire alarm systems throughout the front section of the main building (offices, two stories) and the rear section of the main building (factory, three stories); 2) maintain the front section of the main building in a structurally sound condition; 3) close openings in the front and rear sections of the main building and secure them from entry; 4) maintain 24-hour/day security in the front and rear sections of the main building; and 5) remove the roof and all wood materials from the middle section of the main building (with the brick walls permitted to be left standing if determined to be safe). During the fall of 1998 until January 1999, the Atlas Tack Corp. demolished the middle section of the main building. As a result, most of the main building has now been demolished, and the soils in this area, formerly covered by the building structure, are now exposed to the elements.

On August 9, 1999, EPA issued an Order to the Atlas Tack Corp. to remove asbestos-containing materials from the rear (now free-standing) three-story building and power plant at the Site. Because the Atlas Tack Corp. failed to comply with this administrative order, EPA began the asbestos removal process on September 28, 1999. On February 9, 2000, EPA completed the removal of asbestos-containing materials.

III. Community Participation

Throughout the Site's history, community concern and involvement has been very high. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

In June 1991, EPA conducted community interviews to gather information for the preparation of the Community Relations Plan. During November 1991, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. The Community Relations Plan was updated several times with the last update in April 1997.

In May 1991, EPA issued a fact sheet describing the Site history, the Superfund process, EPA's plans for the Remedial Investigation/Feasibility Study (RI/FS) site investigations, and opportunities for public involvement. On May 30, 1991, EPA held an informational meeting in the Fairhaven Town Hall to describe the plans for the RI/FS. In July 1991, EPA announced start of field studies at the Site. On July 11, 1995, EPA held a public information meeting in the Hastings Junior High School in Fairhaven to discuss the results of the RI report (Weston, 1995). In July 1995, EPA issued a Fact Sheet on the RI. On August 6, 1998, EPA held an informational meeting in the Fairhaven Town Hall to discuss the results of the FS Report (Weston, 1998b). During the August

1998 meeting, a summary of the FS was presented and a FS fact sheet handed out.

On December 1, 1998, EPA made the administrative record, including the Proposed Plan (EPA, 1998), available for public review at EPA's Record Center in Boston and at the Millicent Public Library in Fairhaven. Also on December 1, 1998, EPA held an informational meeting in the Fairhaven Town Hall to discuss the results of the RI and the cleanup alternatives presented in the FS, to present the Agency's Proposed Plan, and to answer questions from the public. From December 2, 1998 to February 19, 1999, the Agency held an 80 day public comment period to accept public comment on the alternatives presented in the FS and the Proposed Plan and other relevant documents previously released to the public. The comment period was extended twice at the request of the Fairhaven Board of Selectmen and the Atlas Tack Corp. On January 27, 1999, EPA held an additional informational meeting in the Fairhaven Town Hall to discuss questions raised at the December 1, 1998 meeting about the Proposed Plan. On February 11, 1999, the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. The Agency's response to the oral and written comments are included in the Responsiveness Summary (see Appendix A). The transcripts of the January 27 and February 19, 1999 meeting/hearings, comment letters, and other relevant documents are in the updated Administrative Record. The Administrative Record Index is in Appendix B.

The public informational meetings and the Public Hearing were televised on local cable-access TV to reach as broad an audience as possible. An article about the December 1, 1998 Public Informational Meeting was published in the "New Bedford Standard Times" on November 30, 1998. A brief analysis of the Proposed Plan was in The Advocate weekly newspaper on December 10, 1998. An article about the January 27, 1999 Public Informational Meeting and Public Hearing was in the "New Bedford Standard Times" on January 24, 1999. Notices of all meetings were sent to the mailing list. Public Notices were placed in the "Fairhaven Advocate" on December 22, 1998 and January 28, 1999 regarding the two extensions of the public comment period.

Additional community relations activities conducted by EPA include the following. On May 18, 1992, EPA and DEP held a public information meeting to discuss the progress of Site activities and to update the schedule for future activities. On April 6, 1995, EPA and DEP held a public informational meeting to give an update of Site activities and discuss the formation of a Citizen/Government Work Group. On August 15, 1995, EPA established a Citizen/Government Work Group. The Citizen/Government Work Group also met on November 15, 1995; April 10, 1996; September 10, 1996; February 25, 1997; November 12, 1997 (to discuss the Technical Memorandum); and May 13, 1998 (to discuss the draft FS Report). All Citizen/Government Work Group meetings were held in the Fairhaven Town Hall.

As an additional effort to inform the public, the Town of Fairhaven hired Sea Change, Inc. to assemble an independent panel to review the RI, FS, and Proposed Plan. Sea Change's purpose has been to provide citizens and government officials with independent scientific and technical information. Sea Change held public panel sessions: on March 19, 1998 to discuss the RI; on June 25, 1998 to discuss the draft FS; and on October 1, 1998 to discuss the FS. The Sea Change panel presented comments on the RI, FS, and Proposed Plan. As with all public comments, responses to the Sea Change panel's comments are presented in the Responsiveness Summary in Appendix A.

EPA and the DEP held a meeting with Town representatives on April 10, 1996 and a public meeting on April 24, 1996 to discuss the future land use of the commercial section of the Atlas Tack property. In the meetings, the residential and commercial/industrial types of cleanup were discussed. On May 22, 1996, the Town held a public meeting with abutting property owners to vote on the type of cleanup they preferred. The majority of the attendees voted in favor of the commercial cleanup and the Board of Selectmen concurred with this vote. Details of these meetings are in Appendix A.1 of the FS (Weston, 1998b). As a result of these meetings, EPA decided to split the Site into two different areas, "Commercial" and "Non-commercial." The future use and human health risk assessment were modified from the RI (Weston, 1995) and will be discussed in Sections VI. and VII. of this document.

There is no Technical Assistance Grant (TAG) for this Site. TAG information and the process of applying for a grant was discussed at several meetings, but no community group was interested in applying.

IV. Scope and Role of Response Action

The selected remedy was developed by combining components of different source control and management of migration alternatives, which were considered in the FS, to obtain a comprehensive approach for Site remediation. The selected remedy for the source areas includes the excavation of wastes, soils, and sediments with contaminant concentrations greater than the cleanup goals, and the off-site disposal of these materials at an appropriate licensed waste disposal facility. On-site treatment of some of the contaminated materials, where practicable, will be conducted to reduce the off-site disposal costs. The concentration of contaminants in the groundwater will be reduced to less than the cleanup goals by removing the source in the soils and allowing natural attenuation enhanced by phytoremediation to remediate the Site groundwater over time.

This remedial action will address the following principal threats (**bolded** below), per the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), to human health and the environment posed by Site conditions:

- Worker exposure to **contaminated surface soil and sludge in the Commercial Area**,

- Migration of **contamination from the commercial building, the Solid Waste and Debris (SWD) Area, and the Marsh surface soil** to groundwater, surface water, and creek sediment,

- Exposure of biota to **contaminated surface soil and sediment in the SWD and Marsh Areas**, and to **contaminated surface water and sediment in Boys Creek**, and

- Human ingestion of **contaminated shellfish** from Boys Creek.

This Site has not been, nor expected to be, divided into operable units.

V. Summary of Site Characteristics

Chapter 1 of the FS (Weston 1998b) contains an overview of the RI (Weston, 1995). The Site was divided into the Commercial Area, various Non-Commercial Areas (Solid Waste and Debris, Marsh, and Creek Bed Areas), and Groundwater, as shown in Figure 2. The contaminants were disposed and spilled onto the Commercial, and Solid Waste and Debris Areas. These areas still contain the majority of the contamination currently remaining at the Site. The contaminants were discharged from wastewater or migrated into the Marsh and Creek Bed Areas. The chemicals of concern (COCs), and the maximum and exposure point concentrations for the COCs detected in the soils, groundwater, sediments, and shellfish at the Site are presented in Tables 1 to 5. The chemicals posing a potential risk to ecological receptors detected in soils, vegetation, biota, sediments, and surface water are presented in Table 6. The waste types and amounts for each area are shown in the Table C-1 in Appendix C. The significant findings of the RI are summarized below.

A. Soil

1. Commercial Area: This area includes both the soils surrounding the building, and sludges and waste areas inside and formerly inside the building (the middle section of the main building was demolished in late 1998; see Section II. above). Contaminants identified in these areas were metals (including arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and zinc), cyanide, volatile organic compounds (VOCs, primarily toluene), semi-volatile organic compounds (SVOCs, primarily polycyclic aromatic hydrocarbons [PAHs]), and polychlorinated biphenyls (PCBs) (Arochlor 1260). The main waste area is the Plating Pit which contains about 600 cubic yards of material. The rest of the Commercial Area contains about 10 cubic yards of waste. The Plating Pit, Tack Wash Area, Pickling Trench, and Manhole 2 were formerly in the middle section of the main building and are now outside. The Tumbling Room, Exotic Plating Treatment Sump, and Catch Basin/Floor Drain (formerly Manhole 1) Areas are in the rear section of the main building and currently remain inside.

Rainfall causes the leaching of the Site contaminants into the groundwater resulting in their eventual migration to the marsh and Boys Creek. Surface water runoff during storm events also is a means of migration of contaminants from the Commercial Area to other areas on and off the Site. Additionally, some of the contaminants leach from the soils located below the groundwater table.

2. Solid Waste and Debris Area: This area includes the Fill Area, Former Lagoon Area, and Commercial and Industrial Debris (CID) Area at the eastern end of Church Street. Contaminants identified in these areas were metals (including antimony, copper, lead, and zinc), cyanide, VOCs, PAHs, PCBs, and pesticides.

The contamination in this area is migrating via groundwater and surface water runoff to Boys Creek and Marsh Areas, and eventually off the Site into Buzzards Bay. Groundwater moves relatively freely though the contaminated fill and becomes contaminated. Contaminated soils near the surface can erode from rain and subsequently flow into Boys Creek. Contamination in the groundwater will either be sorbed onto sediments in Boys Creek, or be transported into the surface water and flow off the Site. The vegetative cover in the Fill Area is sparse, so contaminants from that area can migrate via wind-blown dust to other areas on and off the Site.

3. Marsh Area: Contaminants identified in this area were metals (including cadmium, copper, and zinc), cyanide, and VOCs.

There is limited migration of contaminants once in the Marsh Area. The contaminant concentrations in the marsh near the source area (Solid Waste and Debris Area) are as much as an order of magnitude higher than the contaminant concentrations outside the hurricane barrier. The contamination in this marsh (and marshes in general) have been adsorbed by the marsh soils and/or vegetation. Also, the hurricane barrier limits surface water flow into this marsh and the flushing out of this marsh. This limits movement of contamination in this area.

B. Groundwater

Contaminants identified in the groundwater were metals (including beryllium, cadmium, copper, lead, nickel, and zinc), cyanide, and VOCs. Groundwater below the Site exceeds Ambient Water Quality Criteria (AWQC) for cadmium, copper, lead, mercury, nickel, zinc, and cyanide. Contaminated groundwater flows from under the Site in a northeasterly direction and discharges into the marsh and Boys Creek.

C. Surface Water

The surface water bodies at the Site include the main channel and tributaries of Boys Creek. AWQC are exceeded in these water bodies for the following metals: arsenic, cadmium, copper, lead, nickel, silver, and zinc; and cyanide. Contaminated groundwater and rainfall runoff from the upland portion of the Site is a significant source of this contamination. The water in Boys Creek flows into Buzzards Bay. Buzzards Bay is about 2000 feet from the current sources of Site contamination. The result is a net movement or flux of contamination into Boys Creek and seaward into Buzzards Bay.

D. Sediment

The contaminated sediments at the Site are located in the main channel and tributaries of Boys Creek. These are collectively referred to as the Creek Bed Area. Contaminants identified in this area were metals (arsenic, cadmium, copper, nickel, and zinc); cyanide; and pesticides.

Contaminants that reach the Creek Bed Area via groundwater or rain runoff can either be absorbed by the sediments or migrate into the surface water, and eventually discharge into Buzzards

Bay.

E. Biota

1. Marsh Area: The vast majority of the Marsh Area is high marsh, with well-established vegetation. See Figure 3-12 of the RI (Weston, 1995) for locations of marsh vegetation. The predominant vegetation in some areas at higher elevations (most notably areas close to the CID Area and the hurricane dike) is *Phragmites communis* (common reed). The predominant vegetation in most of the high marsh is *Spartina patens* (salt hay). Fauna that inhabit the Marsh Area include the great blue heron, the black duck, the meadow vole, and a variety of other small mammals and surface-feeding ducks.

2. Creek Bed Area: Boys Creek, some of its tributaries, and the hurricane dike, lie within the Marsh Area. Boys Creek and its tributaries are areas of low marsh. The main channel of Boys Creek is typically devoid of vegetation; however, *Spartina alterniflora* (spike grass) is established along the banks and in the small tributaries. Fauna that inhabit the Boys Creek sediments include ribbed mussels, soft shell clams, and benthic and epibenthic organisms. The great blue heron, the black duck, and a variety of other ducks also frequent Boys Creek.

Concentrations of heavy metals in surface waters at the Site area are high, particularly north of the hurricane barrier. Concentrations of copper, lead, mercury, nickel, and zinc exceed AWQC guidelines. The Site shellfish and fish were found to contain metals, SVOCs, and pesticides in concentrations greater than those found in the shellfish and fish at the background location on West Island in Fairhaven.

Samples of sediment in the marsh and Boys Creek show elevated concentrations of cadmium, copper, lead, nickel, zinc, and pesticides (DDT and DDE) as compared to background concentrations. Because of these Site contaminants, the sediments are degraded in the stream and associated salt marsh habitats in much of the area north of the hurricane barrier and about 700 feet south of the barrier to bioassay station 158 (in Figure 2-2 in Weston,1997b).

A complete discussion of site characteristics can be found in Sections 3 and 4 of the RI Report (Weston, 1995).

VI. <u>Current and Potential Future Site and Resource Uses</u>

A. Land Uses

The Atlas Tack Corp. property is currently zoned industrial, although there are currently no industrial or commercial activities at the Site. There are, however, abandoned industrial and commercial buildings at the Site that previously housed the Atlas Tack operations. As previously discussed in Section II, the middle section of the main building has recently been demolished by the

Atlas Tack Corp., as ordered by the Bristol County Superior Court as part of the final judgment in a civil action. With respect to the future use of the Site, it cannot be assumed that the buildings in existence today will remain in place. In addition, as previously discussed in Section III, EPA and the DEP held meetings with Town representatives and citizens to discuss the future use of the commercial section of the Atlas Tack property. The western portion of the property was identified as potentially viable commercial property. The Town held a separate meeting and voted that the reasonably anticipated land use for this portion of the property was Industrial/Commercial. Details of these meetings are in Appendix A.1 of the FS (Weston, 1998b). The cleanup goals for the commercial part of the property are based on the potential exposure of a commercial worker to contaminants. Institutional controls will be required for at least parts of this Site to prevent the commercial portion of the Atlas Tack property from being used in a way that is not protective of human health. Possible institutional controls (e.g., deed restrictions, including easements) on the property could limit the use to commercial or other less intrusive activities, which are consistent with the cleanup levels established by the selected remedy. The selected remedy does not prevent some other future use (such as park land), if the risk scenario results in an acceptable risk range.

The eastern portion of the Atlas Tack Corp. property, which has been partially filled, is a salt marsh and wetlands. After the removal of the contamination and restoration of the fill area, the salt marsh and wetlands are expected to retain their current characteristics. The fill area will be returned to a functioning salt marsh environment at the conclusion of the selected remedy.

The Hathaway Braley Wharf Company property is mostly a wooded area with some fresh water wetlands. After the removal of the contamination and restoration, this area will most likely remain the same as it is now.

B. Groundwater Uses

The groundwater beneath and in the vicinity of the Site is not currently used as a drinking water supply nor is it anticipated that it would be in the future. Even if this groundwater were not contaminated, some of it would nonetheless be unsuitable for potable purposes because of the influence of salt water. All homes in the vicinity of the Site are on public water. The closest public water supply well is about one mile from the Site. When in operation, the Atlas Tack Corp. reportedly used the Fairhaven public water for drinking and an on-site well for industrial uses.

The DEP has not classified the groundwater as a current or potential drinking water supply. In April 1996, EPA published its "Groundwater Use and Value Determination Guidance" (EPA, 1996a). This document established EPA-New England's approach to determine a site specific "use" and "value" of the groundwater at a Superfund Site. This determination is utilized by EPA in establishing remedial action objectives and making groundwater remedial action decisions. In March of 1998, EPA entered into a Memorandum of Agreement with the DEP, whereby the DEP would develop the groundwater use and value determinations. In March of 1998, the DEP submitted a "low" Groundwater Use and Value Determination for the Atlas Tack Corp. Site. Details of this are in Appendix A.2 of the FS (Weston, 1998b).

Because the groundwater under the Site is contaminated above certain human health criteria, and therefore not suitable for human consumption (see Table 3 for a summary of contamination found at certain well locations), the Site will require institutional controls (e.g., deed restrictions, including easements) to prevent the use of the groundwater for drinking water. The properties surrounding the Site are not currently impacted by the groundwater contamination from the Site. There is no evidence to suggest that groundwater in the area surrounding the Site will be used for drinking water, since the Town provides public water, and a drilling permit from the Town's Health Department would be required to legally drill a well. The removal of most of the contamination source is expected to significantly reduce the levels of contamination in the groundwater over time and the restriction on groundwater use could be eliminated once the groundwater meets all human health criteria.

C. Surface Water and Marsh Area Uses

The Site is located within the Boys Creek watershed, with Boys Creek discharging into Buzzards Bay via Priest Cove, northwest of Pope Beach. Surface drainage from the Site discharges directly into Boys Creek along the northern portion of the Site and indirectly via overland flow into small tributaries and mosquito ditches located within the Boys Creek marsh. The upper watershed of Boys Creek is primarily urban/residential with surface drainage primarily via storm sewer systems. The lower portion of the watershed is a tidal salt marsh located north and south of the hurricane barrier extending southward to Priest Cove. Boys Creek discharges into Buzzards Bay, northwest of Pope Beach and is tidally influenced. Tidal and non-tidal wetlands are located to the northeast and southeast of the Site along the floodplain of Boys Creek.

Boys Creek is not currently used as a drinking water supply nor is it anticipated that it would be in the future because it is tidally influenced. All homes in the vicinity of the Site are on public water which originate from groundwater wells. The closest town well is about a mile from the Site. When in operation, the Atlas Tack Corp. reportedly used the Fairhaven public water for drinking and an on-site well for industrial uses. In addition to Boys Creek as a surface water body, the Site has a small reservoir that was used by the Atlas Tack Corp. as a backup source of water for fire protection. It is unlikely that this reservoir will be used for fire protection purposes since most of the main building has been demolished. It should be noted that no contaminants in excess of any human health based or ecologically based levels were found in this reservoir

Boys Creek and its associated marsh areas are habitats for plants, fish and wildlife, and it is anticipated that these areas will remain the same after the remedial action. For a detailed description of the ecological environment, refer to Section 3.5.4 of the RI (Weston, 1995).

VII. Summary of Site Risks

Baseline human health and ecological risk assessments were performed, as part of the RI and updated as part of the FS, 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. They provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action. The human health and ecological risk assessments followed a four step process: 1) contaminant 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/effects assessment, which considered the types and magnitude of adverse effects associated with exposure to hazardous substances, and 4) risk characterization, 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. A summary of only those aspects of the human health and ecological risk assessments which support the need for remedial action are discussed below. Risks not significant enough to warrant a response, such as risks to trespassers contacting chemicals of concern in the sediments and soils (Tables 2 and 4), will not be discussed because EPA will not be responding to these risks. Likewise, the human risks associated with the groundwater (Table 3) will not be discussed because they do not directly serve as a basis for this remedial action.

Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Chapter 2 of the "Update to the Human Health Risk Assessment and Development of Risk-Based Clean-Up Levels" (Weston, 1998a) for a more comprehensive risk summary of all exposure pathways and for estimates of the central tendency risk.

A. Human Health Risk Assessment

1. Identification of Chemicals of Concern

The 62 chemicals of concern (COCs) listed in Tables 1 and 5 of more than one hundred chemicals detected at the Site were selected for evaluation in the human health risk assessment. The COCs in Tables 1 and 5 were selected to represent potential site related hazards based on their toxicity, concentration, frequency of detection, and mobility and persistence in the environment. They represent a subset of all the compounds evaluated in the baseline risk assessment. Tables 1 and 5 also contain the exposure point concentrations (EPCs) used to evaluate the reasonable maximum exposure (RME) scenario in the baseline risk assessment (i.e., the concentrations that were used to estimate the exposure and risk from each COC). Estimates of average or central tendency exposure concentrations can be found in Tables 2-2, 2-4, 2-5, 2-6, and 2-8 of the Update to the Human Health Risk Assessment (Weston, 1998a).

Table 1 presents the COCs and EPCs for these COCs detected in the top two feet of the commercial soils (i.e., the concentrations that were used to estimate the exposure and risk to the future commercial/industrial [maintenance] worker from each COC in the soil). Table 1 includes the range of concentrations for each COC, the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), the EPC, and the statistical measure of how the EPC was derived. The 95% Upper Confidence Limit (UCL) of the arithmetic mean was used as the EPC for all chemicals with the exception of beta-BHC and 4,4'-DDT (maximum detected concentration was used for the EPC in accordance with EPA guidance due to the data variability).

Table 5 presents the COCs and EPCs for each of the COCs detected in hard shell clams from Boys Creek (i.e., the concentrations that were used to estimate the exposure and risk to the future adult trespasser from each COC in the hard shell clams). Table 5 includes the range of concentrations for each COC, the frequency of detection, the EPC, and the statistical measure of how the EPC was derived. Because of the small sample number (i.e., 4) and low detection frequency, the EPCs for organics defaulted to the maximum detected concentration (with the exceptions of bis(2-ethylhexyl)phthalate, and di-n-butylphthalate). For the metals, there was a higher detection frequency and as a result, the 95% UCL served as the EPC except for aluminum, arsenic, and zinc.

2. Exposure Assessment

Potential human health effects associated with exposure to the COCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. Although the industry which formerly occupied the Site has ceased operations, future commercial use of the Site was assumed to be the most probable future Site use. The Atlas Tack Corp. property is presently zoned for commercial/industrial use. While residential properties abut the facility and residential land use even served as a basis for the initial risk evaluation in the RI (Weston, 1995), the series of public meetings held in Fairhaven in 1996 resulted in the conclusion that residential land use of the Site was not a plausible future Site use. At these meetings, commercial use was identified as the preferred use for the portion of the Site referred to as the commercial area. Less intense uses for the remainder of the Site for recreation and open space were considered reasonable future uses in what has been designated "non-commercial areas." People were assumed to have ready access to the non-commercial areas of the Site, and as such, a trespasser scenario based upon the consumption of shellfish from Boys Creek was evaluated in the risk assessment. The following is a brief summary of the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario, can be found in Chapter 2 of the Update to the Human Health Risk Assessment (Weston, 1998a).

Of the potential exposure scenarios evaluated, risks to maintenance workers from exposure to the commercial area soils and risks to consumers of shellfish from Boys Creek were found to be significant (exceed either a 1×10^{-4} excess cancer risk or a HI>1). Adult maintenance workers were assumed to incidentally ingest and absorb contaminants present in surface soils (0-2 feet) through the skin 250 days/yr for 25 years. The maintenance worker was assumed to ingest 136 mg/day of soil and have 2,500 cm^2 of skin surface area exposed per exposure event with a soil loading of 0.08 mg/cm^2. The worker's exposure was based on one rate of exposure to soils from both inside and outside the building. The removal of most of the main building, in late 1998, did not change any exposure scenario, and thus did not change the risk calculations. Potential risk from the consumption of shellfish (hardshell clams) from Boys Creek was evaluated assuming that an adult would eat about 3.75 lbs. of Boys Creek hardshell clams per year for 30 years. Actual hard shell clam tissue analysis served to generate EPCs for this medium.

3. Toxicity Assessment

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer slope factor (CSFs). 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 is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk" - or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site related) causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site related exposure is 10^{-4} to 10^{-6}. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. A summary of the CSFs relevant to the risk evaluation can be found in Table 7.

Table 7 provides carcinogenic risk information that is relevant to the COCs in the commercial area soils and hard shell clams from Boys Creek. Table 7 provides the CSFs, the weight of evidence, and the source ("Integrated Risk Information System" [IRIS] or "Health Effects Assessment Summary" [HEAST]). Since just the oral and dermal routes of exposure were evaluated in this risk assessment, only oral and dermal CSFs are presented. At this time, there are no verified or provisional CSFs available for the dermal route of exposure. Thus, the dermal CSFs used in the assessment have been extrapolated from oral values. An adjustment factor (gastrointestinal [GI] absorption factor) was derived by determining the degree to which each chemical was absorbed in the GI tract. The oral CSF was then divided by the GI absorption factor to obtain the dermal ("adjusted") CSF.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by EPA and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all COCs that affect the same target organ (e.g. liver) within or across all media to which a given individual may reasonably be exposed. A HI <1 indicates that toxic noncarcinogenic effects are unlikely. A summary of the reference doses relevant to this hazard evaluation can be found in Table 8.

Table 8 provides non-carcinogenic risk information which is relevant to the COCs in the commercial area soils and hard shell clams from Boys Creek. Table 8 provides the type of exposure (chronic or subchronic), the reference doses (RfDs), the primary target organs on which the RfDs are based, and the source (IRIS or HEAST). Since just the oral and dermal routes of exposure were evaluated in this risk assessment, only oral and dermal RfDs are presented. At this time, there are no verified or provisional RfDs available for the dermal route of exposure. Thus, the dermal RfDs used in the assessment have been extrapolated from oral values. An adjustment factor (GI absorption factor) was derived by determining the degree to which each chemical was absorbed in the GI tract. The oral RfD was then multiplied by the GI absorption factor to obtain the dermal ("adjusted") RfD.

4. Risk Characterization

a. Soil and Sediment Exposure Pathways

Table 9 depicts the carcinogenic risk summary for the COCs in Commercial Area surface soils evaluated to reflect present and potential future incidental ingestion and dermal contact with surface soils in the Commercial Area by a maintenance worker corresponding to the RME scenario. These risks were based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an adult's exposure to the commercial soils, as well as the carcinogenic potency of the COCs. The total risk from direct exposure to contaminated commercial soils at the Site to a future maintenance worker is 1.5×10^{-3}. The COCs contributing most to this risk level are several PAHs (i.e., benzo[a]pyrene, benzo[a]anthracene, dibenzo[a,h]anthracene and indeno[1,2,3-cd] pyrene), as well as PCB (Arochlor 1260). Risk for each chemical was approximately equally distributed between oral and dermal exposure.

Excess cancer risks attributed to the maintenance workers' potential contact with surface soils both inside and outside the former building (1.5×10^{-3}) is estimated to exceed the benchmark for remedial action (1×10^{-4}). Benzo(a)pyrene has been identified as the compound contributing most significantly to this risk estimate. Except for lead, the potential for non-carcinogenic hazards for the maintenance worker exposed to commercial area soils was estimated to be below the benchmark of 1.0 for the specific endpoints evaluated suggesting that the potential for non-carcinogenic effects is unlikely.

While significant lead contamination was detected in commercial area surface soils (predominantly inside the former building), a baseline risk evaluation was not performed for the exposure of maintenance workers and their offsprings to lead in soils. Instead, EPA's approach for assessing risks associated with non-residential adult exposures to lead in soil was used to assess allowable lead concentrations at the Site (EPA, 1996b). The adult lead model methodology focuses on estimating fetal blood level concentration in women exposed to lead contaminated soils. This evaluation resulted in the conclusion that lead concentrations in surface soil in excess of 600 ppm would not provide sufficient protection (using a blood lead threshold of 10 ug/dl and protection of 95% of the potentially exposed fetuses). This in turn led to the identification of surface soils inside the building as the only portion of the Commercial Area where the 95% UCL of the mean lead concentration exceeded 600 ppm, and therefore warranted remediation (refer to Section XI. Selected Remedy).

The human health risk assessment associated with a maintenance worker's contact with Commercial Areas soils is subject to uncertainties concerning the amount of soil that may be ingested and the amount of contamination in soil that may be absorbed via the skin. In the absence of site specific studies, EPA has relied on information obtained from the literature to support its choice of soil ingestion rates and dermal absorption of contamination from soils.

In summary, the total risk level indicates that, if no clean-up action is taken, an individual would have an increased probability of approximately 2 in 1,000 of developing cancer as a result of site-related exposure to the COCs at the frequency, duration, and magnitude assumed in the risk evaluation.

b. Shellfish Exposure Pathway

Table 10 depicts the carcinogenic risk summary for the COCs in hard shell clams evaluated to reflect present and potential future ingestion of hard shelled clams obtained from Boys Creek corresponding to the RME scenario.

Table 10 provides cancer risk estimates for an adult consumer of shellfish (hard shell clams) obtained from the Site. These estimates were developed by taking into account various conservative assumptions about the frequency and duration of an adult's dietary habits with regard to shellfish consumption, as well as the carcinogenic potency of the COCs. The total cancer risk from shellfish ingestion was estimated to be 1.45×10^{-4} which is close to EPA's benchmark generally used to determine the need for remedial action (1×10^{-4}). Arsenic contributed 84% of total shellfish ingestion risk. Various organic compounds contributed the remaining 16%. The highest contributor of the organics was 3,3'-dichlorobenzidene at 1.08×10^{-5} (7% of total risk).

The human health risk estimates associated with the consumption of shellfish are subject to some uncertainty. This uncertainty can be traced to a reliance on a limited data set for the extent of hard-shelled clam contamination, as only four samples were analyzed for chemical contamination. Also, there is uncertainty in the amount of shellfish consumed from the study area. The shellfish beds have been closed for some period of time due to bacterial contamination. If this bacterial contamination no longer required the area to be closed to shellfishing, there still would be a need to address the risk due to the Site related contamination.

In summary, the total risk level indicates that, if no clean-up action is taken, an individual would likely have an increased probability of approximately 1 in 7,000 of developing cancer as a result of consuming a specified amount of shellfish harvested from Boys Creek for the frequency and duration assumed in the risk evaluation.

B. Baseline Ecological Risk Assessment

The objective of the baseline ecological risk assessment was to identify and estimate the potential ecological impacts associated with the COCs at the Site. The assessment focused on the potential impacts of chemicals of concern found in the soils, surface waters, sediments and biological tissue to terrestrial and aquatic flora and fauna that inhabit or are potential inhabitants of the Site, which includes Boys Creek and the surrounding marsh area. The technical guidance for performance of the ecological risk assessment comes primarily from the following sources: "Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference" (EPA, 1989); and "Risk Assessment Guidance for Superfund-Volume II, Environmental Evaluation Manual" (EPA, 1989b).

Risks were evaluated through the use of media-specific ecological effect levels, which are defined as the concentration of a particular contaminant in a particular medium below which no adverse effects to ecological receptors are likely to occur. Ecological effect levels were developed based on established numerical criteria (e.g., AWQC) or on information obtained from the literature (Long & Morgan, 1990 and 1991, and Long et al., 1995). These effect levels can be used to assess baseline risks to ecological receptors by comparing the effect levels to existing contaminant levels in the on-site media. In addition, toxicity testing with on-site sediments served to more fully define baseline risks to aquatic receptors.

Media that were investigated as part of this remedial investigation included surface water, groundwater, surface sediment, surface soil, fish and shellfish. Based on likely exposure pathways, as described in Section 6.4.1 of the RI (Weston, 1995), for species observed or expected to occur on Site, the following media and biota are of potential concern to ecological resources:

- Surface water and marsh soils throughout the Boys Creek Marsh,
- Surface water and sediments in the Boys Creek channel and its tributaries,
- Fish and shellfish within the Boys Creek channel and its tributaries, and
- Groundwater potentially discharging to Boys Creek Marsh and channel.

1. Identification of Chemicals of Concern

Tables I.3, I.6, I.7, I.9, I.11, and I.12 in the RI (Weston, 1995) list the chemicals detected in surface soils (0-2 feet), surface water, sediments, and shellfish samples collected within the Site study area. The chemicals of ecological concern for surface soils, surface water and surface sediments consisted of several organic and inorganic compounds. The chemicals of most concern in the soils were lead, endosulfan II, endosulfan sulfate, iron and copper. The chemicals of most concern in the surface water were arsenic, copper, cyanide, lead, mercury, nickel, and zinc. The chemicals of most concern in the sediments and shellfish were cyanide, arsenic, and iron.

2. Exposure Assessment

Within the exposure assessment, the potential exposure pathways for various species groups such as plants, benthic invertebrates, fish, mammals and birds were directly or indirectly evaluated to determine those considered to be at risk of significant exposure from site contaminants. Table 11 lists the exposure media, habitat types, receptors, exposure routes, and assessment and measurement endpoints for selected species groups for which a potential exposure risk has been identified and for which quantitative data exist. For this assessment, avian and mammalian species (e.g., black duck, great blue heron, and meadow vole) with the greatest potential for exposure were selected for a quantitative evaluation of exposure. The potential for biomagnification was evaluated by including receptors that typically ingest species for which tissue concentrations were assessed (e.g., fish and shellfish).

The meadow vole was assumed to be exposed to COCs through the ingestion of chemicals in soil and vegetation in the Boys Creek marsh. The black duck was assumed to be exposed to chemicals of potential concern through the ingestion of ribbed mussels and soft-shelled clams (site-specific data) exposed to the surface waters and sediments in Boys Creek. In addition, it was assumed that the black duck would incidentally ingest sediments during feeding. The great blue heron was assumed to be exposed to chemicals of potential concern through the ingestion of fish (site-specific data) that are exposed to the surface waters and sediments of Boys Creek.

3. Ecological Effects Assessment

Information on the toxicity of the chemicals of potential concern to ecological receptors was summarized in the toxicity assessment of the ecological risk assessment (Weston, 1997b). Species-specific toxicity data for the indicator avian and mammalian species (black duck, great blue heron and meadow vole) were not available for all of the chemicals of potential concern. Thus, toxicity values from the literature were selected using the most closely related species. Toxicity values selected for the assessment were the lowest exposure doses reported to be toxic or the highest doses associated with no adverse effect. Data for chronic toxicity were preferentially used, when available.

In addition, the toxicity of chemicals of potential concern to aquatic life was assessed by comparing average and maximum surface water concentrations in Boys Creek to marine acute and chronic AWQC, where available. The toxicity of the chemicals of potential concern identified in Boys Creek sediments to benthic and epibenthic organisms was evaluated by comparing sediment contaminant concentrations to the sediment biological effect ranges published by the National Oceanic and Atmospheric Administration [NOAA] (Long & Morgan, 1990 and 1991) and "Environmental Management" (Long et al., 1995) and by predicting the interstitial water contaminant concentrations through the use of the equilibrium partitioning approach and comparing those values to AWQC. Because of the potential synergistic effects of contaminants in sediments and the overall lack of existing sediment toxicity information in the literature, toxicity tests were conducted on sediment samples using the two aquatic invertebrates, *Hyalella azteca* (freshwater amphipod) and *Ampelisca abdita* (marine amphipod) at 25 locations within Boys Creek.

4. Ecological Risk Characterization

The mean mortality rates for each location and appropriate controls are presented in Figure 6.4.4 and 6.4.5 in the RI (Weston, 1995) for *A. abdita* and *H. azteca*, respectively. Mortality rates at sampling locations in the main stem of Boys Creek were evaluated in relation to grain size, total organic carbon, simultaneously extracted metals/acid volatile sulfide (SEM/AVS) ratio, metal concentrations, and organic chemical concentrations. In most cases, there were no clear or consistent correlations between these measured parameters and mortality. However, there did appear to be a correlation between nickel concentrations and *A. abdita* mortality. The SEM/AVS ratio also showed the same general trends. Other correlations also exist between grain size and mortality, and total organic carbon and mortality. In general, as grain size increased and organic carbon decreased, mortality increased. This may be the result of increased bioavailability of chemicals from sandy sediments with a lower organic carbon content. These trends were not consistent between tests or in the *H. azteca* tests. The lack of clear trends and consistent results is most likely a result of the interaction of a number of physical and chemical factors at each location.

The potential risk posed to ecological receptors (meadow vole, black duck, great blue heron, and benthic organisms) was evaluated by comparing estimated daily doses or medium-specific concentrations with critical toxicity values as shown in Table 6. This comparison, described as a Hazard Quotient (HQ) was made for each chemical. If the HQ exceeds unity (e.g., > 1) this indicates that the species may be at risk to an adverse effect from the chemical through the identified exposure route. Exposures to the same chemical through multiple exposure routes are considered to be cumulative and a cumulative Hazard Index (HI) was calculated to determine whether an organism could potentially be at risk due to exposure to all chemicals through all exposure routes.

For the meadow vole, the average and maximum HIs for the meadow vole are presented in Tables 6.4-21 and 6.4.22 in the RI (Weston, 1995), respectively. Lead, endosulfan II, endosulfan sulfate, iron and copper contributed to the majority of the cumulative HI based on their average concentration as shown in Table 6.

For the black duck, the average and maximum HIs are presented in Tables 6.4.23 and 6.4.24 in the RI (Weston 1995), and the three contaminants contributing to the majority of the cumulative HI were cyanide, iron and arsenic based on their average concentrations as shown in Table 6.

For the great blue heron, Table 6.4.25 in the RI (Weston, 1995) presents the average and maximum HIs. Cyanide is responsible for contributing to the greatest percentage of the cumulative HI based on its average concentration as shown in Table 6.

Based on the two surface water sampling rounds that were conducted during the RI, several average and maximum contaminant concentrations were identified that had HQs greater than unity. Results of the August 1991 sampling round indicate arsenic, copper, cyanide, lead, mercury, nickel, silver and zinc concentrations exceeded AWQC. In April 1992, copper, mercury, and zinc exceeded chronic AWQC at both mean and maximum concentrations. Thus, there is a risk to aquatic organisms in the surface waters from exposure to these chemicals of ecological concern.

Table 6.4.20 in the RI (Weston, 1995) represents the comparison of average and maximum sediment concentrations against the sediment biological effect ranges published by NOAA (Long & Morgan, 1990 and 1991) and "Environmental Management" (Long et al., 1995) or marine chronic AWQC. The average HI exceeded one for all chemicals with the exception of chromium. The chemicals with the highest maximum HQs were: methoxyclor, DDE, copper, DDD, DDT, endosulfan, cadmium, zinc and nickel as shown on Table 6. The risk to aquatic organisms is confirmed by results from the sediment toxicity testing, which indicated that the exposure to chemicals in sediments was responsible for a decrease in survival at the majority of sampling locations north of the hurricane barrier.

The ecological risk assessment is subject to some uncertainties. For example, in the exposure assessment, assumptions were made in order to estimate daily intakes for the indicator species, the meadow vole, black duck, and great blue heron. Since limited site-specific information was available, assumptions were made regarding ingestion rates, frequency of exposure, and exposure point locations. Conservative, yet realistic assumptions were made in the absence of site-specific information. The reader is referred to Section 6.4.3.4 of the RI (Weston, 1995) for a discussion of the primary uncertainties associated with the risk evaluation for each of the indicator species.

In summary, contaminant levels in soils and sediments throughout Boys Creek and the surrounding marsh area (including the tidal creek proper and the tidal marsh surface) and adjacent upland areas are sufficiently elevated to pose a substantial risk to invertebrates, fish and wildlife through direct contact and dietary exposure to a variety of organic chemicals and metals.

C. Overall Risk Assessment Conclusion

The human health risk assessment identified unacceptable risks posed by soils in the Commercial Area to maintenance workers and a potentially significant risk to consumers of shellfish in Boys Creek. The ecological risk assessment identified unacceptable risks posed by soils, sediments, surface water, and biota throughout the Site to invertebrates, fish, and wildlife. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment. As such, surface soils 0-2 feet in depth in the Commercial Area and sediments in Boys Creek will be the focus of the remedial action necessary to protect human health, while soils, sediments, and groundwater throughout the Site will be the focus of the remedial action necessary to protect invertebrates, fish, and wildlife.

Results of the baseline human health risk assessment identified concentrations of arsenic, benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h] anthracene, indeno[1,2,3-cd]pyrene, 3,3'-dichlorobenzidene, PCB (Arochlor-1260), and lead in soils and sediments in the Commercial Area and Boys Creek that are present at levels which represent unacceptable carcinogenic and noncarcinogenic risks.

Results of the baseline ecological risk assessment identified maximum concentrations of copper, lead, mercury, nickel, silver, zinc and cyanide in surface waters throughout the Site that frequently exceeded criteria levels. Thus, there is a risk to aquatic organisms in the surface waters and associated wetlands from exposure to these chemicals of ecological concern. Concentrations of endosulfan sulfate, anthracene, DDT (total), cadmium, copper, cyanide, lead and zinc were identified as representing the greatest risk to the survival, reproduction and growth of the benthic community. The risk to the benthic community is confirmed by results from the sediment toxicity testing, which indicated an increase in mortality at locations north of the hurricane barrier where contaminants of concern were elevated. Through direct consumption of marsh vegetation and incidental ingestion, the meadow vole is potentially at risk from exposure to several compounds. The chemicals contributing the greatest risk are endosulfan II, endosulfan sulfate, iron, and lead. The exposure pathway responsible for risk to the black duck is the ingestion of benthic fauna and incidental sediment ingestion. Arsenic and cyanide are the major contaminants of concern contributing to the risk to the black duck and great blue heron, through the ingestion of contaminated fish.

VIII. Development and Screening of Alternatives

A. Statutory Requirements and Remedial Action 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 the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishes several other statutory requirements and preferences, including: a) a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; b) 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 c) a preference for remedies in which treatment permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances as principal element over remedies not involving such treatment. The response alternatives were developed to be consistent with these Congressional mandates at this Site.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment.

The remedial action objectives were:

1. Attain Commercial Area surface (0 to 2 feet) soil/sludge contaminant concentrations which are protective of human health, assuming commercial exposure for human receptors.

2. Attain Solid Waste and Debris Area surface (0 to 2 feet) soil and sediment contaminant concentrations which are protective of aquatic and terrestrial organisms.

3. Attain Marsh and Creek Bed Area surface (0 to 2 feet) soil and sediment contaminant concentrations which are protective of human health (shellfish ingestion) and aquatic and terrestrial organisms.

4. Attain surface water contaminant concentrations which are protective of human health and aquatic and terrestrial receptors.

5. Protect surface water and sediments from contaminant migration from Commercial Area, Solid Waste and Debris Area, and Marsh and Creek Bed Area soils and sediments.

6. Prevent unacceptable risk to humans due to exposure to contaminants that may migrate from the groundwater via vapor intrusion into buildings.

7. Protect the surface water in Boys Creek and its tributaries from contaminant migration from groundwater.

8. Comply with applicable chemical-, location-, and action-specific ARARs.

B. Alternative and Technology Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and the remedial action objectives listed above, a range of cleanup alternatives was developed for the Site.

With respect to source control, the FS developed a range of alternatives in which, for some alternatives, 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 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 Chapter 3 of the FS, the FS identified, assessed and screened technologies based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MM) alternatives. Chapter 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 and screened in Chapter 5 of the FS.

In summary, of the 23 source control and 4 management of migration remedial alternatives screened in Chapter 4 of the FS, 13 source control alternatives and two management of migration alternatives, and a composite No-Action alternative were retained for detailed analysis. Tables 3-1 to 3-5 of the FS (Weston , 1998b) identify the 16 alternatives that were retained through the screening process, as well as those that were eliminated from further consideration.

IX. Description of Alternatives

This section includes each remedial alternative evaluated in detail for the FS and considered during the remedy selection process. Sixteen cleanup alternatives, including a composite No-Action alternative, were evaluated in detail for the various areas: Commercial (CA), Solid Waste and Debris (SWD), Marsh Surface Soil (MSS), and Creek Bed Sediment (CBS) Areas; and Groundwater (GW). Similar source control alternatives for the different areas were combined in the Proposed Plan to simplify the cleanup selection process. The cleanup alternatives are different combinations of plans to remove, contain, or treat contamination. This section summarizes the cleanup alternatives presented in the Proposed Plan and applies a number to each alternative for ease of reference. In the Proposed Plan, EPA identified Alternative 4 (Source Removal with Treatment and On-Site Disposal) and Alternative 6 (Minimal Action Groundwater - Monitored Natural Attenuation with Phytoremediation) together as the preferred alternatives. Please consult the FS for more detailed information on the individual alternatives for each area.

Alternative 1. No Further Action (NA-1): This alternative is a combination of all the No-Action Alternatives (CA-1, SWD-1, MSS-1, CBS-1 and GW-1) for the different source areas and groundwater. This alternative involves no treatment or containment of contaminated soils, sediments, and groundwater at the Site. The purpose of this alternative is to evaluate the overall human health and environmental protection provided by the Site in its present state. The No-Action Alternative is required to be evaluated as a baseline against which all other alternatives are compared. This alternative would not be protective of human health and the environment.

A. Source Control Alternatives Analysis

Alternative 2. Limited Action with Institutional Controls (MSS-2 and CBS-2): This alternative involves no excavation, treatment, or containment of contaminated soils and sediments in the Marsh and Creek Bed Areas. No similar limited action alternatives for the Commercial, and Solid Waste and Debris Areas were evaluated in detail. This alternative would not be protective of human health and the environment. This alternative has the following features:

- Institutional Controls (e.g., deed restrictions, including easements) on the use of the Marsh and Creek Bed Areas.

- Monitoring of soil, sediment, vegetation, and surface water.

- Estimated Time for Design and Construction: 1 year
  Estimated Time for Operation: none
  Estimated Time to meet remedial goals: 30 years or more
  Estimated Capital Cost: $ 28,000.
  Estimated O&M Cost (Present Worth): $ 0.58 million.
  Estimated Total Cost (Present Worth): $ 0.61 million.

Alternative 3. Source Removal with On-Site Disposal (CA-3, SWD-3, MSS-3, and CBS-3): This alternative involves excavating soils and sediments from contaminated areas with disposal on-site in a RCRA "Type C" landfill. Certain materials from the Commercial Area would be treated off-site prior to off-site disposal. This alternative has the following features:

- Perform site preparation including: establishing site office; removing debris and vegetation; sampling to refine remedial areas; and demolishing certain buildings. All non-contaminated wastes would be disposed of in appropriate off-site facilities.

- Perform a pre-design bioavailability study (see Section XI.C.1.a for a further explanation) on the Marsh Area soils and sediments to determine the appropriate amount of wetland removal.

- Remove soils and sediments with concentrations of contaminants that exceed the cleanup goals.

- Replace and contour soil in cleanup areas, and restore any removed wetlands.

- Dispose contaminated soils and sediments in a on-site Hazardous Waste (RCRA) type landfill.

- Monitor leachate and perform Operation and Maintenance (O&M) for the life of the landfill. For evaluation purposes, this life is estimated to be 30 years.

- Establish institutional controls (e.g., deed restrictions, including easements) for certain on-site activities, such as commercial construction only, and to limit the future land use of the on-site landfill.

- Estimated Time for Design and Construction: 4 years
  Estimated Time for Operation: 30 years
  Estimated Time to meet remedial goals: 4 years
  Estimated Capital Cost: $ 12.3 million.
  Estimated O&M Cost (Present Worth): $ 1.1 million.
  Estimated Total Cost (Present Worth): $ 13.4 million.

Alternative 4. Source Removal with Treatment and On-Site Disposal (CA-3, SWD-4, MSS-4, and CBS-4): This alternative includes excavation of soils and sediments from contaminated areas, on-site treatment, and on-site disposal. Debris and contaminated materials not suitable for on-site treatment are sent off-site for appropriate disposal. This alternative has the following features.

- Perform site preparation including: establishing site office; removing debris and vegetation; sampling to refine remedial areas; and demolishing certain buildings. All non-contaminated wastes would be disposed of in appropriate off-site facilities.

- Perform a pre-design bioavailability study (see Section XI.C.1.a for an explanation) on the Marsh Area soils and sediments to determine the appropriate amount of wetland removal.

- Perform treatability studies on soils and sediments to determine the appropriate treatment method(s) to minimize contaminant leaching from the soils and sediments. The anticipated treatment technology is some form of solidification/stabilization.

- Remove soils and sediments with concentrations of contaminants that exceed cleanup goals.

- Replace and contour soil in cleanup areas, and restore any removed wetlands.

- Treat contaminated soils and sediments on-site for heavy metal stabilization followed by on-site disposal under a permeable cover of clean soil at least two feet thick.

- Send contaminated soils and sediments determined to be hazardous wastes (for certain materials that would occur after on-site treatment) to the appropriate off-site disposal facilities (i.e., Hazardous Waste or Toxic Substances and Control Act (TSCA) landfill for PCB materials). A minimal amount of material will require treatment off-site to meet land disposal restrictions prior to disposal.

- Establish institutional controls (e.g., deed restrictions, including easements) for certain on-site activities such as commercial construction only.

- Estimated Time for Design and Construction: 4 years
  Estimated Time for Operation: 30 years
  Estimated Time to meet remedial goals: 4 years
  Estimated Capital Cost: $ 16.4 million.
  Estimated O&M Cost (Present Worth): $ 0.7 million.
  Estimated Total Cost (Present Worth): $ 17.1 million.

Alternative 5. Source Removal with Off-Site Disposal (CA-4, SWD-6, MSS-6, and CBS-6): This alternative includes removal or excavation of soils and sediments from contaminated areas followed by appropriate off-site disposal. This alternative has the following features:

- Perform site preparation including: establishing site office; removing debris and vegetation; sampling to refine remedial areas; and demolishing certain buildings. All non-contaminated wastes would be disposed of in appropriate off-site facilities.

- Perform a pre-design bioavailability study (see Section XI.C.1.a for an explanation) on the Marsh Area soils and sediments to determine the appropriate amount of wetland removal.

- Remove soils and sediments with concentrations of contaminants that exceed cleanup goals.

- Replace and contour soil in cleanup areas and restore any removed wetlands.

- Send contaminated soils and sediments to the appropriate off-site disposal facilities (i.e., Hazardous Waste or Toxic Substances and Control Act (TSCA) landfill for PCB materials). A minimal amount of material will require treatment off-site to meet land disposal restrictions prior to disposal.

- Establish institutional controls (e.g., deed restrictions, including easements) for certain on-site activities such as commercial construction only.

- Estimated Time for Design and Construction: 4 years
  Estimated Time for Operation: 30 years
  Estimated Time to meet remedial goals: 4 years
  Estimated Capital Cost: $ 23.9 million.
  Estimated O&M Cost (Present Worth): $ 0.4 million.
  Estimated Total Cost (Present Worth): $ 24.3 million.

B. Management of Migration Alternatives Analysis

Alternative 6. Monitored Natural Attenuation with Phytoremediation (GW-2): This alternative includes institutional controls to prevent groundwater usage, natural attenuation, and phytoremediation (planting trees in the appropriate location) to passively lower the groundwater. No direct treatment of groundwater is included. The groundwater cleanup goals are expected to be met in approximately 10 years after completion of source control measures and the implementation of this alternative. The FS did not evaluate this alternative in conjunction with a source control alternative; therefore, the time to achieve the cleanup goals and the associated operational costs for this alternative were based on a 30-year timeframe. The costs were updated for this ROD to reflect the shorter operational time required when this alternative is implemented with an adequate source control remedy. This alternative has the following features:

- Monitor groundwater to track the progress of natural attenuation.

- Decrease contamination migration by lessening the groundwater contact with the waste sources by limiting and lowering the groundwater level and flow by using phytoremediation. Any trees planted will need to be monitored to determine that any metals accumulated within the trees do not pose a risk to human health or the environment.

- Establish institutional controls (e.g., deed restrictions, including easements) for certain on-site activities such as use of groundwater at the Site.

- Estimated Time for Design and Construction: 4 years (dependant on source control schedule)
  Estimated Time for Operation: 10 years
  Estimated Time to meet remedial goals: 14 years
  Estimated Capital Cost: $ 83,000.
  Estimated O&M Cost (Present Worth): $ 0.31 million.
  Estimated Total Cost (Present Worth): $ 0.39 million.

Alternative 7. Groundwater Treatment On-Site Treatment and Disposal (GW-3): This alternative actively recovers groundwater and treats it to remove contamination. This involves the installation of sufficient groundwater extraction wells to contain the migration of contaminated groundwater, on-site treatment of the collected groundwater, and re-infiltration of the treated groundwater into the ground. Prior to discharge, the treated groundwater will be monitored to ensure compliance with treatment goals. It is expected that the groundwater cleanup goals will be met in approximately 7 years after completion of source control and the implementation of this alternative. The FS did not evaluate this alternative in conjunction with a source control alternative; therefore, the time to achieve the cleanup goals and the associated operational costs for this alternative were based on a 30-year timeframe. The costs were updated for this ROD to reflect the shorter operational time required when this alternative is implemented with an adequate source control remedy. This alternative has the following features:

- Pump contaminated groundwater from several site locations into a central treatment unit on site.

- Treat groundwater for metals, cyanide, and volatile organic contaminants.

- Discharge treated water on-site.

- Monitor groundwater.

- Establish institutional controls (e.g., deed restrictions, including easements) for certain on-site activities such as use of groundwater at the Site.

- Estimated Time for Design and Construction: 6 years (dependant on source control schedule)
  Estimated Time for Operation: 7 years
  Estimated Time to meet PRGs: 13 years
  Estimated Capital Cost: $ 1.92 million.
  Estimated O&M Cost (Present Worth): $ 2.88 million.
  Estimated Total Cost (Present Worth): $ 4.8 million.

X. Comparative Analysis of Alternatives

Section 121(b)(1) of CERCLA presents several factors that EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulates nine evaluation criteria to be used in assessing remedial alternatives, as described below.

Threshold Criteria

In accordance with the NCP, two threshold criteria must be met in order for the alternative to be eligible for selection:

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

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all of the ARARs of state and federal environmental laws, and if not, provides the grounds for invoking a CERCLA waiver(s) for those requirements.

Primary Balancing Criteria

The following five criteria are used to compare and evaluate those alternatives which fulfill the two threshold criteria.

3. Long-term effectiveness and permanence assesses alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will be successful.

4. Reduction of toxicity, mobility or volume through treatment addresses the degree to which alternatives employ recycling or treatment to reduce toxicity, mobility or volume, and how treatment is used to address the principle threats posed by the site.

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

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

7. Cost includes estimated capital as well as operation and maintenance costs, on a net present-worth basis.

Modifying Criteria

The two modifying criteria discussed below are used in the final evaluation of remedial alternatives generally after EPA has received public comment on the RI/FS and Proposed Plan.

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

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

Following the detailed analysis of each individual alternative in the FS, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. A summary of this comparative analysis can be found in Tables 3-6 to 3-9 of the FS (Weston 1998b).

The section below presents the nine criteria and a brief narrative summary of the alternatives' strengths and weaknesses according to the detailed and comparative analysis presented in the FS. For the purposes of this Record of Decision, only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria. The discussion below compares and contrasts each alternative to the nine evaluation criteria, with particular attention paid to the issues and concerns that led to the selection of the final remedy. Although not included in the FS and Proposed Plan, a discussion of how the selected source control remedy addresses these nine criteria is also included.

Source Control Alternatives

1. Overall protection of human health and the environment - Alternatives 3, 4, and 5, and the selected remedy all meet this threshold criteria through a combination of excavation, treatment, disposal, and/or institutional controls (e.g., deed restrictions, including easements), which will greatly reduce human and animal contact with contamination. Alternatives 3, 4, and 5 all consist of excavating contaminated soils and sediments; additionally, Alternative 3 has on-site disposal, Alternative 4 has on-site treatment and disposal, while Alternative 5 has off-site disposal. The selected source control remedy will meet this threshold criteria by excavating contaminated soils and sediments, treating some of this material, and having disposal occur off-site. Alternatives 1 and 2 were eliminated from further consideration as they are not protective of human health and the environment because the contamination, that will remain in place, will be untreated and will continue to pose unacceptable risks.

2. Compliance with applicable or relevant and appropriate requirements (ARARs) - Alternative 3 complies with ARARs, except that invocation of waivers might be required of the setback requirements of the Massachusetts Solid Waste Management Regulations for the on-site landfill. Alternatives 4 and 5, and the selected remedy all meet this threshold criteria and do not require waivers.

3. Long-term effectiveness and permanence - Alternatives 3, 4, and 5, and the selected remedy would be effective in reducing the leaching of contaminants because all would reduce contaminant mobility through treatment or containment. Alternative 3 requires significantly more maintenance and monitoring in the long term than Alternatives 4 or 5, or the selected remedy because Alternative 3 has an impermeable cap and leachate collection system that would need to be maintained in order to ensure its long-term effectiveness and permanence. Alternative 4 requires some maintenance and monitoring in the long term because a soil cover would need to be maintained; while Alternative 5 and the selected remedy requires only monitoring since contaminated materials, except residual contamination, would be removed from the Site. Alternative 4 would require on-site treatment of all suitable contaminated materials. Depending on the results of the treatability studies, Alternative 4 may use an innovative technology, which is expected to be reliable. Alternative 4 would have the highest level of effectiveness and permanence because the greatest amount of contamination would be treated. The selected remedy would have a high level of effectiveness and permanence because a significant amount of the contamination would be treated. Alternative 5 may have some treatment of a minimal amount of material to meet land disposal restriction (LDR) requirements. Since all alternatives will result in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, 5-year reviews of this Site will be required for each alternative.

4. Reduction of toxicity, mobility or volume through treatment - Alternative 3 would not involve treatment for the materials remaining on-site; therefore there would be no reduction of toxicity, mobility, or volume through treatment. Alternative 4 and the selected remedy to some extent would reduce the mobility and may reduce the toxicity of the contamination by solidification and/or stabilization of materials. For the minimal amount of materials that need to be disposed of in off-site RCRA facilities, Alternatives 3, 4, and 5, and the selected remedy would involve treatment to meet LDR requirements, thereby reducing the mobility and possibly the toxicity of some of the materials. The treatment process for Alternative 4 and the selected remedy may increase the volume of materials for disposal; however, the amount of increase depends on the type of solidification/stabilization used. Alternative 4 would most closely comply with the statutory preference for treatment. The selected remedy would also comply with the statutory preference by treating some of the contamination.

5. Short term effectiveness - Alternatives 3, 4, and 5, and the selected remedy should have minimal short term exposure effects to the community and workers. The greatest short term exposure would result from potential contaminant releases during the excavation of the contaminated soil and sediment. Potential exposure would be eliminated or minimized through engineering controls and monitoring. The potential risks would be similar for Alternatives 3, 4, and 5, and the selected remedy. Alternatives 3, 4, and 5, and the selected remedy all have some truck traffic to and from the Site. Discussions will be held with Town Officials and residents to determine the most protective and acceptable access route(s) for truck traffic. Alternative 4 and the selected remedy have some additional on-site handling of the materials because of treatment on-site; but the short term risks that treatment presents can be addressed probably by using a temporary structure or enclosure to house the treatment operations.

6. Implementability - Alternatives 3, 4, and 5, and the selected remedy all involve common, reliable technologies that can be readily obtained and implemented. Alternative 3 may involve the most implementability issues because of the construction of a RCRA landfill, its associated operation and maintenance, and the required institutional controls (e.g., deed restrictions, including easements) associated with such a landfill. Alternative 4 and the selected remedy will require treatability studies to determine the appropriate type of stabilization process that will be utilized. Also, Alternative 4 would require some institutional controls (e.g., deed restrictions, including easements) for the area where the treated materials would be placed. Alternatives 3, 4, and 5, and the selected remedy all would require some restrictions, such as, the prohibition on residential housing at places where low level contamination remains in the Commercial Area.

7. Cost - Alternative 3 would be the least expensive at an estimated present worth cost of \$13.4 million. Alternative 4 would cost an estimated \$17.1 million. The selected remedy would cost an estimated \$18.2 million. Alternative 5 would be the most expensive cost at an estimated \$24.3 million.

8. State acceptance - The DEP stated that the Proposed Plan's preferred source control alternative (Alternative 4) should not be selected due to overwhelming public opposition and the apparent availability of other feasible and more acceptable options. The DEP also stated that the identification of the possible disposal options should be preceded by judicious sorting and characterization of the wastes.

9. Community acceptance - During the public comment period, the community expressed, overwhelmingly, their preference that the contaminated materials not be left on the Site. There was some significant support for the contaminated materials to be treated prior to proper disposal off-site. Alternative 3 had no support from the community. The Atlas Tack Corp. preferred their own on-site capping alternative, and did not support any of the source control alternatives.

Management of Migration Alternatives

1. Overall protection of human health and the environment - Alternative 6 would meet this threshold criteria through a combination of source removal (soil and sediment), monitored natural attenuation, phytoremediation and institutional controls (e.g., deed restrictions, including easements). Alternative 6 does this because once the contamination sources are removed, natural attenuation processes, such as sorption and dilution, will reduce the risk to humans and ecological receptors within an anticipated ten years after the completion of the source control remediation. Alternative 7 would meet this threshold criteria through a combination of source removal, groundwater treatment, and institutional controls. Alternative 1 was eliminated from further consideration as it is not protective of human health and the environment because the contamination that will remain in place will continue to pose unacceptable risks.

2. Compliance with applicable or relevant and appropriate requirements (ARARs) - Alternatives 6 and 7 would meet this threshold criteria and do not require waivers.

3. Long-term effectiveness and permanence - Both Alternatives 6 and 7, in combination with a source removal alternative (Alternatives 3, 4, or 5, or the selected source control remedy), will result in reducing contaminant levels in groundwater over time. Both alternatives would rely on institutional controls (e.g., deed restrictions, including easements) to prevent human exposure to contaminants during the cleanup and in the long term. Long term groundwater monitoring would be implemented to evaluate the effectiveness of both Alternatives 6 and 7. The primary mechanism for reduction under Alternative 6 would be natural attenuation (such as sorption and dilution) and would take approximately 10 years after the completion of the source control alternative to achieve cleanup goals. Alternative 7 would rely on physical treatment processes to contain, recover, and treat the contaminated groundwater and would achieve cleanup goals in approximately 7 years after startup of the treatment system. Alternative 7 would require that the treatment system be properly operated and maintained.

4. Reduction of toxicity, mobility or volume through treatment -Through natural attenuation and phytoremediation, Alternative 6 would reduce the toxicity, mobility, and volume of groundwater contamination through passive treatment. Alternative 7 will actively reduce the toxicity, mobility, and volume of the contamination by recovery and treatment processes.

5. Short term effectiveness - Both Alternatives 6 and 7 should have minimal short term effects to the community and remediation workers. Engineering controls would be implemented to eliminate or minimize exposures. However, there will be some additional minimal risks to workers and near by residents with Alternative 7 because construction of a groundwater extraction and treatment system involves more construction activities, such as earth moving and truck traffic, than installation of a passive treatment system. Also, some impact on the environment during installation of groundwater conveyance piping will result from Alternative 7.

6. Implementability - All aspects of Alternatives 6 and 7 involve common construction technologies which can be readily implemented. Alternatives 6 and 7 would require monitoring and institutional controls (e.g., deed restrictions, including easements) on the use of groundwater possibly even after cleanup levels are achieved because the groundwater may still not be suitable for potable purposes. Alternative 6 would require the planting of trees to lower the groundwater. Alternatives 7 would require construction and operation of a treatment system.

7. Cost - Alternative 6 would be the least expensive, with an estimated present worth cost of $0.39 million. Alternative 7 would have a much more expensive cost, estimated at $4.8 million. The costs for both alternatives have been updated since the issuance of the Proposed Plan to account for the shorter time period to achieve the cleanup goals (when implemented with a source control remedy) versus the 30-year timeframe used for the operation and maintenance costs in the Proposed Plan.

8. State acceptance - The DEP stated that light non-aqueous phase liquid (LNAPL) (primarily toluene) may be the source of groundwater contamination in certain areas of the Site and that the LNAPL may move during soil excavation. The DEP suggested that the removal of this potential source should be specified as part of the preferred alternative for groundwater. Also, the DEP noted that EPA should consider the benefit and feasibility of removing highly concentrated and localized areas of groundwater contamination as part of the preferred alternative.

9. Community acceptance - There were few public comments offered during the comment period specifically regarding the groundwater alternatives. There were some general comments about wanting the groundwater cleaned up. One public official specifically accepted Alternative 6 as long as the monitoring was performed to determine that cleanup goals would be eventually achieved. The Sea Change panelist Jim Plunkett commented that the groundwater should not be actively treated at the Site, especially with the removal of the source. The Atlas Tack Corp. did not specifically comment on the groundwater alternatives, but did indicate that they believe the groundwater does not pose a risk to human health and the environment.

XI. 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 selected remedy for the contamination source is a modification of Alternative 4 which will include the excavation of 54,000 yds^3 of contaminated soils and sediments, treatment (as necessary to satisfy RCRA Land Ban requirements and to facilitate off-site disposal), and disposal off-site in licensed solid waste, TSCA, or RCRA Hazardous Waste facilities, as appropriate. The original Alternative 4 was excavation and treatment of contaminated materials with disposal on-site, and included off-site disposal of solid waste and debris, and contaminated materials that could not be treated to the appropriate Hazardous Waste or TSCA standards. The modification to Alternative 4 is the off-site disposal of all contaminated materials, some of which will be treated as needed depending on the requirements of the off-site disposal facilities (estimated to be 6,000 yds^3 after treatment). Contaminated material will only be treated on-site if it lowers the cost of off-site disposal. Some small amount of contaminated materials may require off-site treatment to meet disposal requirements (LDRs) (estimated to be 3,400 yds^3). The amount of material treated on-site should be significantly less with the modified alternative than the original Alternative 4.

As previously discussed, the Site is divided into the following areas: the Commercial Area; the Solid Waste and Debris Area; and the Marsh and Creek Bed Areas; as shown in Figure 2. Cleanup goals for each area are based on the future use, the nature and extent of contamination, and the species impacted. The approximate locations and depths of excavation are shown in Figure 3. The approximate final contours of the Site are shown in Figure 4.

The Commercial Area is being remediated so that it no longer presents an unacceptable human health risk, it is suitable for commercial use in the future, and the migration of contaminants via groundwater and surface water into the adjacent marsh and Boys Creek is prevented. The other areas are being remediated to be protective of the environment (to prevent the migration of contaminants leaching from the soils to the groundwater into Boys Creek, to reduce the contamination in the sediments of Boys Creek and adjacent marsh, and to reduce the contamination in the top two feet of Site soils). Institutional controls (e.g., deed restrictions, including easements) will be established in the Commercial Area to restrict future use of the property, including restrictions on excavation, construction, and residential use.

The selected remedy for the remediation of the groundwater is Alternative 6: minimal action of the groundwater. The contaminants in the groundwater will be reduced to levels protective of the ecological receptors in the surface water by removing the contamination source in the soils and over time through natural attenuation enhanced by phytoremediation. The groundwater will be monitored. Institutional controls (e.g., deed restrictions, including easements) will be established on the Site to prevent the installation of drinking water wells until the groundwater meets drinking water standards.

An expected outcome of the selected remedy is that the surface soils (0-2 feet) in the Commercial Area will no longer present an unacceptable risk to commercial area workers and their off-springs via incidental ingestion and dermal contact and will be suitable for commercial reuse. In addition, the Site related human health risk associated with ingestion of shellfish will be eliminated because of the cleanup of Boys Creek sediments to address ecological concerns. The cleanup goals consistent with a commercial/industrial use for the Commercial Area and trespassers for the rest of the Site are estimated to be met once the source removal is completed, which should be approximately four years after the signing of this ROD.

Soils and sediments at the Site should no longer present an unacceptable risk to environmental receptors via ingestion of contaminated vegetation or biota, and incidental ingestion of contaminated soils or sediments. In addition, the contaminants in the soil will no longer act as a source of surface water and sediment contamination in Boys Creek, thereby providing suitable habitat for environmental receptors.

Another expected outcome of the selected remedy is that groundwater at the Site will not present an unacceptable risk to environmental receptors via leachate into Boys Creek. After the soils and sediments above the cleanup levels have been removed, only residual levels of contaminants will remain to leach into the groundwater. Approximately ten years are estimated as the amount of time necessary for the groundwater to naturally attenuate to achieve the groundwater quality goals consistent with a viable ecosystem in Boys Creek and the associated marsh areas. The selected remedy will also provide environmental and ecological benefits through the restoration of an estuarine wetlands system.

Although not a factor in the selection of the remedy, it is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts such as increased property values, the possible creation of jobs, increased tax revenues due to redevelopment, and an enhanced human uses of ecological resources.

A. Interim Groundwater Cleanup Levels

Interim cleanup levels have been established in groundwater for all COCs identified in the Baseline Risk Assessment found to pose an unacceptable risk to the environment. Interim groundwater cleanup levels have been established to provide protection for environmental receptors in the surface waters and associated wetlands. Cleanup levels for copper, nickel, zinc, and cyanide are based on the Clean Water Act's Ambient Water Quality Criteria for the protection of aquatic life in saltwater, which have been incorporated into the Massachusetts Surface Water Quality Standards, multiplied by a 10-fold dilution factor. Selected from a range of dilution factors for the Site based upon dilution evaluations, the dilution factor of 10 is at the low end of the range. Refer to Appendix D of the FS (Weston, 1998b) for more details. A cleanup level has been set for toluene based on DEP's Massachusetts Contingency Plan (MCP) Upper Concentration Limit.

In the Proposed Plan and FS, EPA indicated that DEP's MCP GW-3 Method 1 standards would be used for those contaminants for which there exist GW-3 Method 1 standards, while the approach of multiplying the AWQC by a 10-fold dilution factor would be used for copper, for which there does not exist a GW-3 Method 1 standard. In the selected remedy, EPA has opted to set the interim groundwater cleanup levels for all COCs based on the AWQC, where there exist AWQC. The selected remedy does not have an interim groundwater cleanup level for cadmium, even though there is an AWQC for cadmium, because its AWQC multiplied by a 10-fold dilution factor is higher than its groundwater concentration at the Site. Similarly, the selected remedy does not have an interim groundwater cleanup level for lead, even though there is an AWQC for lead, because its AWQC multiplied by a 10-fold dilution factor is higher than its dissolved groundwater concentration at the Site. In the Proposed Plan and FS, EPA inadvertently neglected to propose an interim groundwater cleanup level for nickel; in reviewing the groundwater data, EPA has concluded that an interim groundwater cleanup level for nickel should be established based on the AWQC. Because there currently is no AWQC for toluene, EPA has opted to set the interim groundwater cleanup level for toluene based on the DEP's MCP Upper Concentration Limit. Also, in the Proposed Plan and FS, for toluene in the groundwater under the Commercial Area, EPA indicated that DEP's MCP GW-2 Method 1 standard would be used based upon the threat of toluene volatilizing from the groundwater. Upon further examination of this exposure point, EPA has now determined that toluene volatilizing from the groundwater does not represent a potential future threat to human health. The average groundwater concentration of toluene is 7,790 ug/l at the Site, while the groundwater concentration which results in an unacceptable indoor vapor risk was calculated to be 146,000 ug/l (see Appendix D for Indoor Air Modeling). As such, the Proposed Plan's proposed interim groundwater cleanup level for toluene based upon GW-2 Method 1 has not been adopted.

These changes do not substantially alter the interim groundwater cleanup levels from those proposed in the Proposed Plan and FS. In addition, they do not affect the estimated time for the Selected Remedy to attain these levels. These changes also do not alter the source control remedy, even though they change some of the cleanup levels from those in the Proposed Plan and FS, because they do not result in any significant changes in estimated soil volumes.

Table 12 summarizes the interim groundwater cleanup levels expected to provide protection of ecological receptors in the surface waters and wetlands for COCs identified in groundwater. All interim groundwater cleanup levels and final groundwater cleanup levels, if any, must be met at the completion of the remedial action throughout the Site. EPA has estimated that these levels will be attained within approximately 10 years after completion of the source control component.

Periodic assessments of the protection afforded by remedial actions will be made as the remedy is being implemented and at the completion of the remedial action. When contaminant levels in the groundwater either meet or approach the interim cleanup levels consistently over a three year period, a risk assessment shall be performed on the residual groundwater contaminants, as listed on Table 12, to determine whether the remedial action is protective. This risk assessment shall follow EPA procedures and will assess the risks to the environmental receptors from groundwater discharge into Boys Creek. If, after review of the risk assessment, the remedial action is determined by EPA to be not protective of the environment, the remedial action shall continue until either protective levels are achieved, and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective or is modified. These protective residual levels shall constitute the final cleanup levels for this ROD and shall be considered performance standards for this remedial action.

If interim groundwater cleanup levels are not met and the remedy is found to be not protective as a result of the ecological risk assessment, an evaluation of additional actions necessary to meet protective levels will be conducted. These actions may include a continuation of this remedy or will involve more active remediation. EPA will select subsequent action(s) consistent with the NCP and Superfund remedy selection policy and guidance.

The Site's aquifer has been classified by the State (314 CMR 6.03). The groundwater is classified as either Class I (fresh potable water supply) or II (saline water near tidally influenced areas) depending on the location under the Site. The future use of groundwater was evaluated based upon EPA Region I's "Groundwater Use and Value Determination Guidance" (EPA, 1996). This guidance "is intended to result in more informed and focused decision-making and more common-sense and cost-effective groundwater cleanups." This guidance stresses the need for site-specific groundwater "Use and Value Determination" (performed by the State, with public input, and reviewed by EPA) before applying potential chemical-specific ARARs such as MCLs. The Groundwater Use and Value Determination for Atlas Tack Corporation Superfund Site was released by DEP on March 11, 1998 (Weston, 1998b). Additionally, DEP's determination concluded that, due to the low use and value of the aquifer, use of the aquifer for potable purposes was not likely. As such, the Safe Drinking Water Act's maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) are not applicable or relevant and appropriate and were not used to establish groundwater cleanup levels. At the same time, because the groundwater is not suitable for potable purposes even at locations not influenced by salt water because of contamination (see Table 3 for a summary of contamination found at certain well locations), institutional controls (e.g., deed restrictions, including easements) will need to be established to prevent any future use of the groundwater at the Site for drinking water.

B. Soil/Sediment Cleanup Levels

The cleanup levels are based on the protection of human health and the environment. This Site poses risks to human health from soils in the Commercial Area for future workers and possibly to consumers of shellfish in Boys Creek. Also, this Site poses risks to the ecological receptors from soils, sediments, biota, and the groundwater flowing from the contaminated soils and sediments to the surface water. Soil cleanup levels for chemicals posing a risk to humans were developed for Commercial Area. Soil and sediment cleanup levels for chemicals posing a risk to the environment were developed for different Site areas. Because the risks to the ecological receptors were greater than to humans in the non-commercial areas (in particular, the Boys Creek sediments due to shellfish ingestion), only the cleanup levels that are protective of the environment are presented below. Sediment cleanup levels for shellfishing were not separately established also because the estimated risk (1.45×10^{-4}) was at the threshold for remedial action (1×10^{-4}) and there are inherent uncertainties in the risk estimates (e.g., shellfish consumption rates, bioavailability of the arsenic). By setting cleanup levels for the Boys' Creek sediments to address ecological risks, the human health risks associated with the ingestion of shellfish will also be addressed.

Cleanup goals for toluene and PCB were identified in the FS and Proposed Plan. The toluene cleanup goal was based on the MCP Upper Concentration Limit. Upon further examination of the concentrations in the soil, the toluene concentrations do not exceed the Upper Concentration Limit. The PCB cleanup goal for the Solid Waste and Debris Area was based on the Massachusetts hazardous waste regulations. The PCB cleanup goal should have been based upon a risk to ecological receptors. Upon further review, the PCB concentrations do not present an ecological risk. As such, the Proposed Plan's cleanup goals for toluene and for PCB in the Solid Waste and Debris Area have not been adopted as cleanup levels. These changes do not alter the soil cleanup area or cleanup volumes from the preferred alternative in the Proposed Plan.

Endosulfan II, endosulfan sulfate, and iron were evaluated during the baseline ecological risk assessment. With respect to endosulfan II and endosulfan sulfate, in the Commercial Area, no soil cleanup goals were established–endosulfan II was not detected in this area, and, while endosulfan sulfate was detected, this area was determined not to be a suitable habitat for ecological receptors. With respect to endosulfan II and endosulfan sulfate, in the Non-Commercial Areas, cleanup goals were likewise not established because soil benchmarks were not exceeded or cleanup goals could not be calculated for the indicator organisms. However, due to the co-location in the Non-Commercial Areas of the other contaminants to be remediated, soils contaminated with endosulfan II and endosulfan sulfate will be remediated. With respect to iron, a cleanup goal was not established because it is naturally occurring and impractical to clean up.

1. Human Health Concerns - Current and Anticipated Future Use(s) of the Site

Based on discussions with Town representatives and citizens, it was deemed reasonable that future use of the commercial area would likely remain as commercial use and thus served as the basis for future land use for the Commercial Area only. Other portions of the Site, including the salt marsh and wetlands (on the eastern side), and the Hathaway Braley Wharf Company containing mostly a wooded area and fresh water wetlands, due to existing wetland regulations, are anticipated to remain in their undeveloped state.

Soil cleanup levels for COCs in surface soil (0-2 in feet depth) within the Commercial Area exhibiting an unacceptable cancer risk or non-carcinogenic hazard potential have been established such that they are protective of public health.

With respect to carcinogenic COCs, soil cleanup levels for known and suspected carcinogens (Classes A, B, and C compounds) have been set at a 10^{-6} excess cancer risk level considering exposures via incidental ingestion and dermal contact to a commercial worker, except for arsenic and PCBs. Exposure parameters for incidental soil ingestion and dermal contact have been described (Weston 1998 a, b, and c). In the case of arsenic, a risk management decision was utilized to move away from the background value (4.8 mg/kg) in the Proposed Plan to arrive at the cleanup level of 7.6 mg/kg. The cleanup level for arsenic (7.6 mg/kg) is based on a risk level of 5.7×10^{-6} which is consistent with risk levels for the remainder of the Commercial Area and within EPA's risk range (10^{-4} to 10^{-6}). This does not change the volume of soils estimated to be remediated in the Proposed Plan because the arsenic is located with the other contaminants and the estimated soil volumes for the other contaminants is the same as in the Proposed Plan. In the case of PCBs, EPA has chosen to utilize a policy based approach which entails cleanup to 10 ppm for areas in which commercial land use is applicable (EPA, 1990). A more conservative value of 10 ppm was chosen because it could not be assumed that exposure would be limited (e.g., roof remaining over soils, soils remaining covered, or contaminated material remaining in the same place) in the future.

With respect to non-carcinogenic compounds, lead was the only COC. The cleanup level for lead in surface soils was established based on a non-carcinogenic risk to provide protection to the fetus of a potentially exposed female in a non-residential setting. EPA employed EPA's approach for assessing risks associated with non-residential adult exposures to lead in soil to establish a concentration in surface soil, which if ingested by a pregnant female would be unlikely to result in fetal blood lead levels in excess of 10 ug/dl. The cleanup level chosen for lead in surface soils for the Commercial Area is 600 mg/kg (EPA, 1996b).

Beryllium was identified earlier in the Risk Assessment (Weston, 1995) as a chemical with a carcinogenic risk from ingestion exposure and a cleanup goal was established in the FS. However, due to the withdrawal of the oral cancer potency estimate for this compound (IRIS, 1998), no cleanup level was established for beryllium in the Proposed Plan.

Chrysene has been identified in Table 9 as a COC. A cleanup level for chrysene was not established because the total carcinogenic risk of 1.1×10^{-6} is only sightly above the cleanup range of 1×10^{-6}. This does not alter the soil cleanup area or volume from the preferred alternative in the Proposed Plan.

Table 13 summarizes the cleanup levels for carcinogenic and non-carcinogenic COCs in surface soils protective of incidental ingestion and dermal contact by a commercial worker.

These cleanup levels must be met at the completion of the remedial action at the points of compliance. Points of compliance for these compounds are the top 2 feet of surface soil in the Commercial Area after the completion of the remedial action. Compliance with the lead cleanup level should be based on the arithmetic average concentration whereas other constituents should be based on the 95% UCL of the arithmetic mean concentration from Commercial Area surface soils. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

2. Ecological Considerations

Based upon the results of the Baseline Ecological Risk Assessment, site-specific remedial objectives and acceptable exposure limits for aquatic and terrestrial receptors have been identified for the areas within the Site that have environmental risks associated with exposure to contaminants in soils and/or sediments. These areas are the Commercial Area, Solid Waste and Debris Area, and Marsh and Boys Creek Areas.

Table 14 summarizes the COC concentrations, i.e., soil/sediment cleanup levels, that have been established to protect ecological receptors. These cleanup levels in soils and/or sediments have been determined by EPA to be protective of the environment and attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. These cleanup levels must be met at the completion of the remedial action at the points of compliance, i.e., the soil and sediment depths as identified in Table 14. The selected remedy's soil and sediment cleanup levels for copper, zinc, and cyanide which were based on leaching have changed from the cleanup levels presented in the Proposed Plan. These changes were the result of changes to the groundwater cleanup levels, which were then used to determine soil and sediment cleanup levels (see Section XI.A. for a discussion of these changes). However, these changes in the cleanup levels do not significantly change the estimated volume of soils to be excavated.

a. Commercial Area

One of the ecologically based remedial action objectives for the Commercial Area soils (0-2 feet deep and greater than 2 feet) is to protect surface water and sediments from contaminant migration from Commercial Area soils via groundwater. Target soil concentrations referred to as Soil Leaching Concentrations (SLCs) were calculated to represent the quality of soil meeting this remedial action objective. An SLC represents the concentration of a contaminant in soil that would present a threat to surface water quality due to the potential for the contaminant to leach to groundwater and migrate to surface water. The SLCs are based upon the attenuation of the contaminants from the leachate in soils and sediments, and the dilution of the leachate in Boys Creek. The SLCs were derived using site-specific K_D values, the Seasonal Soil Compartment (SESOIL) Model, AWQCs, and a site-specific surface water:groundwater dilution factor. The surface water: groundwater dilution factor was used to establish target groundwater concentrations, which are synonymous with the interim groundwater cleanup levels (see Section XI.A. above). SLCs were calculated for contaminants whose dissolved concentration in groundwater exceeded the groundwater target concentration, and whose total concentrations in surface water exceeded the AWQC (i.e., copper, zinc, and cyanide). These SLCs have been chosen as the soil cleanup levels in the Commercial Area (Table 14).

Chemical-specific cleanup goals for protection of surface water and sediments from direct run-off of soil contaminants via erosion are not necessarily based on the present drainage patterns in the Commercial Area.

b. Solid Waste and Debris Area

Soil cleanup levels for COCs in surface soil (0-2 feet deep) in the Solid Waste and Debris

(SWD) Area exhibiting an unacceptable ecological risk have been developed such that they are protective of terrestrial organisms as shown in Table 14. Dietary exposure models calculated for the meadow vole, robin and masked shrew led to the development of ecological risk based concentrations of five chemicals that are responsible for the majority of the risks to those species. Ecological risk based concentrations (ERBCs) were calculated for antimony, copper, lead, zinc and DDT, which are expected to be co-located with any other chemicals of potential concern to terrestrial receptors (see Table 6 for other chemicals of potential concern). Background concentration information was evaluated for all compounds of concern which had ERBCs calculated (Table 14). The cleanup levels for lead, zinc, and DDT were chosen based on their background concentrations since it is not practical to select a cleanup level lower than background.

To protect surface water and sediments from contaminant migration from the SWD Area via groundwater, SLCs were calculated for some COCs (copper, zinc and cyanide) to represent soil concentrations that would provide protection to ecological receptors. See discussion above in Section XI.B.2.a. regarding the development of the SLCs. These SLCs have been chosen as the soil cleanup levels in the SWD Area for copper and zinc (for soils at depths greater than 2 feet) and for cyanide (for soils 0-2 feet deep and greater than 2 feet) (Table 14). For copper and zinc in soils 0-2 feet deep, the cleanup levels which were selected to protect terrestrial organisms (see above paragraph) are lower than their SLCs, and as such will be used as the cleanup levels instead of the SLCs.

Also, there is currently transport of contaminants from the SWD Area to surface water and sediment via erosion and runoff. Design, construction and maintenance of erosion controls would also contribute to meeting the objective of protecting surface water and sediments from contaminants migrating from the SWD Area.

c. Marsh and Creek Bed Areas

Results of the ecological risk assessment indicate that contaminant levels in the Boys Creek Marsh and Creek Bed Areas are sufficiently elevated to pose a substantial risk: to aquatic organisms due to chemicals in surface water; to aquatic benthic and epibenthic organisms due to contaminants in sediments; to the great blue heron due to contaminants in fish; and to the black duck due to contaminants in shellfish. ERBCs were developed for cadmium, copper and zinc since they were responsible for contributing to the majority of the unacceptable risk and, based on review of RI data, they are co-located with many of the other chemicals (e.g., cyanide, arsenic, nickel, DDT and methoxyclor) which contributed risk to aquatic and terrestrial receptors. Therefore, cleanup goals were only established for soils in the Marsh Area and sediments in the Creek Bed Area at depths 0-2 feet for cadmium, copper and zinc (Table 14) based on several methods which included: an evaluation of empirically-derived sediment quality guidelines (e.g., ER-Ms) compared to site-specific sediment concentrations; the development of benchmarks based on models of dietary exposure for the black duck and great blue heron; and the development of equilibrium partitioning hazard quotients for organic contaminants using AWQC. Toxicity tests, ancillary chemical/physical properties (SEM/AVS, grain size, TOC), and tissue data from ribbed mussel, hard shell clams, soft shell clams, and mummichog supported the cleanup goals. ER-Ms were chosen to establish cleanup levels based on a weight-of-evidence approach. ER-Ms represent concentrations above which deleterious effects would likely occur. This weight-of-evidence evaluation of other benchmarks, site-specific toxicity testing, and field observations indicates that the ER-M values for cadmium, copper, and zinc are protective for this Site.

To protect surface water and sediments from contaminant migration from Marsh and Creek Bed Areas soils and sediments (at depths greater than 2 feet) via groundwater, it was determined that these Marsh and Creek Bed Areas soils and sediments would need to meet the cleanup goals based on soil leaching (i.e., SLCs). See discussion above in Section XI.B.2.a. regarding the development of the SLCs. These SLCs have been chosen as the soil and sediment cleanup levels for copper, zinc and cyanide in the Marsh and Creek Bed Areas for soils and sediments at depths greater than 2 feet (Table 14).

C. Description of Remedial Components

After an extensive process of evaluating cleanup alternatives and review of comments to the Proposed Plan, EPA has selected the remedy described below as the best balance between the nine criteria and the best overall approach to the Site. The selected remedy includes a modification to the preferred source control alternative discussed in the Proposed Plan. The selected groundwater remedy is the same as the preferred alternative discussed in the Proposed Plan. The principle features of the selected remedy are as follows.

1. Source Control

a. Site Setup, Clearing, Sampling, and Contamination Delineation

The first step in the remedial process will be to establish an on-site office and mobile laboratory to support the field activities. Then, the following activities will be completed, most at the same time. The soils and sediments will be sampled to better define the remediation areas and amounts. A treatability study will be performed to determine the most appropriate treatment for the contaminated materials that can and need to be treated. Debris and vegetation will be excavated from the work areas. The power plant, metal building, and rear section of the main building will be demolished to make room for the remedial activities. Cleared vegetation, debris, and building materials will be disposed of in the appropriate off-site facilities. Discussions will be held with Town Officials and residents to determine the most protective and acceptable access route(s) for truck traffic.

Also, a bioavailability study in the Marsh Area will be performed to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland or riverfront area. Bioavailability is defined as the degree to which materials in an environmental media can be assimilated by organisms (EPA, 1997a). There is a relationship between bioavailability and chemical exposure to organisms. The bioavailability study will be used to assess exposure. The measurements of bioavailability include analyses of the magnitude, duration, and frequency of exposure. The study will likely include data from the chemical sources, chemical distribution (including transformation), and spatial-temporal distributions of key receptors. Because evaluation of contamination concentrations in whole sediments may not be sufficient to address the question of bioavailability, modifying factors (e.g., organic carbon simultaneously extracted metals/acid volatile sulfide (SEM/AVS) ratio) must be considered. Specific assessment tools to measure or estimate bioavailability may include: sediment, pore water and overlying water concentrations; SEM; AVS and organic carbon concentrations; tissue concentrations; biomarkers; fate and transport models; and food chain models (Ingersoll, 1997).

b. Excavation, Treatment, and Disposal

Approximately 54,000 yd^3 of contaminated soils and sediments will be excavated wherever heavy metals, cyanide, PCBs, PAHs, and pesticides are present above the cleanup levels. Once removed, the contaminated soils and sediments will be separated from any solid wastes and debris. Materials will be tested to determine if they contain contamination at levels above the cleanup goals as shown in Tables 13 and 14. The contaminated materials will be tested and further separated into materials that will be treated and not treated. The estimated total volumes of each material at the Site are shown in Table C-1 in Appendix C. The actual amount of excavation in the Marsh Area will depend on results of the bioavailability study. Approximately 55,000 yd^3 of solid waste, debris, and treated and un-treated soils and sediments will be sent off-site to the appropriate disposal facilities in compliance with the EPA Off-Site Rule, 40 CFR 300.440. A minimal amount of material determined to be hazardous waste will require treatment off-site to meet land disposal restrictions prior to disposal.

The on-site treatment will be for materials requiring treatment for off-site disposal (estimated to be 6,000 yd^3 treated). The most appropriate treatment method(s) will be determined from the Treatability Studies. The treatment will eliminate the potential for contaminants to leach from these materials. The treatment technology(ies) will most probably be some form of solidification/ stabilization. The treatment of the contaminated materials will be done in a temporary enclosure to the extent practicable to ensure that workers and residents in the area are not impacted by airborne dust and contaminants. Appropriate engineering controls will be used to reduce all other dust emissions from excavation and storage of materials, and truck traffic on-site.

Soils and sediments with contaminant concentrations that do not exceed the cleanup goals will be placed back into the areas that have been excavated. Additional fill will be brought onto the Site to properly contour the Site. Once the contamination is removed from the various Site areas, each area will be regraded and revegetated to its original pre-contamination condition to the extent possible. Salt marsh areas that are excavated to remove contamination will be regraded and revegetated to approximate the original conditions of the remediated area. Erosion protection will be provided in each area, as appropriate, to prevent bank scouring and erosion.

Some of the soils and sediments to be excavated are below groundwater elevations and/or in Boys Creek. These removed soils and sediments may have water treatment issues associated with excavation, storage, treatment, and/or disposal activities. Soils and sediments that require dewatering will be placed into a tank or on an impervious surface. Dewatering of soils or sediments will probably involve some type of mechanical dewatering (e.g., filter press) and/or gravity settling. Soils and sediments will be dried enough to meet disposal requirements. All water separated from the soils and sediment will be tested, and if necessary treated to groundwater or surface water standards, before being discharged back onto the Site. Boys Creek may be temporarily diverted in some locations to allow for the removal of contaminated sediments.

The excavation, treatment, and disposal of contaminated soils and sediments are described in more detail in Appendix C.

c. Monitoring

A long-term monitoring program will be undertaken to assess the effectiveness of the remedy over the long term. Soils, sediments, surface water, and vegetation will be sampled and analyzed for the levels of the COCs. These monitoring activities will be undertaken for 30 years after the completion of the source control remedy.

2. Management of Migration - Monitored Natural Attenuation with Phytoremediation of the Site Groundwater

The risks from the groundwater contaminants will be significantly reduced by primarily removing contamination sources to the groundwater. The groundwater contamination will be further reduced by natural attenuation. For the inorganic compounds, natural attenuation is expected to involve chemical transformation, sorption, and dilution. For the organic compounds, natural attenuation is expected to involve chemical transformation, sorption, dilution, and biodegradation. Additional measures to control the groundwater elevation will be by phytoremediation (trees will be planted to lower the groundwater). Planting trees will only be done in areas of the Site that the groundwater is not influenced by the ocean and tidal action in Boys Creek. The exact location, types, and numbers of trees to be planted will be determined during the remedial design. It will take several years for the trees to become large enough and the tree roots to be deep enough to fully lower the groundwater level. When fully grown the trees should limit the flow of groundwater through areas where residual contamination still remains at the Site. The trees selected to lower the groundwater will be limited to types that do not take up contamination, thereby preventing the movement of contamination from one location (groundwater) to another (trees). The groundwater should meet the cleanup goals approximately ten years after the removal of the contamination sources.

A long-term groundwater monitoring program will be undertaken to assess the effectiveness of the remedy (natural attenuation with phytoremediation of the groundwater in conjunction with source control) over the long term. The groundwater monitoring will include analysis of contaminants of concern over 30 years after the completion of the source control remedy. The most appropriate sampling locations will be determined once the sources of contamination are removed. The use of existing wells may be possible. In addition, the trees will be monitored for metals.

3. Institutional Controls

Institutional controls will also be established on the Site properties to ensure that the remedy is protective of human health and the environment. Typically, institutional controls will be restrictive covenants running with the land in perpetuity, and may include easements. Institutional controls will be established to prevent any future use of the groundwater at the Site for drinking water. If groundwater is determined to be within safe and acceptable levels for drinking after the groundwater cleanup levels have been reached, then restrictions on groundwater use may be lifted. Also, institutional controls will be established to limit other activities at the Site. Such limits include restricting the types of use and construction within portions of the Commercial Area to only commercial and industrial uses (i.e., no residential use). Institutional controls may also be established in the Non-Commercial Area to limit the use of that area to certain recreational uses consistent with the risk assessment and response actions conducted in that area. It should be noted, however, that the wetlands within this area are currently under restrictions from existing wetland regulations.

There is a current risk at the Site from shellfish ingestion. The existing shellfish ban imposed by the Town of Fairhaven, based on bacterial issues, should be continued until testing indicates no risk from bacteria contamination, as well as from Site contaminants. It is expected, at the conclusion of the post remedial risk assessment, that the Site will not pose a risk from shellfish ingestion due to Site contaminants because of the removal of the sources of contamination that cause this shellfish ingestion risk.

4. Review of the Completed Remedy

The Commercial Area of the Site will be cleaned up to be protective of human health based upon anticipated future commercial use; residential uses will be prohibited. As such, because the selected remedy will nonetheless result in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow unlimited use and unrestricted exposure, EPA is required to conduct five-year reviews. The purpose of these reviews is to evaluate whether the selected remedy remains protective of human health and the environment. These five-year reviews are required no less often than each five years after the initiation of the remedial action, and EPA may terminate these reviews when no hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure.

5. Cost and Schedule

The total cost of this action is estimated to be approximately $18.6 million. A breakdown of the costs for the source control and groundwater remedial actions are shown on Tables 15 and 16. The design and studies should be completed 2 years after the Record of Decision (ROD) is signed.

The physical Site cleanup of contamination sources and Site restoration should be completed 4 years after the ROD is signed. It is anticipated that the groundwater cleanup levels will be reached within 10 years of completion of the source removal.

XII. Statutory Determinations

The remedial action selected for implementation at the Atlas Tack Corp. Superfund Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

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

The remedy at this Site will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment, engineering controls and/or institutional controls. More specifically the removal and treatment/disposal of contaminated soils and sediments will reduce human health and ecological risks and reduce contaminant leaching to the groundwater to acceptable levels.

Moreover, the selected remedy will achieve potential human health risk levels that attain the 10^{-4} to 10^{-6} incremental cancer risk range and a level protective of noncarcinogenic endpoints. The remedy is also protective of sensitive ecological receptors. The groundwater at the Site is considered by the DEP not to be a current or future drinking water source. The remedy will require institutional controls to prevent the use of the groundwater for drinking water purposes. Interim groundwater cleanup goals have been established to be protective of sensitive wetlands and surface water environmental receptors. It is anticipated that, with the elimination of the source of contamination in the soils and sediments, the levels of these contaminants in the groundwater will be naturally reduced to acceptable levels within about 10 years after the completion of the source control remedy. Once these levels have been met, an ecological risk assessment will be conducted to insure they are protective of the environment. On the developable portion (Commercial Area) of the Site, institutional controls (e.g., deed restrictions, including easements) will be established to limit the activities to only commercial uses (i.e., no residential use).

B. The Selected Remedy Attains ARARs

The selected remedy will attain all applicable or relevant and appropriate federal and state requirements (ARARs) that apply to the Site. A brief summary of the ARARs follows. Refer to Tables 17, 18, and 19 for a comprehensive presentation of the chemical-, location-, and action-specific ARARs and other policies, criteria and guidances "to be considered" (TBCs).

In implementing the selected remedy, the off-site disposal of hazardous substances must comply with EPA's Off-Site Rule (40 CFR 300.440-Procedures for Planning and Implementing Off-Site Response Actions).

1. Chemical-Specific ARARs

The Clean Water Act's Ambient Water Quality Criteria (a.k.a. National Recommended Water Quality Criteria) for the protection of aquatic life (AWQC) were used to determine appropriate groundwater, soil, and sediment cleanup levels based upon contaminant migration from soils and sediments to the groundwater and then from the groundwater to surface water. Based upon the current and potential future use of the surface water at the Site (as described above in Section VI.C.), these AWQC have been determined to be relevant and appropriate in their use to calculate cleanup levels in groundwater, soils and sediments. "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program," NOAA Technical Memorandum NOS OMA 52 (Long & Morgan, 1990 and 1991) and "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments" (Long et al., 1995) were used as a TBC to establish cleanup levels for sediments (0-2 feet deep) within Boys Creek and adjacent marsh. EPA's approach for assessing risks associated with non-residential adult exposures to lead in soil was used as a TBC to establish the cleanup level for lead in the Commercial Area (EPA, 1996b). Finally, the EPA Cancer Slope Factors (CSFs) and Reference Doses (RfDs) were used in performing the human health risk assessment and in establishing cleanup levels for the soils in the Commercial Area.

2. Location-Specific ARARs

The selected remedy has been determined by EPA to comply with the requirements of the Protection of Wetlands Executive Order 11990, the Floodplain Management Executive Order 11988, the Clean Water Act § 404 dredge and fill regulations, the Fish and Wildlife Coordination Act, the Coastal Zone Management Act, and various Massachusetts statutes, regulations and policies, such as the Wetlands Protection Act, River Protection Act Amendments to the Wetlands Protection Act, Clean Waters Act, and Coastal Zone Management Policies. EPA has determined that: (a) there is no practicable alternative with less adverse impact on the on-site floodplains, wetlands, and riverfront areas; (b) all practicable measures will be taken to minimize and mitigate any adverse impacts from the work to the floodplains, wetlands, and riverfront areas; (c) current information indicates that there will likely to be no impact on threatened or endangered species; (d) there will be no significant loss of flood storage capacity, and no significant net increase in flood storage or velocities; (e) banks will be restored and habitat will be improved; (f) the performance of the selected remedy will not result in any discharge that will cause or contribute to exceedances of state water quality standards or toxic effluent standards or to degradation of water quality; and (g) erosion controls will be implemented to prevent contaminant runoff to surface water. An evaluation of the selected remedy's effect on the Site's floodplain, wetlands and riverfront areas is attached as Appendix E of this ROD.

3. Action-Specific ARARs

The source control remedy will comply with the Clean Water Act's NPDES requirements, Massachusetts Surface Water Quality Standards, and Massachusetts Ground Water Quality Standards in the discharge of water resulting from the dewatering of excavated soils and sediments. In addition, the source control remedy will comply with various RCRA and TSCA requirements concerning the handling of hazardous materials and PCB materials (with contamination equal to or above 50 ppm), respectively. PCB contaminated materials will be decontaminated prior to off-site transport or disposal in accordance with 40 CFR 761.79. EPA's Guidance on Remedial Actions for Superfund Sites with PCB Contamination (August 1990) was considered in establishing the cleanup level for PCBs in the Commercial Area.

C. The Selected Remedial Action is Cost-Effective

In the Agency's judgment, the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once EPA identified alternatives that are protective of human health and the environment and that attain, or, as appropriate, waive ARARs, EPA evaluated the overall effectiveness of each alternative by evaluating the following three of five balancing criteria used in the detailed analysis of alternatives: (1) long term effectiveness and permanence; (2) reduction in toxicity, mobility, and volume through treatment; and (3) short-term effectiveness. Overall effectiveness is then compared to cost to determine whether a remedy is cost effective. The costs of the source control and groundwater remedial actions are shown on Tables 15 and 16.

Alternative 5 is not considered cost effective since its cost is higher than any of the other alternatives while not providing any additional effectiveness. Alternative 3 is the least costly protective alternative, however, it is less "effective" than Alternative 4 and the selected remedy because it involves significantly less treatment. Since Alternative 4 and the selected remedy provide for the treatment of increased volumes of contaminated material, they, therefore, also provide increased reduction in mobility and toxicity as well as long term effectiveness and permanence. Alternative 4 and the selected remedy are both cost effective since their costs are proportional to their overall effectiveness.

The selected Management of Migration remedy (Alternative 6 - GW-2) is the lowest cost protective alternative carried through the detailed alternative analysis in the FS for the groundwater cleanup. The groundwater will be monitored and institutional controls will be put in place to prevent the use of the groundwater for drinking water purposes. Active restoration of the aquifer (Alternative 7 - GW-3) would have cost an additional $4.4 million over the selected remedy and would not have significantly reduced the estimated time frame to attain groundwater cleanup goals in the long term. As such, the selected remedy affords the greatest overall effectiveness proportional to its cost.

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

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which 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; 5) cost; 6) State acceptance; and 7) community acceptance. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against 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.

1. Source Control

The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. The selected remedy requires excavation of contaminated soils and sediments. These soils and sediments will then be treated on-site, as necessary to lower costs, prior to disposal at appropriate facilities off-site. Treating the soils and sediments, such that they comply with legally-mandated off-site disposal requirements, utilizes a permanent solution (off-site disposal) relying on treatment (most likely fixation or solidification) to the maximum extent practicable, while meeting all legal treatment and off-site disposal requirements. The selected remedy affords the best balance of tradeoffs as compared to the other alternatives that are protective and meet ARARs. Alternatives 3 and 5 do not require treatment to any great extent, but instead, rely upon an engineering solution that is less effective in the long term. In addition, Alternative 3 presents significant implementation issues related to constructing a 3-acre, 25-30 foot landfill in the center of town and has been greatly criticized by members of the surrounding community. The selected remedy raises few implementation issues and is consistent with the wishes of those in the town and the State that the contamination be removed from the Site. As a result, the selected remedy affords a better balance of tradeoffs than Alternatives 3 and 5. Like the selected remedy, Alternative 4 provides for treatment of contaminated soils and sediments, but the materials would then be disposed of on-site, contrary to the strong sentiments of the community. Because the costs for Alternative 4 and the selected remedy are close, and the selected remedy has the support of the community and State, the selected remedy provides the best balance among the tradeoffs presented.

2. Management of Migration

Alternative 6 (GW-2) with the removal of the sources of contamination to the groundwater in the long term achieves a permanent solution without the use of active groundwater treatment.

Alternative 6 is estimated to attain groundwater cleanup goals within ten years after the completion of the source control remedy as a result of the source removal, natural attenuation, and phytoremediation. Alternative 7 (GW-3) provides for active treatment of the groundwater at an estimated cost of $4.8 million versus $0.4 million for the selected Alternative 6. However, the time estimated to attain groundwater cleanup goals is not substantially different for the two alternatives. The selected remedy affords the best balance of trade-offs as compared to the other option (Alternative 7) because the selected remedy achieves a permanent solution within a similar time period at a substantially reduced cost.

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

A principal element of the selected remedy is treatment. This element addresses the primary threat at the Site, contaminated soils and sediments, which represent risks to human health and the environment from contact and ingestion and to sensitive ecological receptors through the leaching of contaminants to the groundwater. The selected remedy satisfies the statutory preference for treatment as a principal element by treating the more heavily contaminated soils and/or sediments to meet acceptable leaching levels, criteria (TCLP), LDRs and/or TSCA requirements as appropriate.

XIII. Documentation of Significant Changes

EPA presented a Proposed Plan (preferred alternative) for remediation of the Site on December 2, 1998. The source control portion of the preferred alternative included removal, treatment and on-site disposal of contaminated soils and sediments (Alternative 4). The management of migration portion of the preferred alternative included natural attenuation, after source removal, and monitoring (Alternative 6). During the public comment period, the public and their State and Federal elected representatives voiced considerable displeasure with the preferred alternative particularly with regard to the disposal of treated soils and sediments on-site in a RCRA Corrective Action Management Unit (CAMU). The proposed disposal area would have been located at the rear of the Atlas Tack property and would have been approximately 3.4 acres in size and 4 to 6 feet in height. The estimated cost for Alternative 4 was $17.1 million. Approximately 30,000 yd^3 of material was to be treated in Alternative 4. The Selected Remedy will treat approximately 5,000 yd^3 on-site; an additional 3,400 yd^3 will be treated off-site.

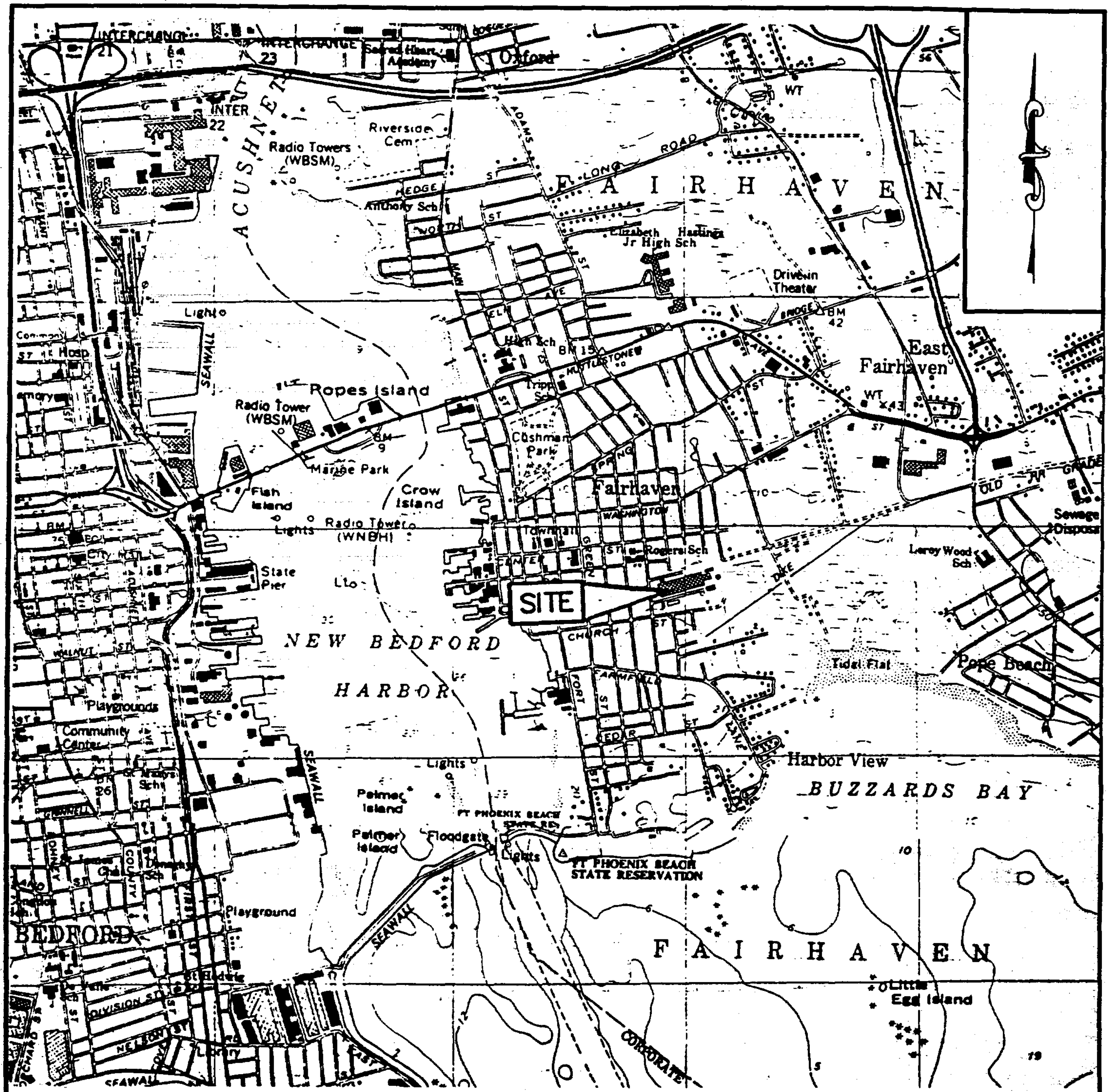
The cost for Alternative 5 was estimated at $24.3 million. Alternative 5 provided for the disposal of a large amount of contaminated soils and sediments to a RCRA Hazardous Waste Landfill, and lesser amounts of solid wastes and less contaminated materials to other disposal facilities. New information, developed during the comment period regarding off-site disposal options and locations, indicated that, with the combination of treatment of some of the soils and sediments, and judicious selection of appropriate disposal areas and types, all of the contaminated soils and sediments could be disposed of off-site for only approximately $1.2 million more than the cost of the Proposed Plan's preferred source control alternative. As previously noted, EPA believes that this additional cost is a justified response to the concerns of the public. This change does not require the issuance of a new proposed plan. Although it represents a different mix of components from the alternatives presented in the FS and the Proposed Plan, EPA believes that it could have been reasonably anticipated by the public.

After consideration of all of the public comments received on the December 1998 Proposed Cleanup Plan, EPA does not believe that significant changes to the remedy described in that Plan are needed. In general, most comments favored removal of the contamination to an off-site disposal facility. Some comments favored treatment of the material. These community issues resulted in some modifications to the proposed remedy. The attached Responsiveness Summary (Appendix A) should be consulted for a more detailed discussion of the comments received on the Proposed Plan and EPA's responses to them.

XIV. State Role

The Massachusetts Department of Environmental Protection has reviewed the various alternatives and had 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 laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the Atlas Tack Corp. Superfund Site. A copy of the declaration of concurrence is attached as Appendix F.

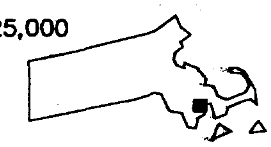
FIGURES



BASE MAP IS A PORTION OF THE FOLLOWING U.S.G.S. 7.5 MINUTE QUADRANGLE:
NEW BEDFORD NORTH, MA, 1979, AND NEW BEDFORD SOUTH, MA, PHOTOREVISED 1977 1:25,000

1 MILE 0.5 0 1

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

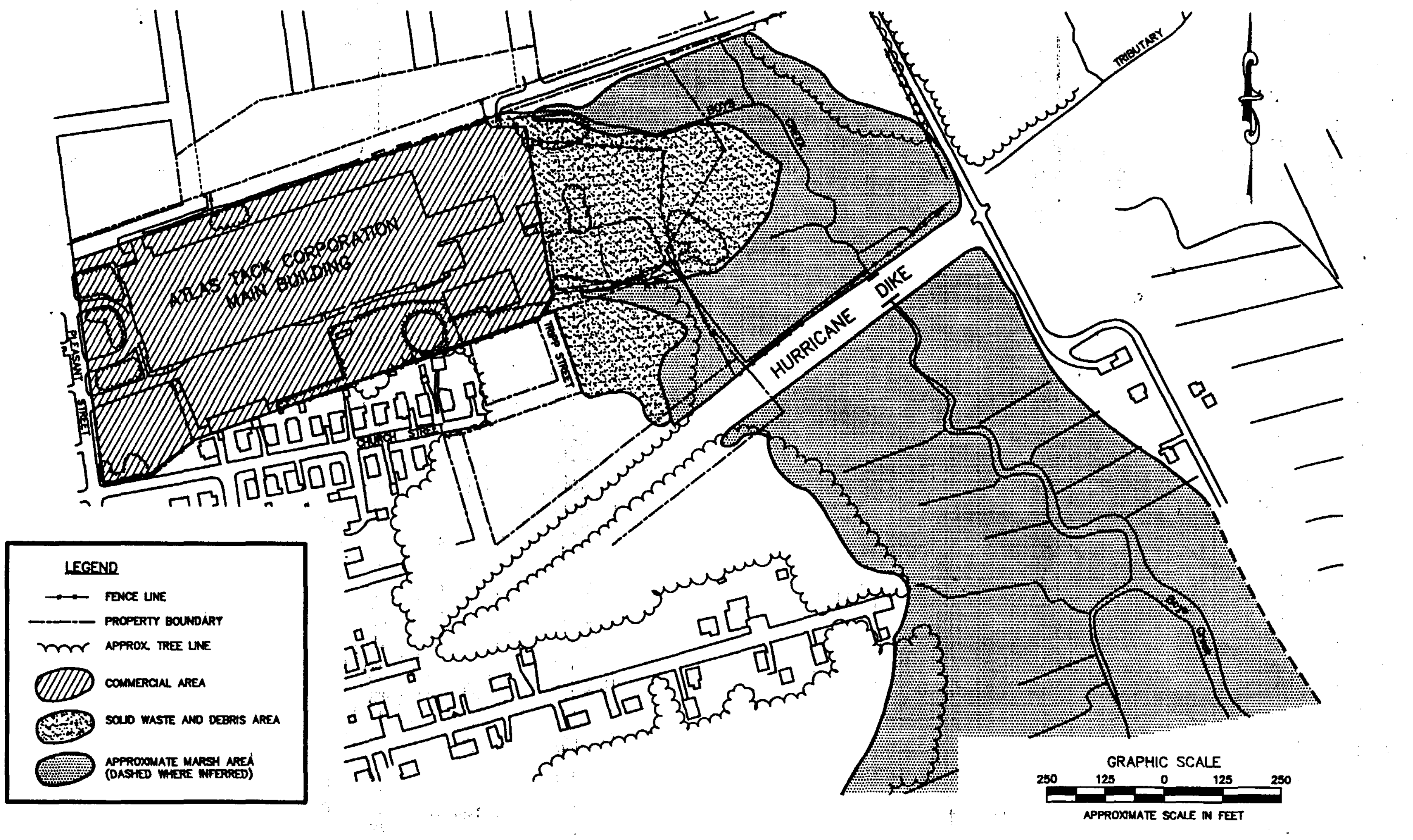


ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

SITE LOCUS MAP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

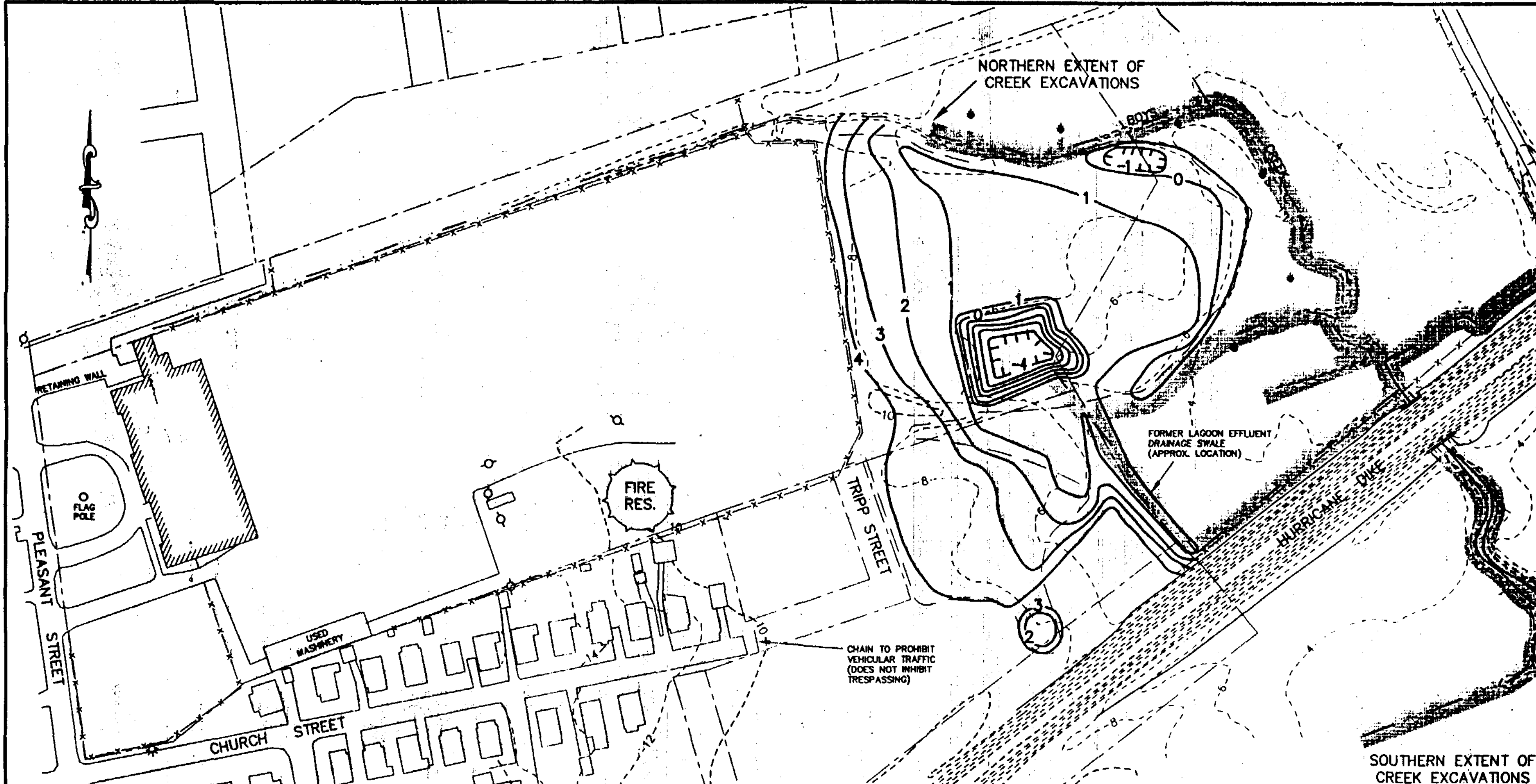
DATE SEPTEMBER 1999	FIGURE NO. 1



ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

STUDY AREA

DATE SEPTEMBER 1999 | FIGURE NO. 2



NOTES:

1. EXTENT OF CREEK EXCAVATION IS APPROXIMATELY 500 FEET FURTHER SOUTH THAN SHOWN. DEPTH OF CREEK EXCAVATION IS A MINIMUM OF 2 FEET.
2. THE EXTENT OF MARSH SURFACE SOIL EXCAVATION WILL BE DETERMINED BASED ON THE RESULTS OF THE PREDESIGN BIOAVAILABILITY STUDY.

LEGEND

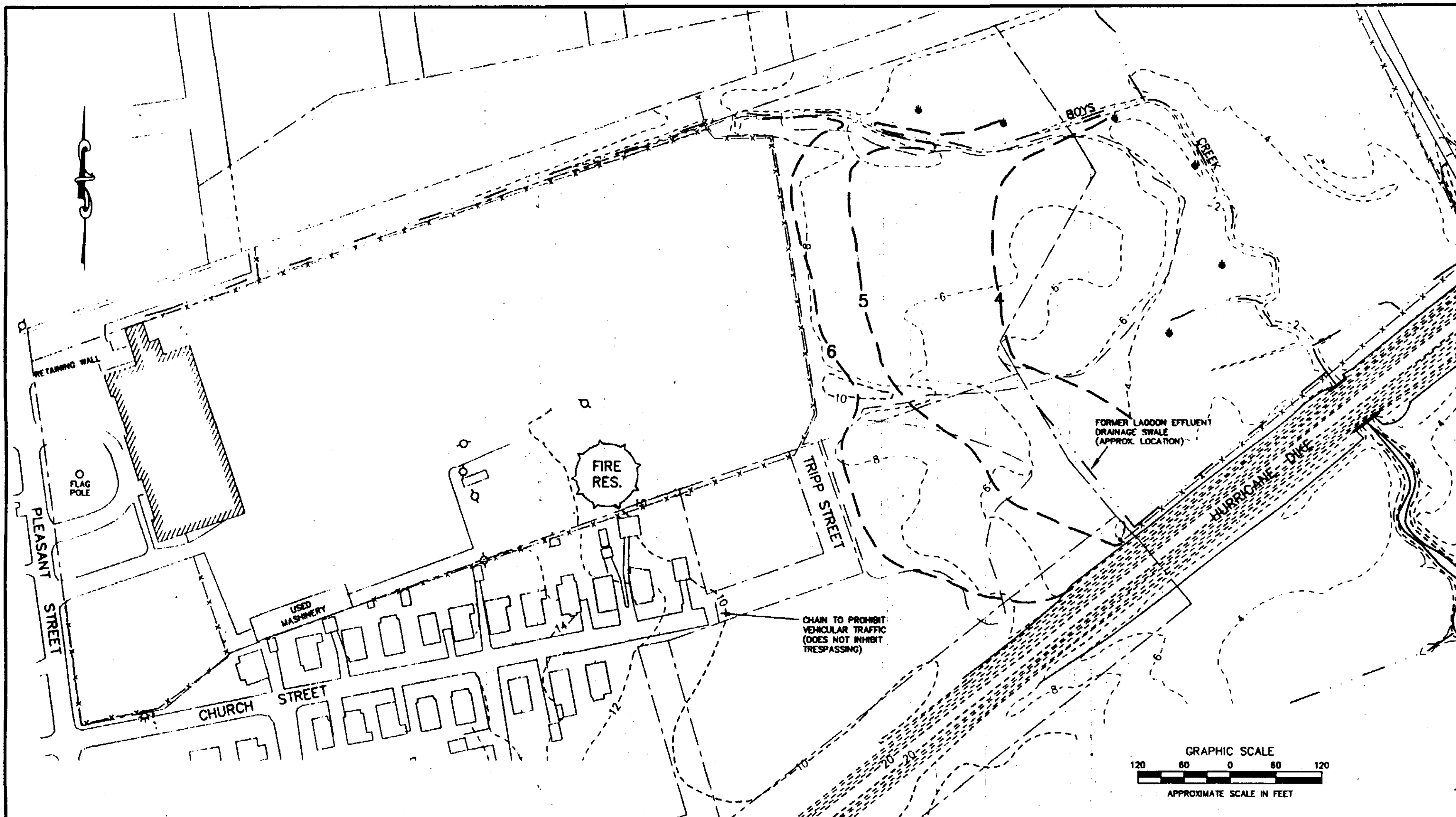
- CREEK/TRIBUTARIES
- UTILITY POLE
- COMMERCIAL BUILDING
- APPROXIMATE FENCE LINE
- PROPERTY LINE
- BOUNDARY OF SOLID WASTE AND DEBRIS AREA (APPROX. LOCATION)
- APPROXIMATE EXISTING GROUND SURFACE CONTOURS (2 FOOT INTERVALS)
- APPROXIMATE EXCAVATION CONTOURS (1 FOOT INTERVALS)
- EXTENT OF SEDIMENT CONTAMINATION EXCEEDING CLEANUP GOALS

ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

APPROXIMATE EXTENT OF EXCAVATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: JULY 1999 | FIGURE NO. 3



LEGEND

- CREEK/TRIBUTARIES
- UTILITY POLE
- COMMERCIAL BUILDING
- APPROXIMATE FENCE LINE
- PROPERTY LINE
- BOUNDARY OF SOLID WASTE AND DEBRIS AREA (APPROX. LOCATION)
- 10 — APPROXIMATE EXISTING GROUND SURFACE CONTOURS (2 FOOT INTERVALS)
- 6 — APPROXIMATE FINISH GRADE CONTOURS (1 FOOT INTERVALS)

ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

APPROXIMATE FINAL CONTOURS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: JULY 1999

FIGURE NO. 4

TABLES

TABLE 1

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations for Commercial Soils (Future Maintenance Worker)

Scenario Timeframe: Future
Medium: Commercial Soil
Exposure Medium: Inside and Outside Building - Top 2 feet

Exposure Point	Chemical of Concern	Concentration PPM Min	Concentration PPM Max	Frequency of Detection	Exposure Concentration	Exposure Point Concentration Units	Statistical Measure
Soil On-Site-Direct Contact							
	Volatiles						
	Methylene Chloride	1.30E-02	1.50E-02	3 / 27	1.44E-02	PPM	95%UCL
	Semi-Volatiles						
	Acenaphthylene	1.70E-01	2.20E+00	4 / 10	1.27E+00	PPM	95%UCL
	Benzo(a)Anthracene	1.40E-01	2.10E+02	7 / 10	6.03E+01	PPM	95%UCL
	Benzo(a)Pyrene	1.50E-01	1.90E+02	6 / 10	5.48E+01	PPM	95%UCL
	Benzo(b)Fluoranthene	2.20E-01	1.50E+02	8 / 10	4.33E+01	PPM	95%UCL
	Benzo(g,h,i)Perylene	2.30E-01	9.50E+02	8 / 10	2.70E+02	PPM	95%UCL
	Benzo(k)Fluoranthene	1.40E-01	1.90E+02	8 / 10	5.46E+01	PPM	95%UCL
	bis(2-Ethylhexyl)Phthalate	8.30E+00	4.90E+01	2 / 10	1.52E+01	PPM	95%UCL
	Butyl Benzyl Phthalate	1.10E+00	3.20E+00	2 / 10	1.56E+00	PPM	95%UCL
	Chrysene	1.60E-01	2.30E+02	9 / 10	6.60E+01	PPM	95%UCL
	Dibenz(a,h)Anthracene	4.20E-01	1.40E+01	4 / 10	4.58E+00	PPM	95%UCL
	Dibenzofuran	1.50E-01	8.40E+01	3 / 10	2.43E+01	PPM	95%UCL
	Indeno(1,2,3-cd)Pyrene	2.80E-01	1.20E+02	8 / 10	3.47E+01	PPM	95%UCL
	2-Methylnaphthalene	2.80E-01	2.00E+01	2 / 10	6.20E+00	PPM	95%UCL
	2-Methylphenol	6.50E-01	2.80E+00	2 / 10	1.42E+00	PPM	95%UCL
	Naphthalene	1.20E-01	1.20E+02	3 / 10	3.45E+01	PPM	95%UCL
	Phenanthrene	1.40E-01	4.30E+02	7 / 10	1.23E+02	PPM	95%UCL
	Pyrene	2.20E-01	3.80E+02	9 / 10	1.09E+02	PPM	95%UCL
	Pesticides and Polychlorinated Biphenyls						
	Aroclor-1260	2.80E-01	3.60E+01	6 / 8	1.89E+01	PPM	95%UCL
	Beta-BHC	1.20E-02	1.20E-02	1 / 8	1.20E-02	PPM	MAX
	4,4'-DDT	9.80E-03	9.80E-03	1 / 8	9.80E-03	PPM	MAX
	Inorganics						
	Aluminum	2.88E+02	9.38E+04	27 / 27	1.46E+04	PPM	95%UCL
	Antimony	6.50E+00	1.18E+02	9 / 23	3.07E+01	PPM	95%UCL
	Arsenic	5.50E-01	9.60E+01	27 / 27	1.87E+01	PPM	95%UCL
	Beryllium	3.30E-01	1.50E+00	15 / 25	5.58E-01	PPM	95%UCL
	Cadmium	8.50E-01	1.50E+03	9 / 24	2.15E+02	PPM	95%UCL
	Chromium	5.80E+00	2.43E+03	27 / 27	3.11E+02	PPM	95%UCL
	Cobalt	1.90E+00	6.06E+02	24 / 26	6.89E+01	PPM	95%UCL
	Copper	1.16E+01	5.40E+04	23 / 27	6.09E+03	PPM	95%UCL
	Lead	3.70E+00	5.95E+03	27 / 27	1.28E+03	PPM	95%UCL
	Manganese	1.97E+01	1.59E+03	27 / 27	5.65E+02	PPM	95%UCL
	Mercury	2.40E-01	1.80E+00	9 / 27	4.35E-01	PPM	95%UCL
	Nickel	2.10E+00	1.70E+03	25 / 27	2.94E+02	PPM	95%UCL
	Vanadium	5.80E+00	6.35E+02	27 / 27	5.92E+01	PPM	95%UCL
	Zinc	2.61E+01	1.90E+05	26 / 27	3.80E+04	PPM	95%UCL
	Cyanide	3.90E+00	1.69E+04	8 / 27	2.19E+03	PPM	95%UCL

Key:
PPM= Part Per Million (mg/kg)
95% UCL: 95% Upper Confidence Limit
Min: Minium concentration
Max: Maximum concentration

TABLE 2

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations for Non-Commercial Soils (Future Adult Trespasser)

Scenario Timeframe: Future
Medium: Non-commercial Soils
Exposure Medium: Soils

Exposure Point	Chemical of Concern	Concentration PPM Min	Concentration PPM Max	Frequency of Detection	Exposure Concentration	Exposure Point Concentration Units	Statistical Measure
Soil On-Site-Direct Contact							
	Volatiles						
	Semi-Volatiles						
	Benzo(a)Anthracene	1.90E-01	6.60E+01	15 / 19	1.89E+01	PPM	95%UCL
	Benzo(a)Pyrene	8.00E-02	5.90E+01	16 / 19	1.63E+01	PPM	95%UCL
	Benzo(b)Fluoranthene	4.00E-02	7.00E+01	17 / 19	1.99E+01	PPM	95%UCL
	Benzo(k)Fluoranthene	6.20E-02	3.40E+01	15 / 19	9.29E+00	PPM	95%UCL
	bis(2-Ethylhexyl)Phthalate	6.70E-02	1.50E+01	12 / 19	4.70E+00	PPM	95%UCL
	Chrysene	1.40E-01	7.00E+01	16 / 19	1.74E+01	PPM	95%UCL
	Dibenz(a,h)Anthracene	1.20E-01	1.50E+00	7 / 19	1.33E+00	PPM	95%UCL
	Dibenzofuran	1.40E-01	2.90E+00	10 / 19	1.95E+00	PPM	95%UCL
	Indeno(1,2,3-cd)Pyrene	6.50E-02	2.90E+01	12 / 19	8.23E+00	PPM	95%UCL
	2-Methylphenol	2.20E-01	2.20E-01	1 / 19	2.20E-01	PPM	MAX
	Pesticides and Polychlorinated Biphenyls						
	Aldrin	2.20E-01	2.20E-01	2 / 19	7.13E-02	PPM	95%UCL
	Aroclor-1260	8.20E-02	2.60E+02	10 / 19	3.85E+01	PPM	95%UCL
	Gamma-BHC (Lindane)	1.40E-03	6.00E-03	2 / 19	6.00E-03	PPM	MAX
	4,4'-DDD	2.70E-02	2.70E+00	9 / 19	7.75E-01	PPM	95%UCL
	4,4'-DDE	2.00E-02	2.20E-01	12 / 19	1.20E-01	PPM	95%UCL
	4,4'-DDT	3.60E-02	4.60E+01	16 / 19	7.06E+00	PPM	95%UCL
	Dieldrin	5.90E-02	1.00E-01	2 / 19	6.64E-02	PPM	95%UCL
	Inorganics						
	Aluminum	4.63E+02	2.47E+04	18 / 18	9.27E+03	PPM	95%UCL
	Antimony	5.36E+01	1.62E+02	4 / 10	7.28E+01	PPM	95%UCL
	Arsenic	2.40E+00	7.25E+01	18 / 18	3.13E+01	PPM	95%UCL
	Beryllium	3.20E-01	6.60E-01	14 / 18	4.63E-01	PPM	95%UCL
	Cadmium	6.00E+00	3.00E+03	12 / 14	6.18E+02	PPM	95%UCL
	Chromium	8.30E+00	7.68E+02	18 / 18	2.16E+02	PPM	95%UCL
	Cobalt	2.40E+00	4.42E+02	18 / 18	8.29E+01	PPM	95%UCL
	Copper	2.40E+01	7.00E+04	18 / 18	1.76E+04	PPM	95%UCL
	Lead	3.10E+01	2.79E+03	18 / 18	1.47E+03	PPM	95%UCL
	Manganese	3.36E+01	2.41E+03	18 / 18	9.80E+02	PPM	95%UCL
	Mercury	2.20E-01	2.70E+00	16 / 18	1.32E+00	PPM	95%UCL
	Nickel	5.40E+00	1.79E+04	18 / 18	3.08E+03	PPM	95%UCL
	Vanadium	9.00E+00	1.13E+02	17 / 18	4.81E+01	PPM	95%UCL
	Zinc	5.07E+01	2.15E+04	18 / 18	7.67E+03	PPM	95%UCL
	Cyanide	7.60E+00	3.01E+03	15 / 18	4.89E+02	PPM	95%UCL

Key:
ppm=Parts per million
95% UCL: 95% Upper Confidence Limit
Min: Minimum concentation
Max: Maximum concentration

TABLE 3

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations for Groundwater (Human Health and Ecological Receptors)

Scenario Timeframe: Future
Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Min	Concentration Max	Frequency of Detection	Exposure Concentration	Concentration Units	Statistical Measure	Human Health Criteria MCLs	Ecological Criteria AWQCs
Ingestion									
	Organics								
	Benzene	1.00E+00	3.10E+02	2 / 23	3.94E+01	ug/l	Arithmetic Mean	5	
	bis(2-Ethylhexyl)Phthalate	2.00E+00	1.10E+01	4 / 23	5.40E+00	ug/l	Arithmetic Mean		
	Ethyl benzene	1.00E+00	1.10E+01	3 / 23	3.75E+01	ug/l	Arithmetic Mean	700	
	Methylene Chloride	7.00E+02	8.20E+02	2 / 23	9.31E+01	ug/l	Arithmetic Mean		
	2-Methylnaphthalene	2.00E+00	1.70E+01	3 / 23	5.30E+00	ug/l	Arithmetic Mean		
	2-Methylphenol	1.10E+01	1.00E+03	4 / 23	2.76E+01	ug/l	Arithmetic Mean		
	4-Methylphenol	9.00E+00	4.90E+02	3 / 23	1.67E+01	ug/l	Arithmetic Mean		
	Naphthalene	2.00E+00	3.50E+01	3 / 23	6.30E+00	ug/l	Arithmetic Mean		
	Toluene	1.00E+00	2.20E+05	7 / 23	7.79E+03	ug/l	Arithmetic Mean	1,000	
	Xylene	2.00E+00	1.30E+03	4 / 23	6.12E+01	ug/l	Arithmetic Mean	10,000	
	Inorganics								
	Aluminum	5.24E+02	1.12E+05	13 / 13	3.47E+04	ug/l	Arithmetic Mean		
	Arsenic	2.50E+00	1.12E+01	5 / 13	2.80E+00	ug/l	Arithmetic Mean	50	36
	Barium	4.95E+01	1.28E+03	12 / 13	3.28E+02	ug/l	Arithmetic Mean	2,000	
	Beryllium	1.50E+00	8.30E+00	4 / 13	2.20E+00	ug/l	Arithmetic Mean	4	
	Cadmium	2.50E+00	6.57E+02	9 / 13	6.10E+01	ug/l	Arithmetic Mean	5	9.3
	Chromium	1.06E+01	2.14E+02	11 / 13	7.42E+01	ug/l	Arithmetic Mean	100	50
	Cobalt	6.30E+00	9.65E+01	9 / 13	2.69E+01	ug/l	Arithmetic Mean		
	Copper	1.41E+01	8.06E+03	11 / 13	9.28E+02	ug/l	Arithmetic Mean		3.1
	Cyanide	4.50E+00	6.68E+02	13 / 30	5.11E+01	ug/l	Arithmetic Mean	200	1
	Lead	1.01E+01	2.20E+03	11 / 13	1.87E+02	ug/l	Arithmetic Mean		8.1
	Manganese	9.18E+01	7.89E+03	13 / 13	1.65E+03	ug/l	Arithmetic Mean		
	Mercury	1.00E-01	6.10E-01	3 / 13	1.50E-01	ug/l	Arithmetic Mean	2	0.94
	Nickel	8.20E+00	5.57E+02	13 / 13	1.91E+02	ug/l	Arithmetic Mean		8.2
	Vanadium	2.00E+00	2.67E+02	12 / 13	5.27E+01	ug/l	Arithmetic Mean		
	Zinc	1.48E+02	1.13E+04	10 / 13	2.80E+03	ug/l	Arithmetic Mean		81

Key:
Min: Minium concentration
Max: Maximum concentration
MCLs: Maximum Concentration Levels for SDWA/Massachusetts Regulations
AWQCs: Ambient Water Quality Criteria for the protection of aquatic life in saltwater

Note: This Table contains a limited data set of wells that could be potable water. On-stie wells MW-1, MW-2, MW-3, MW-4, and MW-7 are not icluded in this summary information.

TABLE 4

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations for Sediments (Future Adult Trespasser)

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Concern	Concentration ppm		Frequency of Detection	Exposure Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max				
Sediment Direct Contact							
	Organics						
	4,4'-DDD	3.40E-03	6.20E-02	7 / 10	3.70E-02	ppm	Mean
	4,4'-DDE	2.80 E-03	9.50E-02	8 / 11	4.60 E-02	ppm	Mean
	4,4'-DDT	1.30 E-02	4.50E-02	3 / 10	3.60E-02	ppm	Mean
	Semi-Volatiles						
	Benzo(a)anthracene	6.00 E-02	1.30E+00	9 / 9	3.80 E-01	ppm	Mean
	Benzo(a)pyrene	7.00 E-02	1.60E+00	9 / 9	4.40 E-01	ppm	Mean
	Benzo(b)fluoranthene	6.60 E-02	8.00E-01	9 / 9	3.30E-01	ppm	Mean
	Benzo(k)fluoranthene	7.10 E-02	7.80E-01	9 / 9	3.10 E-01	ppm	Mean
	Chrysene	8.90 E-01	2.00E+00	11 / 11	5.30 E-01	ppm	Mean
	Dibenzo(a,h)anthracene	-	2.50E-01	1 / 10	3.60 E-01	ppm	Mean
	Indeno(1,2,3-cd)pyrene	4.90 E-02	5.20E-01	9 / 9	2.50 E-01	ppm	Mean
	Inorganics						
	Aluminum	1.75 E+03	1.17E+04	11 / 11	5.35 E+03	ppm	Mean
	Antimony	3.90 E+00	1.74E+01	6 / 11	7.60 E+00	ppm	Mean
	Arsenic	1.90 E+00	3.98E+01	11 / 11	1.67 E+01	ppm	Mean
	Barium	1.26 E+01	9.18E+01	9 / 11	2.78 E+01	ppm	Mean
	Beryllium	2.90 E-01	3.50E-01	2 / 11	3.40 E-01	ppm	Mean
	Cadmium	7.40 E+00	1.50E+01	2 / 11	2.60 E+00	ppm	Mean
	Chromium	2.90 E+00	1.39E+02	11 / 11	5.61 E+01	ppm	Mean
	Copper	1.84 E+02	1.47E+03	11 / 11	4.34 E+02	ppm	Mean
	Cyanide	1.01 E+01	9.41E+01	7 / 11	2.47 E+01	ppm	Mean
	Lead	7.10 E+00	2.92E+02	9 / 11	1.09 E+02	ppm	Mean
	Manganese	4.10 E+01	2.33E+02	11 / 11	8.97 E+01	ppm	Mean
	Mercury	1.50 E-01	9.60E-01	8 / 11	4.00 E-01	ppm	Mean
	Nickel	3.60 E+00	2.15E+02	11 / 11	4.24 E+01	ppm	Mean
	Vanadium	6.50 E+00	8.54E+01	11 / 11	3.46 E+01	ppm	Mean
	Zinc	9.85 E+01	1.73E+03	10 / 11	5.92 E+02	ppm	Mean

Key:
ppm: parts per million (mg/kg)
Min: Minimum
Max: Maximum concentration

TABLE 5

Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations for Hard Shell Clams (Future Adult Trespasser)

Scenario Timeframe: Future
Medium: Hard Shell Clams
Exposure Medium: Hard Shell Clams

Exposure Point	Chemical of Concern	Concentration (Dry Weight) Min	Concentration (Dry Weight) Max	Frequency of Detection	Exposure Concentration	Exposure Point Concentration Units	Statistical Measure
Ingestion							
	Semi-Volatiles						
	Acenaphthene	2.60E-01	2.60E-01	1 / 4	2.60E-01	ppm	MAX
	Acenaphthylene	2.50E-01	2.50E-01	1 / 4	2.50E-01	ppm	MAX
	Anthracene	2.10E-01	2.10E-01	1 / 4	2.10E-01	ppm	MAX
	Benzo(a)Anthracene	2.50E-01	2.50E-01	1 / 4	2.50E-01	ppm	MAX
	Benzo(a)Pyrene	2.10E-01	2.10E-01	1 / 4	2.10E-01	ppm	MAX
	Benzoic Acid	1.80E+00	1.80E+00	1 / 2	1.80E+00	ppm	MAX
	Benzo(k)Fluoranthene	2.20E-01	1.30E+00	2 / 4	1.30E+00	ppm	MAX
	Benzyl Alcohol	4.60E-01	5.40E-01	2 / 2	5.40E-01	ppm	MAX
	bis(2-Chloroisopropyl)Ether	2.40E-01	2.40E-01	1 / 4	2.40E-01	ppm	MAX
	bis(2-Ethylhexyl)Phthalate	1.00E+00	5.10E+00	4 / 4	4.83E+00	ppm	95%UCL
	Butyl Benzyl Phthalate	2.20E-01	2.20E-01	1 / 4	2.20E-01	ppm	MAX
	2-Chloronaphthalene	2.50E-01	2.50E-01	1 / 4	2.50E-01	ppm	MAX
	2-Chlorophenol	3.10E-01	3.10E-01	1 / 2	3.10E-01	ppm	MAX
	Chrysene	2.30E-01	2.30E-01	1 / 4	2.30E-01	ppm	MAX
	1,3-Dichlorobenzene	2.90E-01	2.90E-01	1 / 4	2.90E-01	ppm	MAX
	1,4-Dichloroonenzene	3.00E-01	3.00E-01	1 / 4	3.00E-01	ppm	MAX
	3,3'-Dichlorobenzidine	6.30E-01	4.10E+00	2 / 4	4.10E+00	ppm	MAX
	Diethyl Phthalate	2.30E-01	2.30E-01	1 / 4	2.30E-01	ppm	MAX
	Dimethyl Phthalate	2.10E-01	2.10E+00	2 / 4	2.10E+00	ppm	MAX
	di-n-Butyl Phthalate	6.20E-01	2.70E+00	3 / 4	2.52E+00	ppm	95%UCL
	2,4-Dinitrotoluene	2.30E-01	2.30E-01	1 / 4	2.30E-01	ppm	MAX
	di-n-Octyl Phthalate	2.40E-01	2.40E-01	1 / 4	2.40E-01	ppm	MAX
	Hexachlorobutadiene	2.80E-01	2.80E-01	1 / 4	2.80E-01	ppm	MAX
	Isophorone	2.50E-01	2.50E-01	1 / 4	2.50E-01	ppm	MAX
	2-Methylnaphthalene	3.00E-01	3.00E-01	1 / 4	3.00E-01	ppm	MAX
	2-Methylphenol	2.50E-01	2.50E-01	1 / 2	2.50E-01	ppm	MAX
	Naphthalene	3.10E-01	3.10E-01	1 / 4	3.10E-01	ppm	MAX
	2-Nitrophenol	2.30E-01	2.30E-01	1 / 2	2.30E-01	ppm	MAX
	4-Nitrophenol	1.20E+00	1.20E+00	1 / 2	1.20E+00	ppm	MAX
	Pentachlorophenol	4.50E-01	4.50E-01	1 / 2	4.50E-01	ppm	MAX
	Phenanthrene	2.30E-01	2.30E-01	1 / 4	2.30E-01	ppm	MAX
	Pyrene	2.30E-01	2.30E-01	1 / 4	2.30E-01	ppm	MAX
	Inorganics						
	Aluminum	1.73E+02	2.03E+02	4 / 4	2.03E+02	ppm	MAX
	Arsenic	8.20E+00	1.43E+01	4 / 4	1.43E+01	ppm	MAX
	Barium	4.30E+00	4.30E+00	1 / 4	3.82E+00	ppm	95%UCL
	Chromium	5.20E+00	8.30E+00	2 / 4	7.97E+00	ppm	95%UCL
	Copper	2.28E+01	6.36E+01	4 / 4	5.78E+01	ppm	95%UCL
	Manganese	2.53E+01	7.55E+01	4 / 4	7.04E+01	ppm	95%UCL
	Mercury	6.60E-01	8.50E-01	4 / 4	8.46E-01	ppm	95%UCL
	Nickel	7.10E+00	1.22E+01	4 / 4	1.18E+01	ppm	95%UCL
	Silver	9.70E-01	5.90E+00	4 / 4	5.17E+00	ppm	95%UCL
	Zinc	1.53E+02	2.30E+02	4 / 4	2.30E+02	ppm	MAX
	Cyanide	1.15E+01	1.15E+01	1 / 4	1.01E+01	ppm	95%UCL

Key:
ppm: part per million (mg/kg)
95% UCL: 95% Upper Confidence Limit
Min: Minimum
Max: Maximum concentration

Table 6
Summary of Chemicals Posing Potential Risk to Ecological Receptors

Receptor	Media	Chemicals with Hazard Index Greater than 1	HI based on Average Concentration	HI based on Maximum Concentration
Meadow Vole	Soil/Vegetation	Aroclor 1260	—	4.28
		4,4'-DDT	—	3.27
		Endosulfan II	523	697
		Endosulfan sulfate	294	1200
		Benzo(a)pyrene	—	2.3
		Phenanthrene	—	1.16
		Toluene	—	4.8
		Aluminum	9.79	35.7
		Antimony	39.6	208
		Barium	6.86	13.8
		Cadmium	9.6	118
		Cobalt	8.24	93.1
		Copper	68.4	638
		Iron	491	1410
		Lead	800	2260
		Mercury	—	1.35
		Nickel	3.2	44
		Zinc	26.4	147
Black Duck	Sediment, Mussels, and Clams	Arsenic	2.06	2.79
		Cyanide	28.5	68.8
		Iron	2.19	4.86
Great Blue Heron	Sediment/Fish	Arsenic	1.16	2.26
		Cadmium	—	2.42
		Cyanide	21	45.5
		Iron	—	2.2
Benthic Invertebrate Community	Sediment/Interstitial Water	4,4'-DDD	18.5	31
		4,4'-DDE	23	47.5
		4,4'-DDT	22.8	28.5
		Endosulfan II	—	24.6
		Methoxyclor	90	93.3
		Acenaphthylene	1.55	1.7
		Anthracene	3.17	5.74
		Benzo(a)anthracene	1.46	4.98
		Benzo(a)pyrene	1.02	3.72
		Chrysene	1.38	5.21
		Dibenz(a,h)anthracene	3.94	3.94
		Fluoranthene	1.28	2.33
		Phenanthrene	1.63	3.17
		Pyrene	1.26	4.51
		PAHs (total)	1.27	3.37
		Antimony	3.8	8.7
		Arsenic	2.04	4.85
		Cadmium	2.17	12.5
		Chromium	—	1.72
		Copper	12.8	43.2
		Lead	2.33	6.25
		Mercury	2.67	6.4
		Nickel	2.03	10.3
		Zinc	3.95	11.5

TABLE 7

Cancer Toxicity Data Summary

Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Absorption Efficiency (for Dermal)	Adjusted Cancer Slope Factor (for Dermal)	Slope factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (April 1998)
Volatiles							
Methylene Chloride	7.50E-03	0.9	8.33E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Semi-Volatiles							
Benzo(a)Anthracene	7.30E-01	0.5	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Benzo(a)Pyrene	7.30E+00	0.5	1.46E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Benzo(b)Fluoranthene	7.30E-01	0.5	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Benzo(k)Fluoranthene	7.30E-02	0.5	1.46E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
bis(2-Ethylhexyl)Phthalate	1.40E-02	0.5	2.80E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Butyl Benzyl Phthalate	NTV	-	NTV		C	—	04/01/98
Chrysene	7.30E-03	0.5	1.46E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Dibenzo(a,h)Anthracene	7.30E+00	0.5	1.46E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
1,4-Dichlorobenzene	2.40E-02	0.9	2.67E-02	$(mg/kg\text{-}day)^{-1}$	C	HEAST	04/01/98
3,3'-Dichlorobenzidine	4.50E-01	0.5	9.00E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
2,4-Dinitrotoluene	6.80E-01	0.5	1.36E+00	$(mg/kg\text{-}day)^{-1}$	B2c	IRIS	04/01/98
Indeno(1,2,3-cd)Pyrene	7.30E-01	0.5	1.46E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Hexachlorobutadiene	7.80E-02	0.5	1.56E-01	$(mg/kg\text{-}day)^{-1}$	C	IRIS	04/01/98
Isophorone	9.50E-04	0.9	1.06E-03	$(mg/kg\text{-}day)^{-1}$	C	IRIS	04/01/98
Pentachlorophenol	1.20E-01	0.5	2.40E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Pesticides and Polychlorinated Biphenyls							
Aldrin	1.70E+01	0.5	3.40E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Aroclor-1260	2.00E+00	0.5	4.00E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
beta-BHC	1.80E+00	0.5	3.60E+00	$(mg/kg\text{-}day)^{-1}$	C	IRIS	04/01/98
gamma-BHC	1.30E+00	0.5	2.60E+00	$(mg/kg\text{-}day)^{-1}$	B2-C	HEAST	04/01/98
4,4-DDD	2.40E-01	0.5	4.80E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
4,4-DDE	3.40E-01	0.5	6.80E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
4,4-DDT	3.40E-01	0.5	6.80E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Dieldrin	1.60E+01	0.5	3.20E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	04/01/98
Inorganics							
Arsenic	1.50E+00	0.9	1.67E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	04/01/98
Beryllium	NTV	-	NTV		B2	—	04/01/98
Cadmium	NTV	-	NTV		B1	—	04/01/98
Chromium VI	NTV	-	NTV		A	—	04/01/98
Lead	NTV	-	NTV		B2	—	04/01/98
Nickel	NTV	-	NTV		A	—	04/01/98

Key

Absorption Efficiency Reference: Weston, 1995

NTV: No Toxic Value Available

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

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

EPA Group: *Cancer Classifications*

A - Human carcinogen

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

B2 - Probable human carcinogen- indicated 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

TABLE 8

Non-Cancer Toxicity Data Summary

Ingestion, Dermal

Chemical of Concern	Chronic/Subchronic	Oral RFD Value	Oral RFD Units	Absorption Efficiency (for Dermal)	Adjusted RFD (for Dermal)	Adjusted Dermal RFD Units	Primary Target Organ	Sources of RFD	Date of RFD (April 1998)
Volatiles									
Methylene Chloride	Chronic	6.00E-02	mg/kg-day	0.9	5.40E-02	mg/kg-day	Liver	IRIS	1998
Semi-Volatiles									
Acenaphthene	Chronic	6.00E-02	mg/kg-day	0.9	5.40E-02	mg/kg-day	Liver	IRIS	1998
Acenaphthylene	Chronic	3.00E-03	mg/kg-day	0.9	2.70E-03	mg/kg-day	Kidney	IRIS	1998
Anthracene	Chronic	3.00E-01	mg/kg-day	0.9	2.70E-01	mg/kg-day	NOAEL	IRIS	1998
Benzo(a)Anthracene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Benzo(a)Pyrene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Benzo(b)Fluoranthene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Benzo(g,h,i)Perylene	Chronic	3.00E-03	mg/kg-day	0.9	2.70E-03	mg/kg-day	Kidney	IRIS	1998
Benzoic Acid	Chronic	4.00E+00	mg/kg-day	0.5	2.00E+00	mg/kg-day	NOAEL	IRIS	1998
Benzo(k)Fluoranthene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Benzyl Alcohol	Chronic	3.00E-01	mg/kg-day	0.9	2.70E-01	mg/kg-day	Forestomach	HEAST	1998
Butyl Benzyl Phthalate	Chronic	2.00E-01	mg/kg-day	0.5	1.00E-01	mg/kg-day	Liver	IRIS	1998
bis(2-Chloroisopropyl)Ether	Chronic	4.00E-02	mg/kg-day	0.5	2.00E-02	mg/kg-day	Blood	IRIS	1998
bis(2-Ethylhexyl)Phthalate	Chronic	2.00E-02	mg/kg-day	0.5	1.00E-02	mg/kg-day	Liver	IRIS	1998
2-Chloronaphthalene	Chronic	8.00E-02	mg/kg-day	0.9	7.20E-02	mg/kg-day	Lungs	IRIS	1998
2-Chlorophenol	Chronic	5.00E-03	mg/kg-day	0.9	4.50E-03	mg/kg-day	Reproductive	IRIS	1998
Chrysene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Dibenzo(a,h)Anthracene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Dibenzofuran	Chronic	4.00E-03	mg/kg-day	0.9	3.60E-03	mg/kg-day	-	NCEA	1998
1,3-Dichlorobenzene	Subchronic	NTV		-	NTV		-	---	1998
1,4-Dichlorobenzene	Subchronic	NTV		-	NTV		-	---	1998
3,3'-Dichlorobenzidine	Subchronic	NTV		-	NTV		-	---	1998
Diethyl Phthalate	Chronic	8.00E-01	mg/kg-day	0.5	4.00E-01	mg/kg-day	Decreased growth rate	IRIS	1998
Dimethyl Phthalate	Subchronic	NTV		-	NTV		-	---	1998
di-n-Butyl Phthalate	Chronic	1.00E-01	mg/kg-day	0.5	5.00E-02	mg/kg-day	Lethality	IRIS	1998
2,4-Dinitrotoluene	Chronic	2.00E-03	mg/kg-day	0.9	1.80E-03	mg/kg-day	Neurotoxicity	IRIS	1998
di-n-Octyl Phthalate	Chronic	2.00E-02	mg/kg-day	0.5	1.00E-02	mg/kg-day	Liver	HEAST	1998
Hexachlorobutadiene	Chronic	2.00E-04	mg/kg-day	0.5	1.00E-04	mg/kg-day	Kidney	HEAST	1998
Isophorone	Chronic	2.00E-01	mg/kg-day	0.9	1.80E-01	mg/kg-day	NOAEL	IRIS	1998
Indeno(1,2,3-cd)Pyrene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
2-Methylnaphthalene	Chronic	4.00E-02	mg/kg-day	0.9	3.60E-02	mg/kg-day	-	NCEA	1998
2-Methylphenol	Chronic	5.00E-02	mg/kg-day	0.9	4.50E-02	mg/kg-day	Decreased Body weight	IRIS	1998
Naphthalene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
2-Nitrophenol	Subchronic	NTV		-	NTV		-	---	1998
4-Nitrophenol	Chronic	8.00E-03	mg/kg-day	0.9	7.20E-03	mg/kg-day	-	NCEA	1998
Pentachlorophenol	Chronic	3.00E-02	mg/kg-day	0.5	1.50E-02	mg/kg-day	Liver	IRIS	1998
Phenanthrene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998
Pyrene	Chronic	3.00E-02	mg/kg-day	0.9	2.70E-02	mg/kg-day	Kidney	IRIS	1998

TABLE 8 (Continued)

Non-Cancer Toxicity Data Summary

Ingestion, Dermal

Chemical of Concern	Chronic/Subchronic	Oral RFD Value	Oral RFD Units	Absorption Efficiency (for Dermal)	Adjusted RFD (for Dermal)	Adjusted Dermal RFD Units	Primary Target Organ	Sources of RFD	Date of RFD (April 1998)
Pesticides and Polychlorinated Biphenyl									
Aldrin	Chronic	3.00E-05	mg/kg-day	0.5	1.50E-05	mg/kg-day	liver	IRIS	1998
Aroclor-1260	Subchronic	NTV		-	NTV		-	---	1998
beta-BHC	Subchronic	NTV		-	NTV		-	---	1998
gamma-BHC	Chronic	3.00E-04	mg/kg-day	0.5	1.50E-04	mg/kg-day	liver	IRIS	1998
4,4-DDD	Subchronic	NTV		-	NTV		-	---	1998
4,4-DDE	Subchronic	NTV		-	NTV		-	---	1998
4,4-DDT	Chronic	5.00E-04	mg/kg-day	0.5	2.50E-04	mg/kg-day	liver	IRIS	1998
Dieldrin	Chronic	5.00E-05	mg/kg-day	0.5	2.50E-05	mg/kg-day	liver	IRIS	1998
Inorganics									
Aluminum	Chronic	1.00E+00	mg/kg-day	0.9	9.00E-01	mg/kg-day	-	NCEA	1998
Antimony	Chronic	4.00E-04	mg/kg-day	0.9	3.60E-04	mg/kg-day	Lethality	IRIS	1998
Arsenic	Chronic	3.00E-04	mg/kg-day	0.9	2.70E-04	mg/kg-day	Skin	IRIS	1998
Barium	Chronic	7.00E-02	mg/kg-day	0.9	6.30E-02	mg/kg-day	Blood pressure	IRIS	1998
Beryllium	Chronic	5.00E-03	mg/kg-day	0.9	4.50E-03	mg/kg-day	NOAEL	IRIS	1998
Cadmium	Chronic	1.00E-03	mg/kg-day	0.5	5.00E-04	mg/kg-day	Kidney	IRIS	1998
Chromium VI	Chronic	5.00E-03	mg/kg-day	0.9	4.50E-03	mg/kg-day	NOAEL	IRIS	1998
Cobalt	Chronic	6.00E-02	mg/kg-day	0.9	5.40E-02	mg/kg-day	-	NCEA	1998
Copper	Chronic	3.70E-02	mg/kg-day	0.9	3.33E-02	mg/kg-day	GI	HEAST	1998
Lead		NTV		-	NTV		-	---	1998
Manganese	Chronic	2.40E-02	mg/kg-day	0.5	1.20E-02	mg/kg-day	CNS	IRIS	1998
Mercury (inorganic)	Chronic	3.00E-04	mg/kg-day	0.9	2.70E-04	mg/kg-day	Kidney	IRIS	1998
Nickel	Chronic	2.00E-02	mg/kg-day	0.5	1.00E-02	mg/kg-day	Decreased body weight	IRIS	1998
Silver	Chronic	5.00E-03	mg/kg-day	0.9	4.50E-03	mg/kg-day	Skin	IRIS	1998
Vanadium	Chronic	7.00E-03	mg/kg-day	0.9	6.30E-03	mg/kg-day	-	HEAST	1998
Zinc	Chronic	3.00E-01	mg/kg-day	0.9	2.70E-01	mg/kg-day	Blood	IRIS	1998
Cyanide	Chronic	2.00E-02	mg/kg-day	0.5	0.01	mg/kg-day	-	IRIS	1998

Key
NTV: No Toxic Value Available
IRIS: Integrated Risk Information System, U.S. EPA
HEAST: Health Effects Assessment Summary Tables; U.S. EPA
RFD: Reference Dose
NCEA: National Center for Environmental Assessment
NOAEL: No Observed Adverse Effect Level
CNS : Central Nervous System
GI : Gastrointestinal

TABLE 9

Risk Characterization Summary-Carcinogens

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Commercial Soils		Benzo(a)pyrene	1.90E-04	NA	9.10E-04	1.10E-03
			Benzo(a)anthracene	2.10E-05	NA	7.70E-05	9.80E-05
			PCB Aroclor 1260	1.80E-05	NA	6.60E-05	8.40E-05
			Dibenzo(a,h)anthracene	1.60E-05	NA	5.90E-05	7.40E-05
			Benzo(b)fluoranthene	1.50E-05	NA	5.50E-05	7.00E-05
			Indeno(1,2,3 cd)pyrene	1.20E-05	NA	4.40E-05	5.60E-05
			Benzo(k)fluoranthene	1.90E-06	NA	7.00E-06	8.90E-06
			Chrysene	2.30E-07	NA	8.40E-07	1.10E-06
			Arsenic	1.30E-05	NA	8.20E-06	2.20E-05
						Soil Risk Total =	**1.50E-03**

Key
NA: Not Applicable

Table 10

Summary of Shellfish Risks

Area/Medium	Carcinogenic Risk				Hazard Index				
	COPC	Ingestion	Dermal	Total	COPC	Target Endpoint	Ingestion	Dermal	Total
Shellfish	Arsenic	1.24E-04	NA	1.24E-04	Arsenic	Skin	6.40E-01	NA	6.40E-01
	3,3'-Dichlorobenzidene	1.08E-05	NA	1.08E-05					
	Benzo(a)pyrene	8.80E-06	NA	8.80E-06					
	Benzo(a)anthracene	1.06E-06	NA	1.06E-06	Total Hazard Index[a]				8.38E-01
	Total Risk[a]			1.45E-04	Total Skin Hazard Index				6.40E-01

Scenario: Adult trespasser
Shellfish

[a] Total risk and total hazard index are the sum of all chemicals evaluated, not just those presented in the table.

NA Not applicable
COPC Chemical of Potential Concern

Table 11: Ecological Exposure Pathways of Concern

Exposure Medium	Habitat Type/ Name	Receptor	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Sediment	Boys Creek and the adjacent marsh	Benthic organisms	Ingestion and direct contact with chemicals in sediment	Survival, reproduction and growth of benthic invertebrate community	Comparison of chemical concentrations in sediment to criteria and guidance values. Evaluation of chemical bioavailability using SEM/AVS analysis and equilibrium partitioning. Sediment toxicity testing results using *Hyalella azteca* and *Ampelisca abdita*.
		Piscivorous birds	Ingestion of chemicals in fish and shellfish	Survival, reproduction, and growth of piscivorous birds using these areas to forage.	Evaluation of chronic dietary exposure (affecting reproduction, growth and survival) for selected avian indicator species, using shellfish and fish tissue chemical accumulation, avian dietary exposure modeling, and comparison with appropriate toxicological data.
Surface Water	Boys Creek and its tributaries	Fish community	Ingestion and direct contact with chemicals in surface water	Survival, reproduction, and growth of the resident and transient fish populations.	Evaluation of chronic toxicity (affecting reproduction, growth and survival) for the majority (i.e., 95 percent) of species (including aquatic plants, aquatic invertebrates, and fish) in Boys Creek and contiguous tidal creeks.
Soil	Boys Creek Marsh and adjacent uplands	Vermivorous birds	Ingestion of chemicals in earthworms	Survival, reproduction, and growth of vermivorous birds using these areas to forage.	Evaluation of chronic dietary exposure (affecting reproduction, growth and survival) for selected avian indicator species, using shellfish and earthworm tissue chemical accumulation, avian dietary exposure modeling, and comparison with appropriate toxicological data.
		Herbivorous and vermivorous mammals	Ingestion of chemicals in plant and earthworms	Survival, reproduction, and growth of herbivorous and vermivorous small mammals using these areas to forage.	Evaluation of chronic dietary exposure (affecting reproduction, growth and survival) for selected mammalian species, using plant and earthworm tissue chemical accumulation, mammalian dietary exposure modeling, and comparison with appropriate toxicological data.

Table 12

Interim Groundwater Cleanup Levels Expected to Provide Protection of Ecological Receptors

Habitat Type/ Name	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
Boys Creek	Groundwater to Surface Water	Copper	31	ug/L	AWQC x DF	Survival, reproduction and growth of benthic invertebrate community
		Nickel	82	ug/L	AWQC x DF	
		Zinc	810	ug/L	AWQC x DF	
		Cyanide	10	ug/L	AWQC x DF	
		Toluene	100,000	ug/L	MA UCL	

Notes
AWQC: Ambient Water Quality Criteria
DF: Dilution Factor
COC: Chemicals of Concern
MA UCL: Massachusetts DEP's Massachusetts Contingency Plan Upper Concentration Limit

Table 13 **Soil Cleanup Levels for the Protection of Commercial Area Workers from Incidental Ingestion and Dermal Contact with Surface Soils (0-2 feet)**				
Carcinogenic Compounds of Concern	Cancer Classification	Soil Cleanup Level (mg/kg)	Basis	RME Risk
Arsenic	A	7.8	risk	5.7×10^{-6}
Benzo(a)anthracene	B2	2.5	risk	1×10^{-6}
Benzo(b)fluoranthene	B2	2.5	risk	1×10^{-6}
Benzo(k)fluoranthene	B2	25	risk	1×10^{-6}
Benzo(a)pyrene	B2	0.24	risk	1×10^{-6}
Dibenzo(a,h)anthracene	B2	0.25	risk	1×10^{-6}
Indeno(1,2,3-cd)pyrene	B2	2.5	risk	1×10^{-6}
PCB (Arochlor 1260)		10	policy	
Sum of Carcinogenic Risk				
Non-Carcinogenic Compounds of Concern	Target Endpoint	Soil Cleanup Level (mg/kg)	Basis	RME Hazard Quotient
Lead	CNS	600	EPA Adult lead model	95% protection of exposed fetal population from blood lead levels in excess of 10 ug/dl

RME: Reasonable Maximum Exposure
CNS: Central Nervous System
Cancer Classification

- A - Human carcinogen
- B1- Probable human carcinogen - indicates that limited 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 human carcinogen
- E - Evidence of noncarcinogenicity

Table 14: Soil/Sediment Cleanup Levels Expected to Provide Protection of Ecological Receptors

Habitat Type/ Name	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
Uplands/ Commercial Area	Soil 0-2 feet depth and >2 feet depth	Copper	1,280	mg/kg	SLC [1]	Survival, reproduction and growth of benthic invertebrate community
		Zinc	1,440	mg/kg	SLC	
		Cyanide	34	mg/kg	SLC	
Boys Creek and adjacent marsh/ Marsh and Creek Bed Areas	Sediment/Soil 0-2 feet depth	Cadmium	9.6	mg/kg	ER-M value [2]	Survival, reproduction and growth of benthic invertebrate community
		Copper	270	mg/kg	ER-M value	
		Zinc	410	mg/kg	ER-M value	
Boys Creek and adjacent marsh/ Marsh and Creek Bed Areas	Sediment/Soil >2 feet depth	Copper	1,280	mg/kg	SLC	Survival, reproduction and growth of benthic invertebrate community
		Zinc	1,440	mg/kg	SLC	
		Cyanide	34	mg/kg	SLC	
Uplands/ Solid Waste and Debris Area	Soil 0-2 feet depth	Antimony	2.9	mg/kg	Ecological RBC [3]	Survival, reproduction and growth of vermivorous birds and herbivorous and vermivorous small mammals.
		Copper	33.6	mg/kg	Ecological RBC	
		Lead	19.1	mg/kg	Area Background[4]	
		Zinc	53	mg/kg	Site Background[5]	
		Cyanide	34	mg/kg	SLC	
		4,4'-DDT	0.034	mg/kg	Site Background	
Uplands/ Solid Waste and Debris Area	Soil >2 feet depth	Copper	1,280	mg/kg	SLC	Survival, reproduction and growth of benthic invertebrate community
		Zinc	1,440	mg/kg	SLC	
		Cyanide	34	mg/kg	SLC	

Note: COC: Chemicals of Concern

[1] Soil Leaching Concentration (SLC) was derived using site-specific K_D value, the SESOIL model, AWQC, and site-specific surface water: groundwater dilution factor.

[2] Refer to Weston 1997b for determination of Ecological Risk-Based Concentrations. Because they represent concentrations above which deleterious effects are frequent, always observed, or predicted with most aquatic species tested, and because they represent a weight-of-evidence approach, the ER-M values were selected as the risk-based concentrations for copper, cadmium, and zinc.

[3] Refer to Weston 1997b for Ecological Risk-Based Concentration calculations for protection of meadow vole, masked shrew and robin.

[4] Refer to MADEP Background Soil Data Set, Table 2.2, "Guidance for Disposal Site Risk Characterization," July 1995.

[5] Site background concentration determined by averaging background sampling locations.

Table 15

SELECTED REMEDY
SOURCE CONTROL

ITEM	DESCRIPTION << CAPITAL COST DETAILS >> EXCAVATION, ON-SITE TREATMENT, AND OFF-SITE DISPOSAL	UNIT QUANTITY	UNIT	UNIT COST	ITEM COST
1	Pre-Design Marsh Soil Sampling and Analysis Study	1	LS	200,000	200,000
2	Mobilization, Decontamination, and Demobilization of Construction Equipment	1	LS	50,000	50,000
3	Construction Support (trailers, utilities, scale, h&s, and decon equipment)	1	LS	303,400	303,400
4	Bonds, Insurance, and Work Plans, H&S Plan, and Ops Plan	1	LS	585,000	585,000
5	Construction and Maintenance of Erosion and Sedimentation Protection	1	LS	45,000	45,000
6	Improvements To Haul Road	1	LS	60,000	60,000
7	Demolition and Disposal of Buildings	1	LS	184,000	184,000
8	Asbestos and Lead Abatement and Disposal	1	LS	110,000	110,000
9	Construction of Staging and Dewatering Pads	1	LS	75,000	75,000
10	Excavation of Materials; Material Handling on Site (haul to separate staging areas then load and haul to treatment or transportation); Placement and Compaction of Clean Fill in Lifts;	1	LS	892,845	892,845
11	Screening Cost	1	LS	61,650	61,650
12	Grind Trees, Shrubs, Roots, Stumps, and Wood Debris	1	LS	12,110	12,110
13	Decontaminate Large Debris	1	LS	12,500	12,500
14	Clean Backfill Delivered to Site	1	LS	149,375	149,375
15	Timber Road for Marsh Access	1,500	LF	110	165,000
16	Dewatering & Associated Water Treatment	1	LS	140,000	140,000
17	Divert Creek Water	1	LS	40,500	40,500
18	Pump Creek South of Dike and Treat Creek Water and Water from Dewatering	1	LS	19,500	19,500
19	PCB Field Test Kits	1,568	SMPL	38	59,584
20	Analytical Fees for Characterization During Excavation	1	LS	441,493	441,493
21	Analytical Fees for Post Remediation Confirmation Sampling	1	LS	123,855	123,855
22	Transport and Dispose of PCB-Contaminated Waste to TSCA Facility	496	CY	371	184,175
23	Transport and Dispose of Non-hazardous Soil and Debris to "Local" Landfill	19,488	CY	70	1,364,185
24	Transport and Dispose Non-hazardous Restricted Waste to Special Landfill	30,128	CY	108	3,253,784
25	Transport and Dispose of Hazardous Soil and Waste to RCRA TSD Facility	3,429	CY	385	1,320,204
26	Transport and Dispose of Hazardous Materials to RCRA Landfill	1,544	CY	196	302,575
27	Replanting of Marsh Area	5	AC	9,600	48,000
28	Loam & Seed Other Disturbed Areas	4	AC	11,500	46,000
29	On-Site Treatment Using Solidification/Stabilization (includes mobilization)	5,151	CY	56	318,475
30	Commercial Area Remediation Activities (excluding disposal)	1	LS	121,000	121,000
	CAPITAL COST SUBTOTAL (ROUNDED)				10,689,000
	CONTRACTOR'S OVERHEAD & PROFIT @ 20%				2,138,000
	CAPITAL COST SUBTOTAL				12,827,000
	ENGINEERING, PROCUREMENT, LEGAL AND ADMINISTRATIVE COSTS: @ 20%				2,565,000
	CAPITAL COST SUBTOTAL				15,392,000
	CONTINGENCY @ 15%				2,309,000
	TOTAL CAPITAL COST (ROUNDED)				17,701,000

Table 15 (Continued)

SELECTED REMEDY
SOURCE CONTROL

ITEM	DESCRIPTION EXCAVATION, ON-SITE TREATMENT, AND OFF-SITE DISPOSAL S U M M A R Y O F << CAPITAL COSTS >> A N D << OPERATION AND MAINTENANCE COSTS >>	PRESENT VALUE	TOTAL COST
I	CAPITAL TOTAL	$17,701,000	
II	TOTAL PRESENT VALUE OF O&M COST :		
	INFLATION RATE = 4%		
	DISCOUNT RATE = 7%		
	PRESENT VALUE OF O&M AT 30 YEAR PROJECT LIFE	$473,000	
	ANNUALIZED COST OF O&M = $24,100		
III	PRESENT VALUE COST		$18,174,000
IV	TOTAL PRESENT VALUE ANNUALIZED OVER 30 YEARS		$927,200

ITEM	DESCRIPTION << OPERATION AND MAINTENANCE COSTS >> EXCAVATION, ON-SITE TREATMENT, AND OFF-SITE DISPOSAL	UNIT QUANTITY	UNIT	UNIT COST	PRESENT VALUE
I	SURFACE WATER/SEDIMENT MONITORING				
1	Yr 1 (2 events @ 15 locs. Analysis of VOCs, PAHs, Pest, CN, Metals, tox.)	1	YR	109,400	
2	Yrs 5,10, 15, 20, 25, 30 (2 events @ 5 locs. Assuming analysis of CN, tox., and Metals only)	6	YR	51,480	
	SUBTOTAL				296,905
II	SOIL AND VEGETATION MONITORING				
1	Year 1 (Includes sampling of soil for VOCs, PAHs, Pest., PCBs, Metals, CN)	1	YR	6,830	
2	Years 5, 10, 15, 20, 25, 30 (Includes sampling of soil for Metals and CN only.)	6	YR	4,130	
	SUBTOTAL				21,929
III	SARA REVIEW (AT YEARS 5, 10, 15, 20, 25, AND 30)	6	EA	30,000	111,126
	PRESENT VALUE SUBTOTAL FOR 30 YEAR PROJECT LIFE				429,961
	CONTINGENCY (10%)				42,996
	TOTAL PRESENT VALUE OF O&M (ROUNDED) (30 YEAR PROJECT LIFE)				473,000

Table 16

SELECTED REMEDY
GROUNDWATER

ITEM	DESCRIPTION << OPERATION AND MAINTENANCE COSTS >> MONITORED NATURAL ATTENUATION WITH PHYTOREMEDIATION	UNIT QUANTITY	UNIT	UNIT COST	SUBTOTAL
I	GROUNDWATER MONITORING				
1	Groundwater Monitoring year 1 (quarterly monitoring - 8 locs. Plus QC)	1	YR	34,068	
2	Groundwater Monitoring years 2-5 (biannual monitoring - 8 locs. Plus QC)	4	YR	7,004	
3	Groundwater Monitoring years 6-30 (annual monitoring - 8 locs. Plus QC)	25	YR	3,502	
	SUBTOTAL				110,998
II	VEGETATION MONITORING (8 samples in autumn, analyze for metals)	30	YR	3,600	70,606
III	PERIODIC MAINTENANCE				
	Monitoring Well Redevelopment at Year 15	1	LS	7,000	4,493
	Revegetation Year 2 (replant 1/3 of trees)	1	LS	3,250	3,063
VI	SARA REVIEW (AT YEARS 5, 10, 15, 20, 25, AND 30)	6	EA	25,000	92,605
	PRESENT VALUE SUBTOTAL FOR 30 YEAR PROJECT LIFE				**281,765**
	CONTINGENCY (10%)				28,177
	TOTAL PRESENT VALUE OF O&M (ROUNDED) **(30 YEAR PROJECT LIFE)**				**310,000**

Table 16 (Continued)

SELECTED REMEDY
GROUNDWATER

ITEM	DESCRIPTION MONITORED NATURAL ATTENUATION WITH PHYTOREMEDIATION SUMMARY OF << CAPITAL COSTS >> A N D << OPERATION AND MAINTENANCE COSTS >>	PRESENT VALUE	TOTAL COST
I	CAPITAL TOTAL	$83,000	
II	TOTAL PRESENT VALUE OF O&M COST :		
	INFLATION RATE = 4%		
	DISCOUNT RATE = 7%		
	PRESENT VALUE OF O&M AT 30 YEAR PROJECT LIFE	$310,000	
	ANNUALIZED COST OF O&M = $15,800		
III	PRESENT VALUE COST		$393,000
IV	TOTAL PRESENT VALUE ANNUALIZED OVER 30 YEARS		$20,100

ITEM	DESCRIPTION << CAPITAL COST DETAILS >> MONITORED NATURAL ATTENUATION WITH PHYTOREMEDIATION	UNIT QUANTITY	UNIT	UNIT COST	ITEM COST
I	DEED RESTRICTIONS	1	LS	20,000	20,000
II	INSTALLATION OF MONITOR WELLS (4 overburden, 4 bedrock)	1	LS	20,000	20,000
III	PLANTING OF VEGETATION	1	LS	9,750	9,750
	CAPITAL COST SUBTOTAL (ROUNDED)				50,000
	CONTRACTOR'S OVERHEAD & PROFIT @ 20%				10,000
	CAPITAL COST SUBTOTAL				60,000
	ENGINEERING, PROCUREMENT, LEGAL AND ADMINISTRATIVE COSTS: @ 20%				12,000
	CAPITAL COST SUBTOTAL				72,000
	CONTINGENCY @ 15%				11,000
	TOTAL CAPITAL COST (ROUNDED)				83,000

TABLE 17: CHEMICAL-SPECIFIC ARARs and TBCs

Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirement	Status
Clean Water Act, Ambient Water Quality Criteria, 33 USC 1313, 1314; 64 Fed. Reg. 19781	Establishes national recommended surface water quality criteria for the protection of human health and aquatic life for approximately 150 pollutants, and requires state water quality standards for the same protective purposes. These criteria have been incorporated into the Massachusetts Surface Water Quality Standards.	The Ambient Water Quality Criteria (AWQC) were used to establish interim groundwater cleanup levels and soil and sediment cleanup levels. Contaminated soils and sediments will be excavated (and disposed of off-site) and the contaminants in the groundwater will naturally attenuate (with the assistance of phytoremediation) to attain these ARARs.	Relevant and Appropriate
Cancer Slope Factors (CSFs)	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Cleanup action will minimize exposure to potential receptors	TBC
Reference Doses (RfDs)	These are guidance values used to evaluate the potential non-carcinogenic hazard caused by exposure to contaminants.	Cleanup action will minimize exposure to potential receptors	TBC
The Potential of Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program, NOAA Technical Memorandum NOS OMA 52 (Long & Morgan, 1990) and Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments (Long, et al., 1995)	These reports identify contaminant concentrations in sediments associated with deleterious effects on fish and invertebrates in estuarine and marine environments.	This TBC was used to establish the cleanup levels for sediments. The selected remedy's excavation of sediments (0-2 feet deep) within Boys Creek and adjacent marsh will be consistent with this TBC.	TBC
Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (EPA, December 1996)	This report describes a methodology for assessing risks associated with non-residential adult exposures to lead in soil. This methodology focuses on estimating fetal blood lead concentrations in women exposed to lead contaminated soils.	The soil cleanup level for lead in the Commercial Area was established based upon this TBC.	TBC

TABLE 18: LOCATION-SPECIFIC ARARs and TBCs

Media	Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirement	Status
Wetlands	Clean Water Act § 404 (40 CFR 230)	No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the discharge which would have a less adverse impact to the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. Discharge cannot cause or contribute to violations of any state water quality standard or toxic effluent standard or jeopardize threatened or endangered species. Discharge cannot cause or contribute to significant degradation of the waters of U.S. Appropriate and practicable steps must be taken which will minimize the potential adverse impacts of the discharge of the dredged material on the aquatic ecosystem.	These requirements will be attained because there is no practicable alternative with less adverse impact and all practicable measures will be taken to minimize and mitigate any adverse impacts. Excavated materials will be dewatered or solidified/stabilized. Dredged materials will not be discharged to the aquatic system. Excavated areas will be filled with clean materials from off-site, in accordance with 40 CFR 230. The performance of the selected remedy will not result in any discharge that will cause or contribute to exceedances of state water quality standards or toxic effluent standards or to degradation of water quality.	Applicable
Wetlands Floodplains	Procedures on Floodplain Management and Wetlands Protection (40 CFR 6, App. A)	Federal agencies shall avoid, whenever possible, the long and short term impacts associated with the destruction of wetlands and the occupancy and modifications of floodplains and wetlands development wherever there is a practicable alternative in accordance with Executive Orders 11990 and 11988. The agency shall promote the preservation and restoration of floodplains so that their natural and beneficial values can be realized. Any plans for actions in wetlands or floodplains must be submitted for public review.	These requirements will be attained because there is no practicable alternative with less adverse impact to work in the wetlands and floodplains with less adverse impact, and all practicable measures will be taken to minimize and mitigate any adverse impacts. Wetlands and floodplains disturbed by excavation will be restored to their original conditions. Temporary fill placed in wetlands for access roads and staging area will not have a significant impact on the extent of flooding.	Applicable
Wetlands	Fish and Wildlife Coordination Act, 16 USC 661 et.seq. (50 CFR Part 81, 225, 402, 226, and 227)	Requires federal agencies to take into consideration the effect that water-related projects will have on fish and wildlife. Requires consultation with the Fish and Wildlife Service and the state to develop measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	Consultation with the Fish and Wildlife Services to develop plan to controlling affects on wildlife during remediation activities. This plan will include sampling and analysis of the creek water to ensure minimal impact.	Applicable
Wetlands	Massachusetts Wetlands Protection Act (310 CMR 10.00)	These regulations are promulgated under Wetlands Protection Laws, which regulate dredging, filling, altering, or polluting of wetlands. Work within 100 feet of a wetland is regulated under this requirement. The requirement also defines wetlands based on vegetation type and requires that efforts on wetlands be mitigated. These regulations also contain wildlife habitat evaluation provisions.	If the remedial action activities involve removing, filling, dredging, or altering a DEP defined wetland, or conducting work within 100 feet of a wetland, these regulations will be met. Whenever possible, remedial actions will be conducted so that impacts to wetlands and habitats will be minimized or mitigated.	Applicable

TABLE 18: LOCATION-SPECIFIC ARARs and TBCs (Continued)

Media	Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirement	Status
Wetlands	River Protection Act Amendments to the Massachusetts Wetlands Protection Act (310 CMR 10.58)	These requirements added a new resource area and accompanying performance standards to the Wetlands Protection Act. The resource area is called the "riverfront area," which extends 200 feet (25 feet in municipalities with large populations and in densely developed areas) on each side of perennial rivers and streams. Projects must not have significant adverse impacts on the riverfront area, in order to protect public and private water supplies, wildlife habitat, fisheries, shellfish, groundwater, and to prevent flooding, storm damage and pollution. It must also be demonstrated that there are no practicable and substantially equivalent economic alternatives to the proposed work with less adverse effects on these public interests.	Work at the Site will be within 25 feet of the edge of Boys Creek. The project will have no long-term significant adverse impact; instead, the removal of contaminated sediments and soils will have a significant positive impact. Also, these requirements will be attained because there are no practicable and substantially equivalent economic alternatives to the proposed work with less adverse effects.	Applicable
Dredged Materials	Massachusetts Clean Waters Act Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the United States within the Commonwealth (314 CMR 9.00)	The substantive portions of these regulations establish criteria and standards for the dredging, handling and disposal of fill material and dredged material.	Excavation and filling, operations will meet substantive criteria and standards in these regulations. The remedial alternative will be designed to ensure the maintenance or attainment of the MA Water Quality Standards in the affected water and to minimize the impact on the environment.	Applicable
Coastal Zone	Coastal Zone Management Act, 16 USC 1451, et. seq., as implemented by 15 CFR 930, Federal Consistency With Approved Coastal Management Programs	The general provisions of 15 CFR 930 are intended to insure that all federally conducted or supported activities including development projects, directly affecting the coastal zone are undertaken in a manner consistent to the maximum extent practicable with approved State coastal management programs. The coastal location of the Site makes this act, and related state coastal zone policies, applicable to potential remedial actions at the Site.	All practicable measures will be taken to ensure compliance with substantive requirements of the State coastal management programs.	Applicable
Coastal Zone	Commonwealth of MA - Coastal Zone Management (CZM) Water Quality Policy 1 and Water Quality Policy 3	Requires federal agencies to ensure that point-source discharges in or affecting the coastal zone are consistent with federally approved state effluent limitations and water quality standards. Requires that activities in or affecting the coastal zone conform to applicable state and federal requirements governing surface water discharges.	The selected remedy will not result in any discharge; but, if there is a point source discharge, it will meet AWQC for protection of marine aquatic life from chronic effects.	TBC

TABLE 18: LOCATION-SPECIFIC ARARs and TBCs (Continued)

Media	Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirement	Status
Coastal Zone	Commonwealth of MA - CZM Water Quality Policy 2	Requires protection of coastal resource areas including salt marshes, shellfish beds, dunes, beaches, barrier beaches, salt ponds, eelgrass beds, and freshwater wetlands for their important role as natural habitats.	Erosion controls will be implemented as necessary to prevent runoff of surface water containing soils or site contaminants. Implemented through Waterways and Wetland Protection Regulations.	TBC
Coastal Zone	Commonwealth of MA - CZM Habitat Policy 1	Requires protection of coastal resource areas including salt marshes, shellfish beds, dunes, beaches, barrier beaches, salt ponds, eelgrass beds, and freshwater wetlands for their important role as natural habitats.	All practicable measures will be taken to ensure the coastal resource areas adjacent to the Atlas Tack site will be protected during remediation activities. Disturbed wetlands will be restored as part of the site activities.	TBC
Coastal Zone	Commonwealth of MA - CZM Habitat Policy 2	Requires restoration of degraded or former wetland resources in coastal areas and ensure that activities in coastal areas do not further wetland degradation but instead take advantage of opportunities to engage in wetland restoration.	Areas disturbed by excavation will be restored. This will include construction of ditches to promote flooding by tides to promote the establishment of high marsh plant species where appropriate.	TBC
Coastal Zone	Commonwealth of MA - CZM Coastal Hazard Policy 1	Preserve, protect, restore and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes, and land under the ocean.	Adjacent marshes and wetlands will be restored if disturbed during remedial site activities. If creek flow is diverted during site activities, care will be taken to protect downstream coastal resources.	TBC
Coastal Zone	Commonwealth of MA - CZM Coastal Hazard Policy 2	Ensure construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Approve flood or erosion control projects only when it has been determined that there will be no significant adverse effects on the project site or adjacent or downcoast areas.	Assure the excavation procedures, flood control, and erosion control will protect downstream and adjacent wetlands and coastal resources.	TBC
Rare Species	Massachusetts Wetlands Protection Program Policy 90-2; Standards and Procedures for Determining Adverse Impacts to Rare Species	This policy clarifies the rules regarding rare species habitat contained at 310 CMR 10.37 and 10.59.	Habitats of rare species as determined by the Massachusetts Natural Heritage Program will be considered in the mitigation plans.	TBC

TABLE 19: ACTION-SPECIFIC ARARs and TBCs

Media	Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirements	Status
Dewatering Water	Massachusetts Ground Water Discharge Permit Program 314 CMR 5.00	Any discharge shall not result in a violation of Massachusetts Surface Water Quality Standards (314 CMR 4.00) or Massachusetts Ground Water Quality Standards (314 CMR 6.00).	Water from dewatering excavated soils and sediments may be discharged onto the land surface within the wetland buffer. The discharge shall not result in a violation of these requirements.	Applicable if there are discharges to groundwater
Surface Water	Clean Water Act National Pollution Discharge Elimination System (NPDES) 40 CFR Part 122	Regulates the discharge of water into public surface waters. Among other things, major requirements are: • Use of best available technology (BAT) economically achievable is required to control toxic and non-conventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants. Technology-based limitations may be determined on a case-by-case basis. • Applicable Federally approved State water quality standards must be complied with. These standards may be in addition to or more stringent than other Federal standards under the CWA.	Any point source discharge will comply with all substantive NPDES requirements.	Applicable if there are discharges to surface water
Surface Water	Massachusetts Surface Water Quality Standards 314 CMR 4.00	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained and protected. Minimum water quality criteria required to sustain the designated uses are established. Massachusetts surface water quality standards incorporate federal AWQC as standards for the surface waters of the State. Any on-site water treatment and discharge is subject to these requirements.	Any point source discharge will comply with these requirements.	Applicable if there are discharges to surface water
Hazardous Waste	RCRA Hazardous Waste Regulations (Identification and Listing of Hazardous Wastes) 40 CFR Part 261	These regulations define wastes that are subject to regulation as hazardous wastes.	Wastes and contaminated media (debris, soils and sediments) excavated at the Site will be analyzed to determine if they are listed hazardous waste, "contain" listed hazardous waste or exhibit a characteristic of hazardous waste, in compliance with these regulations.	Applicable

TABLE 19: ACTION-SPECIFIC ARARs and TBCs (Continued)

Media	Requirement	Requirement Synopsis	Actions to be Taken to Attain Requirements	Status
Hazardous Waste	RCRA Hazardous Waste Regulations (Storage of Hazardous Waste) 40 CFR Part 264, Subparts I, J & L 40 CFR 262.34(a)	Subparts I, J and L of Part 264 identify design, operating, monitoring, closure, and post-closure care requirements for long-term storage of RCRA hazardous waste in containers, tanks and waste piles, respectively. However, 262.34(a) allows accumulation of RCRA hazardous wastes for up to 90 days in or on containers, tanks or drip pads, provided that the generator complies with Part 265.	During remediation, remediation wastes will be stored in containers, tanks and/or waste piles (or on drip pads) in compliance with these requirements	Applicable
Excavated/Dredged Materials, Treatment Residuals	TSCA, Subpart D (Storage and Decontamination) 40 CFR 761.65 & 761.79	These regulations establish requirements for the storage for disposal of PCBs and PCB Items with concentrations of 50 ppm or greater. These various requirements include requirements for roof, flooring, curbing, and location outside 100-year floodplain. They also establish decontamination standards and procedures for removing PCBs from non-porous surfaces.	Storage of PCB materials will be conducted in compliance with these requirements. Solid debris, excluding trees and bushes, which have been contaminated with regulated PCB materials will be decontaminated prior to off-site transport and disposal *in accordance with these requirements; in addition,* equipment will be cleaned in accordance with these regulations.	Applicable
Ambient Air	Massachusetts Ambient Air Quality Standards and Massachusetts Air Pollution Control Regulations 301 CMR 7.00	The applicable portions of these regulations prohibit burning or emissions that cause or contribute to a condition of air pollution, including dust from excavation activities.	Control measures will be implemented to ensure compliance with state regulations.	Applicable
Wastewater	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities 314 CMR 8.00	Water treatment units which are exempted from M.G.L.a.21C and which treat, store, or dispose of hazardous wastes generated at the same site are regulated to ensure that such activities are conducted in a manner which protects public health and safety and the environment.	If on-site treatment of wastewater is performed, all processes will comply with all substantive Massachusetts requirements regarding location, technical standards, closure and post-closure, and management standards.	Applicable
Soil/Sediment	A Guide on Remedial Actions at Superfund Sites With PCB Contamination (EPA, August 1990)	Describes various scenarios and considerations pertinent to determining the appropriate level of PCBs that can be left in each contaminated media to achieve protection of human health and the environment.	This guidance was considered in determining the appropriate level of PCBs that will be left in the soils. Management of PCB-contaminated residuals will be designed in accordance with the guidance.	TBC

Appendix A - Responsiveness Summary

Atlas Tack Corp. Superfund Site
Record of Decision

March 2000

1.0 INTRODUCTION

This responsiveness summary summarizes and provides EPA's responses to formal comments regarding the 1998 Proposed Plan for the cleanup of the Atlas Tack Corp. Superfund Site. These comments were received during the comment period between December 2, 1998 and February 19, 1999. The Public Hearing to accept oral comments was held on February 11, 1999. The comments and responses are organized into the following categories.

In this responsiveness summary, EPA is responding to only substantive comments regarding the RI, Draft Final FS, technical memorandums updating the ecological and human health risks, and Proposed Plan. Any comments concerning issues which were resolved by changes to the preferred alternatives in the Proposed Plan are responded to by referring the reader to the appropriate section(s) in this ROD.

EPA presented the Proposed Plan at a public informational meeting on December 1, 1998. EPA held an additional informational meeting on January 27, 1999 to provide the public more information about the preferred remedy. EPA received 47 letters or electronic comments, and 18 persons spoke at the Public Hearing. Some letters had more than one signature. Some persons or groups sent more than one letter, and/or also commented at the Public Hearing. In this responsiveness summary, EPA will respond to commenters or groups in the order that their first correspondence was dated or testimony given at the Public Hearing.

The alternatives in the FS were for each Site Area (Commercial, Solid Waste and Debris, Marsh, and Creek Bed Areas) and Groundwater. The alternatives of all the Site Areas were combined in the Proposed Plan and included: No Action/Limited Action; Removal with On-Site Disposal; Removal with Treatment with On-Site Disposal; Removal with Off-Site Disposal; Minimal Action Groundwater; and Groundwater Treatment. The preferred remedy in the Proposed Plan was Removal with Treatment with On-Site Disposal for the contaminated soils and sediments and Minimal Action for the groundwater.

The selected remedy in the ROD consists of the following activities:

1. Source Control

a. Site Setup, Clearing, Sampling, and Contamination Delineation

The first step in the remedial process will be to establish an on-site office and mobile laboratory to support the field activities. Then, the following activities will be completed, most at the same time. The soils and sediments will be sampled to better define the remediation areas and amounts. A treatability study will be performed to determine the most appropriate treatment for the contaminated materials that can and need to be treated. Debris and vegetation will be excavated from the work areas. The power plant, metal building, and rear section of the main building will be demolished to make room for the remedial activities. Cleared vegetation, debris, and building materials will be disposed of in the appropriate off-site facilities. Discussions will be held with Town Officials and residents to determine the most protective and acceptable access route(s) for truck traffic.

Also, a bioavailability study in the Marsh Area will be performed to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland or riverfront area. Bioavailability is defined as the degree to which materials in an environmental media can be assimilated by organisms (EPA, 1997a). There is a relationship between bioavailability and chemical exposure to organisms. The bioavailability study will be used to assess exposure. The measurements of bioavailability include analyses of the magnitude, duration, and frequency of exposure. The study will likely include data from the chemical sources, chemical distribution (including transformation), and spatial-temporal distributions of key receptors. Because evaluation of contamination concentrations in whole sediments may not be sufficient to address the question of bioavailability, modifying factors (e.g., organic carbon simultaneously extracted metals/acid volatile sulfide (SEM/AVS) ratio) must be considered. Specific assessment tools to measure or estimate bioavailability may include: sediment, pore water and overlying water concentrations; SEM; AVS and organic carbon concentrations; tissue concentrations; biomarkers; fate and transport models; and food chain models (Ingersoll, 1997).

b. Excavation, Treatment, and Disposal

Approximately 54,000 yd^3 of contaminated soils and sediments will be excavated wherever heavy metals, cyanide, PCBs, PAHs, and pesticides are present above the cleanup levels. Once removed, the contaminated soils and sediments will be separated from any solid wastes and debris. Materials will be tested to determine if they contain contamination at levels above the cleanup goals as shown in Tables 13 and 14. The contaminated materials will be tested and further separated into materials that will be treated and not treated. The estimated total volumes of each material at the Site are shown in Table C-1 in Appendix C. The actual amount of excavation in the Marsh Area will depend on results of the bioavailability study. Approximately 55,000 yd^3 of solid waste, debris, and treated and un-treated soils and sediments will be sent off-site to the appropriate disposal facilities in compliance with the EPA Off-Site Rule, 40 CFR 300.440. A minimal amount of material determined to be hazardous waste will require treatment off-site to meet land disposal restrictions prior to disposal.

The on-site treatment will be for materials requiring treatment for off-site disposal (estimated to be 6,000 yds^3 treated). The most appropriate treatment method(s) will be determined from the Treatability Studies. The treatment will eliminate the potential for contaminants to leach from these materials. The treatment technology(ies) will most probably be some form of solidification/ stabilization. The treatment of the contaminated materials will be done in a temporary enclosure to the extent practicable to ensure that workers and residents in the area are not impacted by airborne dust and contaminants. Appropriate engineering controls will be used to reduce all other dust emissions from excavation and storage of materials, and truck traffic on-site.

Soils and sediments with contaminant concentrations that do not exceed the cleanup goals will be placed back into the areas that have been excavated. Additional fill will be brought onto the Site to properly contour the Site. Once the contamination is removed from the various Site areas, each area will be regraded and revegetated to its original pre-contamination condition to the extent possible. Salt marsh areas that are excavated to remove contamination will be regraded and revegetated to approximate the original conditions of the remediated area. Erosion protection will be provided in each area, as appropriate, to prevent bank scouring and erosion.

Some of the soils and sediments to be excavated are below groundwater elevations and/or in Boys Creek. These removed soils and sediments may have water treatment issues associated with excavation, storage, treatment, and/or disposal activities. Soils and sediments that require dewatering will be placed into a tank or on an impervious surface. Dewatering of soils or sediments will probably involve some type of mechanical dewatering (e.g., filter press) and/or gravity settling. Soils and sediments will be dried enough to meet disposal requirements. All water separated from the soils and sediment will be tested, and if necessary treated to groundwater or surface water standards, before being discharged back onto the Site. Boys Creek may be temporarily diverted in some locations to allow for the removal of contaminated sediments.

The excavation, treatment, and disposal of contaminated soils and sediments are described in more detail in Appendix C.

c. Monitoring

A long-term monitoring program will be undertaken to assess the effectiveness of the remedy over the long term. Soils, sediments, surface water, and vegetation will be sampled and analyzed for the levels of the contaminants of concern. These monitoring activities will be undertaken for 30 years after the completion of the source control remedy.

2. Management of Migration - Monitored Natural Attenuation with Phytoremediation of the Site Groundwater

The risks from the groundwater contaminants will be significantly reduced by primarily removing contamination sources to the groundwater. The groundwater contamination will be further reduced by natural attenuation. For the inorganic compounds, natural attenuation should involve chemical transformation, sorption, and dilution. For the organic compounds, natural attenuation should involve chemical transformation, sorption, dilution, and biodegradation. Additional measures to control the groundwater elevation will be by phytoremediation (trees will be planted to lower the groundwater). Planting trees will only be done in areas of the Site that the groundwater is not influenced by the ocean and tidal action in Boys Creek. The exact location, types, and numbers of trees to be planted will be determined during the remedial design. It will take several years for the trees to become large enough and the tree roots to be deep enough to fully lower the groundwater level. When fully grown the trees should limit the flow of groundwater through areas where residual contamination still remains at the Site. The trees selected to lower the groundwater will be limited to types that do not take up contamination, thereby preventing the movement of contamination from one location (groundwater) to another (trees). The groundwater should met the cleanup goals approximately ten years after the removal of the contamination sources.

A long-term groundwater monitoring program will be undertaken to assess the effectiveness of the remedy (natural attenuation with phytoremediation of the groundwater in conjunction with source control) over the long term. The groundwater monitoring will include analysis of contaminants of concern over 30 years after the completion of the source control remedy. The most appropriate sampling locations will be determined once the sources of contamination are removed. The use of existing wells may be possible. In addition, the trees will be monitored for metals.

3. Institutional Controls

Restrictions will also be applied to the Site properties to ensure the remedy is protective. Institutional controls (e.g., deed restrictions, including easements) will be established to prevent any future use of the groundwater at the Site for drinking water. If groundwater is determined to be within safe and acceptable levels for drinking after the groundwater cleanup levels have been reached, then restrictions on groundwater use may be lifted. Also, institutional controls will be established to limit other activities on the Site. Such limits include restricting the types of construction within portions of the Commercial Area to only commercial uses (i.e., no residential use). Further restrictions within the Non-Commercial Area are not anticipated because the wetlands within this area are currently under restrictions from existing wetland regulations.

There is a current risk at the Site from shellfish ingestion. The existing shellfish ban imposed by the Town of Fairhaven, based on bacterial issues, should be continued until testing indicates no risk from bacteria contamination, as well as from Site contaminants. It is expected, at the conclusion of the post remedial risk assessment, that the Site will not pose a risk from shellfish ingestion due to Site contaminants because of the removal of the sources of contamination that cause this shellfish ingestion risk.

2.0 SUMMARY OF COMMENTS RECEIVED DURING THE DECEMBER 2, 1998 - FEBRUARY 19, 1999 PUBLIC COMMENT PERIOD

2.1 Citizen Comments

2.1.1 Channing Hayward:

This commenter sent a letter dated December 2, 1998 supporting the Proposed Plan.

EPA Response:

EPA appreciates this commenter's support for the Proposed Plan. The final remedial selection was modified based on other comments received, such that no hazardous materials, treated or otherwise, will be left on-site after the remediation (see EPA's Response to comment 2.1.2).

2.1.2 Patricia Estrella; Helen Skarstein; Donald and Imelda Sylvia, and Gerald Viel; Mr. and Mrs. Jose Baptista; John Chamberlain; Albert Kenney; Besse Souza; Shirley and Stephen Theberge; and Beverly Vieira:

Patricia Estrella provided oral comments at the Public Hearing on February 11, 1999, and this group of citizens provided the exact same written comments in a letter dated January 11, 1999. This group considered on-site disposal and treatment to be unacceptable at this location. Specifically, in their written letters these citizens were concerned that this Site was not an appropriate location for the disposal of wastes. Patricia Estrella further added in her oral comments that an alternative proposal could consider on-site treatment, in an enclosed facility, with the treated material being removed to a licensed hazardous waste landfill.

EPA Response:

The selected remedy should address the concerns of these commenters (see Section XI Selected Remedy of this ROD). All contaminated materials and other waste materials will ultimately be disposed of off-site in appropriate waste disposed facilities. Approximately 6,000 yd^3 will be treated at the Site prior to disposal. The use of a temporary structure or enclosure to house the treatment operation(s) will be seriously evaluated during the remedial design to reduce any potential emissions from the treatment of wastes on-site to the community.

2.1.3 Albert Teixeira:

This commenter sent a letter dated January 11, 1999 in opposition to the Proposed Plan. Specifically, this commenter compared the EPA's preferred remedy in the Proposed Plan to EPA's nine criteria. This commenter suggested that the remedy be off-site treatment and disposal of the contaminated materials.

EPA Response:

The selected remedy will provide for the off-site disposal of all contaminated materials (see Section XI Selected Remedy of this ROD) with an estimated 3,400 yd^3 of contaminated materials being treated off-site before disposal in a Hazardous Waste Facility. However, an estimated 5,000 yd^3 (before treatment) of contaminated materials will be treated on-site to reduce the cost of off-site disposal to special landfills for non-hazardous waste. Appropriate safeguards will be used when treating materials on-site.

2.1.4 Michael Bouvier:

This commenter sent a letter dated January 13, 1999 in opposition to the Proposed Plan. Specifically, this commenter's concerns were: 1) EPA's data collection are flawed; 2) EPA makes no provision for a hundred year flood; 3) EPA's cost estimates are meaningless because the amount to be removed is not known, monitoring costs have not been included, and the cleanup required as a result of a hundred year flood has not been considered; 4) the cost of preparing and repairing the nearby bike path as a truck disposal route makes this remedy a joke; and 5) EPA must consider the proximity to Rogers School and neighborhood before starting on-site treatment and storage. This commenter expressed preference for the off-site disposal of the contaminated materials.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). EPA disagrees with this commenter's contention that the data used in making this remedial decision were flawed. 1) There are sufficient data to support EPA's remedial decision. EPA did recognize, in the Proposed Plan, the need to do further sampling during the remedial design to better define the extent of the remediation. 2) The hundred year floodplain was considered by EPA and is only an issue for the area of the Site (Boys Creek) south of the hurricane dike. The hundred year floodplain is shown in Figure 3-14 of the RI (Weston, 1995). 3) EPA's cost estimates in the Proposed Plan are within the -30 to +50 % cost estimate ranges that is EPA's practice and include monitoring costs. Since a hundred year flood is not a factor for most of this Site (see Figure 3-14 of RI), no costs for a cleanup associated with a hundred year flood were included in the FS (Weston, 1998b). 4) The use of the bike path as a truck route during remediation will be evaluated, with Town Officials and community, during remedial design. If the bike path is used, it will be fully restored, once the remedial action is completed. Costs associated with the use of the bike path have been considered in the FS (Weston 1998b) and Proposed Plan. 5) The selected remedy should have minimal short term effects on the community and Rogers School. Engineering controls will be implemented to eliminate or minimize exposures from any on-site treatment and temporary storage of materials before off-site disposal. With respect to the issue of off-site disposal, the selected remedy shall address the concerns of this commenter.

2.1.5 Brian Bowcock:

This commenter provided oral comments at the Public Hearing on February 11, 1999, and written comments in a letter dated January 21, 1999 in opposition to the Proposed Plan. This commenter wanted the remedy to be off-site treatment and disposal of the contaminated materials.

EPA Response:

The selected remedy should address most of the concerns of this commenter (see Section XI Selected Remedy of this ROD) regarding the off-site disposal of contaminated materials. See Response 2.1.3 regarding off-site treatment.

2.1.6 Roman Rusinoski

This commenter provided oral comments at the Public Hearing on February 11, 1999, and written comments in a letter dated January 23, 1999. This commenter did not agree with EPA's Proposed Plan and suggested that the metals be separated and sold, and the other by-products be removed off-site to a Confined Disposal Facility being built as part of the New Bedford Harbor Superfund Site.

EPA Response

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). The suggestion that the metals be separated and sold was investigated. EPA has concluded that metals separation is difficult and not likely to be cost effective given the nature and extent of other contamination at this Site. The suggestion that the other material be disposed of at the New Bedford Harbor Superfund Site can not be implemented, since the New Bedford Harbor Site is not licenced to accept wastes from other off-site sources.

2.1.7 Margo Volterra:

This commenter sent two e-mails dated January 27, 1999 in opposition to the Proposed Plan. This commenter suggested that more money be spent.

EPA Response:

The selected remedy should address most of the concerns of this commenter (see Section XI Selected Remedy of this ROD).

2.1.8 William McLane:

This commenter sent an e-mail dated January 28, 1999 in opposition to the Proposed

Plan. This commenter stated that the Site is in an environmentally fragile area and a poor location for long term storage of hazardous and toxic wastes.

EPA Response:

The selected remedy should address most of the concerns of this commenter (see Section XI Selected Remedy of this ROD).

2.1.9 RaeAnn and William Silva:

These commenters sent an undated letter in opposition to the Proposed Plan. These commenters wanted the remedy to be off-site disposal of the contaminated materials.

EPA Response:

The selected remedy should address the concerns of these commenters (see Section XI Selected Remedy of this ROD).

2.1.10 Shirley and Steve Theberge:

These commenters sent a letter dated February 1, 1999 in opposition to the Proposed Plan. These commenters wanted a proper cleanup for their children and future generations.

EPA Response:

The selected remedy should address the concerns of these commenters (see Section XI Selected Remedy of this ROD).

2.1.11 Donna and Edward Jennings:

These commenters sent a letter dated February 7, 1999 in opposition to the Proposed Plan. These commenters wanted an off-site clean-up and off-site disposal of the contaminated materials.

EPA Response:

The selected remedy should address the concerns of these commenters (see Section XI Selected Remedy of this ROD).

2.1.12 Mark Rasmussen:

Mark Rasmussen, Executive Director of The Coalition for Buzzards Bay, provided oral comments at the Public Hearing on February 11, 1999, and written comments in a letter dated

February 8, 1999. This commenter raised the following issues: opposition to on-site waste disposal; concerns for lack of groundwater treatment, the high toluene cleanup level and groundwater treatment limitations; acceptance of bioavailability studies to determine appropriate marsh area removal; and natural resource damages. This commenter suggested the Proposed Plan be modified by: disposal of materials off-site; maximum excavation of contaminated materials to reduce groundwater contamination; the cleanup of Boys Creek and Marsh Areas pending completion and public review of the bioavailability data; and complete restoration to the original grade and monitored wetland restoration.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). All contaminated materials and other waste materials will ultimately be disposed of off-site in appropriate waste disposal facilities. The contaminated materials will be excavated to the cleanup levels, this will reduce the soil and sediments levels to protective levels. The groundwater treatment is not justified because the groundwater cleanup goals are expected to be met about ten years after the sources of contamination have been removed, which is only about 3 years longer than would have been expected with active groundwater treatment. Figure 3, in the ROD, shows the approximate extent of excavation of contaminated areas. It is expected because of the extent of excavation that all the toluene in the cleanup areas will be removed. The bioavailability studies to determine appropriate marsh cleanup will be done as part of this ROD. Figure 4, in the ROD, shows the approximate final contours after the remediation is completed. The final contours, of the Site, should allow for the restoration to wetland of the currently filled areas.

Issues related to natural resource damages are under the control of the Federal and State Trustees. On this Site, the Trustees are NOAA, USFWS, and the Executive Office of Environmental Affairs. EPA has worked with the Trustees regarding this Site. Representatives from NOAA and USFWS assisted EPA in determining the appropriate cleanup levels at this Site.

2.1.13 George Vezina:

This commenter provided oral comments at the Public Hearing on February 11, 1999, and written comments in an e-mail dated February 19, 1999 in opposition to the Proposed Plan. Also, this commenter had concerns that wetland replication could not be done as easily as has been implied.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). Also, EPA realizes that a wetland can be difficult to replicate. Every attempt will be made to regrade and revegetate the wetlands to approximately the original conditions of the area remediated. However, there is the possibility that the wetlands will revert back to having the current plant species due to the lack of water circulation as the result of the hurricane barrier.

2.1.14 Claudia Kirk

This commenter sent a letter dated February 18, 1999 in opposition to the Proposed Plan. This commenter expressed preference for on-site treatment and off-site disposal of the contaminated materials, and a temporary structure to be used to contain dust while excavating.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). The use of a temporary structure/enclosure to house the treatment operation(s) will be seriously considered during the remedial design to reduce any potential emissions. Appropriate engineering controls will be used to reduce all other dust emissions.

2.1.15 Kim McLaughlin:

This commenter sent an e-mail dated February 19, 1999 in opposition to the Proposed Plan. This commenter suggested off- site treatment and disposal of the contaminated materials, but would accept on-site treatment. Also, this commenter suggested a temporary structure be used to contain dust emissions and the use of the Town bike path to reduce truck traffic to the neighborhood.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). The use of a temporary structure/enclosure to house the treatment operation(s) will be seriously considered during the remedial design to reduce any potential emissions. EPA will work with the Town to develop the appropriate truck route(s) during the cleanup.

2.1.16 Patricia Pelczar:

This commenter sent a letter dated February 19, 1999 in opposition to the Proposed Plan. Specifically, this commenter's concerns were waivers of regulations, monitoring, financing of future difficulties, waste volume estimates, and public comments.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). There are no waivers of regulations planned for this selected remedy. A groundwater monitoring plan will be implemented after the remediation to evaluate if the remedy will be protective of the environment. The Superfund statute requires that a 5 year review be conducted at sites where the remedy does not allow unlimited land use and unrestricted exposure to insure the remedy remains protective of human health and the environment. The remedy will be financed either through a settlement with the responsible parties and/or by the EPA's Hazardous Substance Superfund and the Commonwealth of Massachusetts. The estimated volume of contaminated wastes (54,000 yd^3 before treatment) is based upon sampling done during the RI (Weston, 1995) and will be refined during the pre-remedial sampling during the Remedial Design. Finally, all response letters received during the comment period are in the Administrative Record and are responded to in this Responsiveness Summary.

2.1.17 Henry Ferreira:

This commenter sent an undated letter in opposition to the Proposed Plan. This commenter stated that the plan was not in the best interest of the town, but was the cheapest the EPA could get away with, and that possible releases of toxic materials could occur if flooding occurred.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD).

2.1.18 Dr. Barbara Aekser:

This commenter provided oral comments at the Public Hearing on February 11, 1999, in opposition to the Proposed Plan. This commenter was concerned with the location of waste disposal and the deterioration of the treated material.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD).

2.1.19 Kevin Doherty:

This commenter provided oral comments at the Public Hearing on February 11, 1999, in opposition to the Proposed Plan. This commenter's main comments were the following: application of RCRA regulations to this Site; maintenance and operation of unlined hazardous waste materials to be capped; lack of full characterization of the wastes; and water inundating the waste materials as the result of storms.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD). All waste materials including contaminated materials will ultimately be disposed of off-site in appropriate waste disposal facilities.

2.1.20 Jim Simmons:

This commenter provided oral comments at the Public Hearing on February 11, 1999, in opposition to the Proposed Plan. This commenter had concerns with the location of waste disposal.

EPA Response:

The selected remedy should address the concerns of this commenter (see Section XI Selected Remedy of this ROD).

2.2 Local Government Comments

2.2.1 Fairhaven Selectman Robert Hamilton

Selectman Hamilton sent an e-mail dated December 2, 1998 requesting extension of the public comment period.

EPA Response

EPA extended the public comment period twice, first from December 31, 1998 to February 1, 1999, then to February 19, 1999.

2.2.2 Fairhaven Selectmen Robert Hamilton, Bryan Wood, and Winfred Eckenreiter

Selectmen Hamilton, Wood, and Eckenreiter provided oral comments at the Public Hearing on February 11, 1999, and written comments in letters dated January 14 (two letters) and February 1, 1999 and included the SeaChange Panel's review. The Selectmen's main comments were: 1. More than a third of the Site would be converted into an unlined disposal facility rendering it useless for future development. 2. The plan would require the expenditure of either EPA or DEP funds to monitor the Site. 3. The natural ecosystem will be adversely impacted because of digging and placement if hazardous material in a flood prone area. 4. The abutting marsh, streams and shellfish beds would impacted should the unlined disposal area leak. 5. The residential neighborhood would continue to live in fear from the impact of leaking material from the unlined landfill. 6. The disposal site is near residential homes, an elementary school, a nursing home, and a bike path. 7. The time to construct the landfill would be more than just taking the material off-site. 8. The cost of taking the materials off-site is nearly equal the cost of the on site disposal and constant monitoring. 9. The Selectmen do not believe the Hazardous Waste Corrective Action Management Unit (CAMU) regulations apply to this Site.

The SeaChange Panel included Jim Plunkett, Anne Marie Desmarais, and Kevin Doherty. Their main comments were the following.

Jim Plunkett's comments were: 1. The Hazardous Waste Corrective Action Management Unit (CAMU) regulations were intended for just RCRA sites. 2. The minimal groundwater alternative does not meet the criteria of reduction in the mobility, toxicity, and volume by treatment. At the same time, the commenter believed that the groundwater should not be actively treated, especially with a removal action. 3. Allegations have been made that the Site could go before the National Review Board and that the criteria are not meet for this Site. 4. The construction of a land impoundment is both technically and environmentally inappropriate.

Anne Marie Desmarais's comments were: 1. RCRA rules are being applied to a Site that was never regulated under RCRA. 2. Metals may leach in the future. 3. Requirements of State Wetland, Facility Siting, and Solid Waste Regulations will need to be met.

Kevin Doherty's comments were: 1. Concerns with storms eroding the capped waste "compost" mound. 2. Money is driving the decision. 3. Concerns with gas emanating from compost pile of hazardous waste and leaching from the mound.

EPA Response

The selected remedy should address the concerns of the Selectmen and most of the SeaChange Panel concerns (see Section XI Selected Remedy of this ROD). All waste materials including contaminated materials will ultimately be disposed of off-site in appropriate waste disposal facilities.

Regarding additional issues the SeaChange Panel raised, EPA has the following responses. For Jim Plunkett's Comment 2, in Table 3 of the Proposed Plan, the minimal groundwater alternative partially meets the reduction of mobility, toxicity, and volume by treatment because of the phytoremediation component of this alternative. For Jim Plunkett's Comment 3, one of the criteria for going before the National Review Board is that a remedy is greater than $30 million or 50% greater than the least costly protective alternative. At this Site, the least costly protective source control alternative, Alternative 2, costs $13.4 million, and least costly protective management of migration (groundwater) alternative, Alternative 5, costs $ 0.39 million . The selected remedy, which includes both source control and management of migration components, costs $18.6 million and is not costly enough to require going before the National Review Board.

2.2.3 Fairhaven Conservation Commission

Marinus Vander Pol, Jr., Chairman of the Fairhaven Conservation Commission, provided oral comments at the Public Hearing on February 11, 1999, and written comments in letters dated December 21, 1998, and January 21 and February 11, 1999. The December

21, 1998 letter suggested that the EPA has not complied with the Massachusetts Wetlands Protection Act; and that a Determination of Applicability or Valid Order of Conditions has not been issued. The Conservation Commission's letter (unsigned) of January 21, 1999 asked several questions regarding wetland delineation, FEMA designation of flood zone, existing elevations, stabilizing fill, and estimated or theoretical life expectancy for the containment of toxins. The February 11, 1999 letter stated that it was the position of the Conservation Commission that: 1. The resource areas be delineated and verified; 2. A resource restoration plan be submitted for approval and be included in the cleanup plan; and 3. Off site disposal is the only way to get the toxic material out of the flood zone.

EPA Response

EPA responded with letters on January 19 and February 10, 1999. EPA does not need a Determination of Applicability, Valid Order of Conditions, or any Federal, State, or Local permits to conduct a remedial action under the Superfund law. Also, it was stated to the extent practicable EPA will consider input from the Commission. In addition, under the Superfund Law, EPA must comply with all substantive Applicable or Relevant and Appropriate Requirements (ARARs) to proceed with a remedial action. Refer to Section XII. Statutory Determination of the ROD for a complete discussion of the regulatory requirements.

A final wetland delineation and design plan will be performed, as required, during the design phase of the cleanup. The FEMA flood zone is a 100 to 500 year flood area. The existing elevations for the Site are shown on Figure 3 of the ROD. The proposed area clean fill and the approximate final contours for the Site are shown on Figures 3 and 4 of the ROD. An estimated or theoretical life expectancy for containing hazardous substances may be determined during the treatability studies if it is required for disposal in an off-site facility. It is expected any material treated will meet any standards required for off-site disposal.

Regarding the letter dated February 11, 1999 and comments given at the Public Hearing, EPA response is as follows: 1. A final wetland delineation and design plan will be performed, as required, during the design phase of the cleanup; 2. Approvals are not required for a resource restoration plan under the Superfund law; and 3. Off site disposal of all contaminated materials is part of the selected remedy.

2.2.4 Fairhaven Department of Water Resources

Gary Golas, Director of the Fairhaven Department of Water Resources, provided oral comments at the public hearing and written comments in letters dated January 14 and February 19, 1999. The commenter opposed any on-site treatment and suggested that the treatment be off-site so that areas near the Site closed to shellfishing could be opened sooner.

EPA Response

On-site treatment will not have any effect on the shellfish areas near the Site. The selected remedy has been modified from the original Proposed Plan to treat some contaminated materials on-site with disposal of all contaminated materials off-site. This should address any issues related to Site contamination regarding shellfish areas. Once the contaminated soils and sediments are removed during the remedy, the human health shellfishing risks from the Site should be eliminated.

2.2.5 Fairhaven Board of Health

Board of Health Members Raymond Richard, David Szeliga, and Dr. Edward Mee provided written comments in a letter dated January 25, 1999, and David Szeliga provided oral comments at the Public Hearing on February 11, 1999. The Board of Health's concerns were: 1. The Plan will not protect human health and plant and animal life because contamination will be left on-Site. 2. The Plan does not comply with ARARs. 3. The long term effectiveness and permanence is unknown. 4. It is unclear why the removal of contaminated soils to an off-site location would not reduce the toxicity, mobility, or volume. 5. The Town and its citizens have endured many years of non-action and a more permanent solution is the only option the Board can endorse. 6. Cost is the fundamental issue controlling EPA's decision, and taking the contaminated material away from the Site is the only acceptable plan. 7. It is their belief that the DEP will not accept the plan because of the maintenance. 8. The community acceptance of the Proposed Plan is non-existent.

EPA Response

The selected remedy should address the concerns of the Board of Public Health (see Section XI Selected Remedy of this ROD). The selected remedy has been modified from the original Proposed Plan to treat some contaminated materials on-site with disposal of all contaminated materials off-site.

2.2.6 Fairhaven Board of Public Works

Paul Francis, Chairman, Fairhaven Board of Public Works, sent a letter dated February 19, 1999, and Richard Broeder provided oral comments at the Public Hearing on February 11, 1999. They were both in opposition to the disposal of hazardous materials on-site.

EPA Response

The selected remedy should address the concerns of the Board of Public Works (see Section XI Selected Remedy of this ROD).

2.3 State Legislature Comments

2.3.1 Representative William Straus

Representative Straus provided oral comments at the Public Hearing on February 11, 1999, and written comments in a letter dated January 19, 1999. Representative Straus suggested the Proposed Plan be modified to dispose of the contaminated materials in an appropriate off-site facility and that the contaminated materials could be treated on-site, but inside a building to reduce any potential emissions. Also, Representative Straus supported Alternative No. 6 for the site groundwater, natural attenuation, after the contamination sources are removed. He further indicated that monitoring should be done to ensure that the cleanup goals are being achieved and if not, then further remediation performed.

EPA Response

The selected remedy incorporates all the substantial concerns of Representative Straus. All contaminated materials and other waste materials will ultimately be disposed of off-site in appropriate waste disposed facilities. The use of a temporary structure or enclosure to house the treatment operation(s) will be seriously evaluated during the remedial design to reduce any potential emissions from the treatment of wastes on-site. A groundwater monitoring plan will be implemented as part of the selected remedy for the groundwater to evaluate if the remedy will be protective of the environment. Also, the Superfund statute requires that a 5 year review be conducted at sites where the remedy does not allow unlimited land use and unrestricted exposure to insure the remedy remains protective of public health and the environment.

2.3.2 Senator Mark Montigny:

Senator Montigny sent a letter dated January 24, 1999 in opposition to the Proposed Plan. Senator Montigny wanted the remedy to include proper treatment and disposal of the contaminated material off-site.

EPA Response:

The selected remedy should address most of the concerns of Senator Montigny (see Section XI Selected Remedy of this ROD).

2.4 State Government Comments

2.4.1 Commonwealth of Massachusetts, Executive Office of Environmental Affairs (EOEA), Department of Environmental Protection (DEP)

The DEP submitted written comments on the Proposed Plan and FS in a letter dated February 19, 1999.

The DEP had the following comments on the Proposed Plan.

2.4.1.1 DEP Comment 1:

The DEP stated that the proposed remedy should not be selected due to the overwhelming public opposition to the proposal and the apparent availability of other feasible and more acceptable off-site disposal options. The DEP recommended that contaminated material be sorted and characterized at the Site and that EPA select an alternative that incorporates off-site disposal to a much greater extent. Further, the DEP asked that on-site solidification should be conducted only when it is required by the off-site disposal facility. In addition, the DEP sought to have the ROD include a contingency for on-site disposal in the event that an off site facility can not be identified or the cost of disposal becomes prohibitive.

EPA Response:

The selected remedy should address most of the concerns of the DEP (see Section XI Selected Remedy of this ROD). A contingency for on-site disposal of wastes is not part of the ROD. If however, as DEP suggests, off site disposal is unavailable or the remedial costs become prohibitively expensive, then the ROD could be amended per requirements in the NCP. EPA anticipates that the selected remedy in this ROD can be implemented without any significant changes.

2.4.1.2. DEP Comment 2

Waste volumes need to be accurately calculated so the appropriate decision about disposal can be made. A clearer decision flow chart for determining which wastes will be taken off site without solidification, which wastes will be solidified and left on site, and which will be solidified and taken off site should be developed early in the design process.

EPA Response:

Waste volumes and characteristics will be better defined during Remedial Design and further refined during the remedial action. A description of the excavation, treatment, and disposal of waste and contaminated media is in Appendix C of the ROD. Table C-1 and Figure C-1 provides more details of the disposal of the wastes.

2.4.1.3. DEP Comment 3

There are no treatment standards for the solidification technology. Also, the descriptions of the waste sorting and characterization processes do not mention contaminant levels for disposal facilities.

EPA Response:

Treatment standards will be established based on the requirements of disposal facilities and the type of treatment selected. See EPA Response 2.4.1.2 regarding description of the waste sorting and characterization.

2.4.1.4. DEP Comment 4

The bioavailability studies should include clear criteria for decisions on whether marsh sediment should remain in place or should be excavated. The cost estimates should include a cost range, considering no marsh remediation to full remediation.

EPA Response:

The purpose of the bioavailability studies is to determine the extent for remediation in the Marsh Area. EPA will include the Natural Resource Trustees (NOAA, U.S. FWS, and EOEA) and DEP in any decision regarding the Marsh Area. The cost estimates were based on the cost of full remediation of the Marsh Area. However, the final remedial cost is expected to be less if less marsh remediation is done.

2.4.1.5. DEP Comment 5

The Operation and Maintenance (O&M) cost estimates and requirements are not shown for the combined alternatives in the FS nor the Proposed Plan. It is difficult to compare alternatives without this cost estimates.

EPA Response:

While it is difficult to compare O&M costs in the Proposed Plan since the O&M cost information was in the FS (Weston, 1998b), Section X. of the ROD has a comparison of the alternatives which includes the O&M costs for all the combined alternatives.

2.4.1.6. DEP Comments 6 and 7

Concerns with the on-site disposal area in the Proposed Plan.

EPA Response:

The disposal of waste will be off-site, so issues related to on-site disposal will not be addressed in this Responsiveness Summary.

2.4.1.7. DEP Comment 8

How will the high concentrations of organics (221 ppm) found in the groundwater at one location be addressed?

EPA Response:

It is expected, because the organics are co-located with other metal contaminants, that the selected remedy will remove the all contamination at this location (Well MW-5). Since the main organic is toluene and it is lighter than water, it is expected this type of contamination will be removed by excavating the source (the contaminated soils); the excavation of soils will go down where the groundwater resides. Figure 3 shows the approximate extent (depths and locations) of excavation for the remedy.

2.4.1.8. DEP Comment 9

The cleanup levels do not address the 0 to 2 feet of soil outside the building in the Commercial Area. Also, some of the cleanup levels presented in the Proposed Plan are not the same as those presented in the FS. The PCB levels, for example, change from 0.87 ppm in the Study to 10 ppm in the Plan.

EPA Response:

The cleanup levels in the ROD are for the total Commercial Area (0-2 feet and >2 feet depths). The sampling in the RI indicates that very little, or any, additional remediation will be required outside the former building area. The PCB cleanup level (10 ppm) in the ROD is based on the EPA PCB Policy (EPA Directive 9355.4-01-FS, "A Guide on Remedial Actions at Superfund Sites with PCB Contamination" 1990) and is a level that EPA has determined is protective. Because of the PCB and other contaminants are co-located, the estimated volumes of contaminated soils to be remediated will not change.

2.4.1.9. DEP Comment 10

Identify those areas of contamination which are not going to be included in the remedial action, for example wastes or areas potentially contaminated with petroleum.

EPA Response:

See Figure C-1 for the locations of excavation. Under CERCLA, petroleum is specifically excluded in the definition of hazardous substance, and as such, EPA is not authorized to address the release or threat of release of petroleum. Thus, the locations with contaminated petroleum were not identified in the RI, FS, nor Proposed Plan.

The DEP had the following comments on the FS.

2.4.1.10. DEP General Comment

The FS determines volumes of contaminated soils for different Site locations. The costs for all remedial alternatives are based on these volume estimates. The volume estimates are a result of assumptions about results of laboratory analyses for the contaminated soil samples. In several instances problems were found with the assumptions, inconsistencies in how the assumptions were applied and errors in how the costs were calculated. The volume estimates and costs should be thoroughly checked prior to the issuance of the Proposed Plan and the ROD. Also, sensitivity analysis may show clearly the degree to which the costs for each remedial alternative may vary depending on the outcomes of the recommended analytical protocols.

EPA Response:

The cost estimates for the source removal (see Table 17) were modified based on the changes to the disposal of the waste materials. The cost estimates have ranges of -30% to +50% which should account for any variability in the quality of assumptions and their application.

2.4.1.11. DEP Comment 1

Assumption for the volumes of waste disposed are not defined in the FS.

EPA Response:

The assumption for the waste volumes are shown in Appendix C of the ROD.

2.4.1.12. DEP Comment 2

Several errors were found in Figures and Tables that effect the final costs for SWD-4 remedial alternative.

EPA Response:

The cost estimates for the source control portion were updated for the ROD and are shown on Tables 15 in the ROD.

2.4.1.13. DEP Comment 3

The Cost Tables referenced in Section 5 of the FS and used in evaluating the CA, SWD, and MSS remedial alternatives in a number of instances repeat costs for the same activities.

EPA Response:

Each alternative in the FS was a stand alone alternative (i.e. each alternative could be implemented without other alternatives from other Site areas). The cost estimated in the Proposed Plan did not repeat cost when alternatives from the different Site areas were combined. The cost estimates for the source control portion of the selected remedy were updated for the ROD and are shown on Table 15 in the ROD.

2.4.1.14. DEP Comment 4

In the FS, complicated plans for handling contaminated soil, involving excavation, sorting, grinding, decontamination, screening, sampling, field and laboratory analyses, can only be inferred from the Remedial Process Flow Sheets and Cost Tables. The Remedial Design should clearly explain the on-site waste handling, field, and laboratory sampling and analyses plans.

EPA Response:

The description of the excavation, treatment, and disposal of waste and contaminated media is in Appendix C of the ROD. The Remedial Design will have all the appropriate plans to successfully complete the remedial action.

2.4.1.15. DEP Comment 5

There is no discussion in the FS pertaining to the content of the treatability study. The FS should at least describe the scale of the anticipated investigation. The cost of this study should be estimated and considered together with other implementation costs for each on-site treatment alternative.

EPA Response:

In the FS (page 5-12), there was a discussion of the stabilization/solidification treatment technology that the Treatability Study will be based. The Treatability Study will be performed in accordance with the Guide for Conducting Treatability Studies Under CERCLA, EPA/540/R-92/0719, October 1992. The cost for the Treatability Study is included as part of the engineering costs on Table 15 of the ROD.

2.4.1.16. DEP Comment 6

It is not clear from the FS why this spatial orientation (location) for the disposal area was chosen.

EPA Response:

The disposal of waste will be off-site, so issues related to on-site disposal will not be addressed in this Responsiveness Summary.

2.4.1.17. DEP Comment 7

The need for marsh remedial actions does not appear to be supported by an adequate soil characterization. The RI indicates that only three soil samples were taken and analyzed in the Marsh Area, close to the CID boundary. The FS Sections 1.2.5.3, 2.3.3, which should pertain to the Marsh Area, are descriptions of risk assessments pertaining to the Boys Creek sediments. While the FS does state that a bioavailability study for the area is needed, the Proposed Plan and the ROD should be explicit in stating that the need for the design and implementation of the chosen remedial alternative for this area is contingent on further soil characterization.

EPA Response:

In Volume 4 of the RI, there is a report of the extensive field screening that was done of the Marsh Area that supports the need for remedial action in the Marsh Area. Further sampling and a bioavailability study will be performed to better define the areas requiring excavation.

2.4.1.18. DEP Comment 8

The FS does not address the localized contamination of groundwater by organics.

EPA Response:

See Response 2.4.1.7 regarding cleanup of organics in the groundwater.

2.4.1.19. DEP Comment 9

During the Remedial Design, additional wetland mitigation, restoration and monitoring options should be explored for the remediated marsh areas. Excavated areas should have detailed mitigation, restoration and monitoring plans prepared with DEP staff involved in design review. Some of the present recommendations include: taking of additional soil cores to better determine extent of hydric soils, reseeding of hard shell clam beds, increasing culvert size through the hurricane barrier, examining the use of filter fabric, sand or military sheet metal tracks for temporary roads during remediation.

EPA Response

The issues raised in this comment are Remedial Design issues and will be addressed in the

Remedial Design.

2.4.2 Commonwealth of Massachusetts, Executive Office of Public Safety

Richard Grelotti, Undersecretary of Public Safety, sent a letter dated January 26, 1999 forwarding a letter sent to the Office of Public Safety by the Fairhaven Board of Selectmen. This commenter stated that his office does not have any jurisdiction over this environmental issue.

EPA Response

EPA received the same letter sent to Office of Public Safety by the Fairhaven Board of Selectmen. See EPA's response to the Fairhaven Board of Selectmen (see Response 2.2.2).

2.4.3 Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Office of Coastal Zone Management

Margaret Brady, Director, Office of Coastal Zone Management, sent a letter dated February 19, 1999. This commenter had the following issues: placement of treated material in wetlands; flooding of disposal area; inadequate identification of waste volumes; lack of groundwater treatment; and contamination impact to shellfish.

EPA Response

The selected remedy should address most of the concerns of Director Brady (see Section XI Selected Remedy of this ROD). All contaminated materials and other waste materials will be disposed of off-site in appropriate waste disposal facilities. Waste volumes were estimated from the RI sampling. Further sampling will be performed to better determine the exact areas and amount of wastes that needs to be remediated. During remediation, confirmation sampling will be done to ensure that all areas above the cleanup goals are excavated. It is estimated that the contaminants in the groundwater will meet the groundwater cleanup goals about ten years after the contamination is removed. Thus, the additional expense to perform active treatment of the groundwater would be unnecessary. If after ten years, the groundwater is not approaching the cleanup goals, EPA would have to consider other actions that may be necessary to ensure that the remedy is protective of public health and the environment.

2.5 Congressional Comments

2.5.1 Senator John Kerry and Congressman Barney Frank

Senator Kerry and Congressman Frank prepared written comments dated January 20, 1999 which were read by Elsie Sousa at the public hearing on February 11, 1999. Senator Kerry and Congressman Frank had the following questions. What are the depths and levels

of contamination? How do concentrations compare to toxicity standards? What is the extent of remediation? What is the fate and transport rate of pollutants in the groundwater? How can cleanup standard be set, if bioavailability study is not done until after the majority of the contaminants are removed? Can the levels be modified once the study is completed, and if done, what is formal process for modifying those standards? Senator Kerry and Congressman Frank had the following concerns: the location of waste disposal and the permanence of the treated materials

EPA Response

The selected remedy should address most of the concerns and answer the questions of Senator Kerry and Congressman Frank (see Section XI Selected Remedy of this ROD). The depth and levels of contamination are in the Section 4 of RI report and summarized in Section V. of this ROD. The fate and transport of the contamination are addressed in Section 5 of the RI. In summary, the contamination leaches from the source areas into the groundwater then into the surface water in Boys Creek. The approximate extent of remedial excavation are shown in Figure 3 of the ROD. The cleanup levels in the Marsh Area were calculated based on the risk to ecological receptors. Representatives of NOAA and USFWS provided significant input to EPA's establishment of ecological cleanup goals in this ROD. The bioavailability study will be performed as part of the Remedial Design and will be completed before any excavation of soils and sediments in the Marsh Area. If the cleanup standards or remediation areas are modified as a result of the bioavailability study, they will be modified with input from representatives of NOAA and USFWS, and in consultation with DEP. Any significant or fundamental change to the selected remedy will be documented in an Explanation of Significant Differences (ESD) or ROD amendment respectively.

2.6 Federal Agencies

2.6.1 National Oceanic and Atmospheric Administration (NOAA)

NOAA is one of two federal natural resource trustees at this Site. NOAA prepared written comments, dated December 8, 1998, endorsing the Proposed Plan. NOAA's specific comments were as follows. If contaminants are available in the wetland and salt marsh areas, then they should be removed. Any wetland and salt marsh areas should be restored if any excavation of soils and sediments were to occur. Treatment was favored because the contaminants would be permanently contained. On-site disposal was favored because it would provide cost saving compared to off-site disposal, and therefore provide potential funding for any wetland salt marsh replacement. NOAA would like to participate in planning a post-remedy monitoring program and asked that the baseline sampling begin soon after the ROD is approved.

EPA Response

EPA appreciates NOAA's support for the Proposed Plan. The final remedial selection was modified as previously noted based on other comments received. The selected remedy does include the items that were of concern to NOAA. A bioavailability study will determine the extent of necessary wetland and salt marsh removal. The impacts on the on-Site wetlands, floodplains and riverfront areas as a result of the selected remedy will be mitigated. Contaminated materials will be treated in some instances and will be removed off-site for proper treatment and disposal. EPA appreciates NOAA's offer to participate in planning a post-remedy monitoring program. EPA will contact NOAA about this and other site related issues. The baseline sampling will begin as soon as possible after the design of the remedy.

2.7 Atlas Tack Corporation's Comments

The Atlas Tack Corp., one of the parties sent a General Notice of Liability, submitted written comments in four letters to EPA. Kevin O'Connor (Hermes, Netburn, Sommerville, O'Connor & Searing, P.C.), who is an attorney representing the Atlas Tack Corp., sent a letter dated January 27, 1999 and provided oral comments at the public hearing on February 11, 1999. Martin Legg, who is also an attorney representing the Atlas Tack Corp., sent a letter dated February 19, 1999. Leonard Lewis, President of Atlas Tack Corp., sent formal comments dated February 19, 1999. Legg sent additional formal comments dated March 11, 1999. The last letter was sent after the comment period, but is included because it assists EPA in responding to Atlas Tack's comments.

Atlas Tack provided comments on the draft FS (dated April 20, 1998), draft final FS (Weston, 1998b), "Ecological-Based Cleanups Goals" (Weston, 1997b), "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Clean-Up Levels" (Weston, 1998a), "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels" (Weston, 1998c), and the Proposed Plan. Several of Atlas Tack's comments were repeated in various places. EPA is responding only once to any comment. If a comment is repeated, the comment has been nonetheless noted, but a reference has been made to the response to the earlier comment.

2.7.1 Kevin O'Connor letter dated January 27, 1999

This commenter wrote confirming the date of the public meeting and hearing, and asked for an extension of the public comment period.

EPA Response

Notices for all meetings were sent to the Atlas Tack Corp. EPA extended the public comment period twice, first from December 31, 1998 to February 1, 1999, then to February 19, 1999.

2.7.2 Martin Legg letter dated February 19, 1999

This commenter wrote that he is counsel to Lewis, both personally and in his capacity

as the president of the Atlas Tack Corp. This commenter asked that EPA include as part of the Administrative Record the report and comments from Lewis dated February 19, 1999.

EPA Response

The materials submitted by Lewis have been included as part of the Administrative Record for this ROD (see Appendix B Administrative Record Index).

2.7.3 Kevin O'Connor oral comments at the Public Hearing on February 11,1999

This commenter's comments included the following. Atlas Tack was going to present a detailed set of comments to EPA about the technical issues and that these would be available to anyone who wanted them. Atlas Tack characterized EPA's conclusions that the Site does not present a public health risk. The Atlas Tack consultants concluded that EPA's ecological risk assessment is not correct.

EPA Response

EPA does not agree with Atlas Tack's contention that the Site does not pose any risk to human health or the environment. The risk assessments performed for EPA indicates there is a risk to both human health and the environment (see Section VII. Summary of Site Risks).

2.7.4 Lewis sent a letter dated February 19, 1999, titled "Formal Comments of Atlas Tack Corporation to Proposed Plan, Remedial Investigation and Feasibility Study." Comments included: (1) a letter dated February 19, 1999 from O'Connor and (2) "Comments on Proposed Cleanup Plan" prepared by Rizzo Associates, Inc. and Menzie-Cura & Associates, Inc.

There were no substantive comments in this commenter's letter.

EPA Response

No response is needed.

2.7.4.1 O'Connor's letter dated February 19, 1999

This commenter's letter dated February 19, 1999 had the following comments.

2.7.4.1.1 O'Connor General Comment #1

EPA's proposed plan will involve the expenditure of between $17 million and $30 million, a truly massive expenditure, without regard to who pays it or the amount spent at other Superfund sites.

EPA Response

As discussed within the Draft Final Feasibility Study (FS) (Weston, 1998b) on Page 2-1, "EPA must select a cost-effective remedial alternative that effectively mitigates and minimizes threats to, and provides adequate protection of, public health and the environment." As part of the analysis of remedial alternatives, EPA has used nine criteria for the evaluation of remedial alternatives (see 40 CFR 300.430(e)(9)(iii)) that consist of:

1. Overall protection of human health and the environment,
2. Compliance with ARARs,
3. Long-term effectiveness,
4. Reduction of toxicity, mobility, or volume,
5. Short-term effectiveness,
6. Implementability,
7. Cost,
8. State acceptance, and
9. Community acceptance.

As discussed in Section XII.C. of the ROD, and in accordance with 40 CFR 300.430(f)(1)(D) of the NCP, EPA has determined that the selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. Within Section 4 (Development and Screening of Alternatives) and Section 5 (Detailed Analysis of Alternatives) of the FS, cost was considered for all alternatives. However, there is no requirement within the National Contingency Plan that directs EPA to make its remedy decisions based on who pays for the remedy or on how much money has been spent at other Superfund sites. Instead, EPA must use all nine criteria for evaluation to select a remedy.

2.7.4.1.2 O'Connor General Comment #2

EPA has proposed that plan based upon its review and analysis of data that is at least seven and as much as thirteen years old. No data is relied upon that was gathered at the Site after 1992.

EPA Response

The majority of data collected during the Remedial Investigation (RI) (Weston, 1995) took place in 1991 and 1992. It is not uncommon for data to be several years older by the time the proposed plan is published and prior to the initiation of remedial action. The NCP requires that data collected during the RI be sufficient to adequately characterized the Site for the purpose of developing and evaluating effective remedial alternatives. EPA believes that the data gather during the RI are still sufficient to adequately characterize the Site since the contaminant concentrations currently present at the Site have not substantially changed since the RI because no remediation (i.e., no removal and/or treatment of contamination) has occurred and the contamination have not migrated enough to reduce the contaminant concentrations at the Site to below the cleanup levels. Atlas Tack's recent very limited groundwater data (see Response Number 2.7.4.1.6 for discussion) shows that the Site groundwater is still contaminated above cleanup goals. Thus the Site still poses a risk to human health and the environment, thereby requiring a remedy. It should be noted however that EPA will, as part of the selected remedy (see Section XI.C.1.a.of the ROD for explanation), further sample the soils and sediments and perform a bioavailability study in the Marsh Area during Remedial Design to better define the remediation areas, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland, or riverfront area.

2.7.4.1.3 O'Connor General Comment #3

EPA has determined that, with the exception of one specific location, the Site does not pose any unacceptable human health risk whatsoever. That one location is inside a covered manhole in the building and is based upon exposure to that area by a maintenance worker every day for a period of years, an extremely unreasonable exposure scenario. The contamination at the Site does not pose a health risk to the residents of the Town of Fairhaven.

EPA Response:

EPA has determined that there is an unacceptable human health risk at this Site (see Section VII. Summary of Site Risks). EPA followed the RI/FS and risk guidances (see Appendix B: Administrative Record Index for complete list of guidances, which includes: "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," dated October 1, 1998; "Interim Final Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)," dated December 1, 1989; "Interim Final Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual Supplemental Guidance: Standard Default Exposure Factors," dated March 25, 1991; and "Supplemental Guidance to RAGS: Calculating the Concentration Term," dated May 1, 1992) regarding site assessment and calculation of risk at the Site. Because of the time between the start of the RI and the release of the Proposed Plan, EPA had the risk assessment updated before issuing the Proposed Plan with the most up-to-date risk factors (i.e. RfD values, cancer slope factors, etc.). In following the risk guidances (noted above), the EPA did not base the cleanup goals on one location. The cleanup goals were based on data from thoughout the Site. For the Commercial Area, the risk was based on data from this area and not one selected location.

It is EPA's practice to present a conservative representation of risk (reasonable maximum exposure). The reasonable maximum exposure (risk) is defined as "the highest exposure that is reasonably expected to occur at a site" ("Risk Assessment Guidance for Superfund (Part A)," page 6-5). The RME is intended to be "well above the average case that is still within the range of possible exposures" ("Risk Assessment Guidance for Superfund (Part A)," page 6-5).

The results of a single sample, while they influence the computation of the 95% upper confidence limit of the mean exposure point concentration, are just one of all the sample results incorporated. EPA's logic for using the 95% UCL of the mean is provided in "Supplemental Guidance to RAGS: Calculating the Concentration Term," where it states, "Statistical confidence limits are the classical tool for addressing uncertainties of a distribution average. The 95% UCL of the arithmetic mean is used as the average concentration because it not possible to know the true mean." EPA did not perform a risk assessment on the maximum reported soil concentrations. The only time this is done is when there is such heterogeneity in the data rendering the 95% upper confidence limit on the mean concentration greater than the maximum reported value. In which case, it is EPA practice to utilize the maximum reported concentration.

2.7.4.1.4 O'Connor General Comment #4

The ecological risks identified by EPA are based upon a screening level risk assessment, not the detailed and validated, site-specific risk assessment required by CERCLA and the NCP as a basis for remedy selection decisions. The RI did not collect the type or quality of data necessary to perform or validate the required site-specific risk assessment.

EPA Response

The ecological risk assessment performed as part of the RI program was based upon a comprehensive field sampling program that complies with the NCP requirement (40 CFR 300.430(d)(4)) for conducting site-specific risk assessment as a basis for remedy selection decisions.

During the RI (1990-1995), in cooperation with the National Oceanographic and Atmospheric Administration (NOAA) and United States Fish and Wildlife Services (USFWS), EPA conducted a preliminary screening of metals in the sediments and soils of the streams and wetlands of Boys Creek Marsh in the vicinity of the Site. Additional sediment and soil samples were collected from Girls Creek Marsh and West Island Marsh as potential near-field and far-field reference locations. The results of this screening investigation were used to select subsequent sampling locations within the Boys Creek Marsh. The final report of this 1990 screening investigation is located within Appendix F of the RI (Weston, 1995). On August 9, 1991 and April 11, 1992, a total of 17 sediment samples were collected, 15 in Boys Creek, one near-field reference in Girls Creek and one far-field reference at West Island. In addition, a total of 14 surface water locations were collected on August 9, 1991 and April 10th through 12th, 1992. The surface water samples collected were: 11 in Boys Creek, 2 in Girls Creek, and one at the West Island reference station.

Not only did EPA collect a number of site-specific surface water and sediment samples during the RI, but 10-day sediment toxicity tests were performed using both the marine and freshwater amphipods, *Ampelisca abdita* and *Hyalella azteca*. Other biological tissue samples were collected for chemical analysis included; the fish species, Fundulus heteroclitus, and three bivalve species, *Geukensia demissus* (ribbed mussel), *Mya arenaria* (soft-shell clam) and; *Mercenaria mercenaria* (hard-shell clam). In addition, a fish community analysis, wildlife habitat assessment and wetlands delineation and functional assessment were performed in support of the ecological risk assessment.

Therefore, various site-specific physical, chemical, and biological samples were collected, analyzed and evaluated as part of the ecological risk assessment. In an attempt to better characterize those site-specific ecological risks, EPA as part of a technical review team including representatives from the NOAA, USFWS, and the Corps of Engineers New England Division (CENED) worked together to develop an approach for selecting ecological-based cleanup goals. This approach is outlined in the document titled "Ecological-Based Cleanup Goals, Atlas Tack Superfund Site, Fairhaven, Massachusetts" (Weston, 1997), which EPA relied on in completing the FS, Proposed Plan, and this ROD.

Furthermore, EPA will collect additional site-specific data as part of Remedial Design. A Bioavailability Study will be performed that will verify the bioavailability of divalent inorganics to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland, or riverfront area.

Lastly, EPA recognizes the rapidly evolving field of ecological risk assessment and the recent release of EPA's "Guidelines for Ecological Risk Assessment" dated 1998 and EPA's "Guidance for Designing and Conducting Ecological Risk Assessments for Superfund" dated 1998. However, the use of these recent guidance documents would not change EPA's decision to develop remedial action objectives to mitigate existing and potential threats to those ecological receptors found to be at substantial risk from exposure to site-related contaminants.

2.7.4.1.5 O'Connor General Comment #5

Even under this minimal level of risk analysis, EPA concluded that much of the ecological risk at the Site was due to conditions that are naturally occurring or unrelated to the Site. The Remedial Investigation states, "RAOs addressing ecological receptors will be very difficult to attain, but it appears a significant portion of the estimated ecological risk is due to conditions which may be naturally-occurring or which may not be site-related." RI at p. 7-15. The remedy proposed by EPA cannot cure conditions that either are naturally occurring or are not related to the Site.

EPA Response

EPA has selected a remedy based on the protection of human health and the environment from the contaminants found at this Site. EPA is required to assess (as it did for this Site) the risk from all chemicals at a site, even if it is unclear how certain chemicals came to be located at a site. All cleanup goals at this Site are, however, based on contaminants found at the Site. The soil cleanup in the Commercial Area is based upon the contamination of metals (arsenic, copper, lead, and zinc), cyanide, PAHs, and PCB (Arochlor 1260), which were all found at high concentrations in the manufacturing areas (most of which there formerly was a building) of the Site. The soil/sediment cleanup in the Non-Commercial Areas (Debris, Marsh, and Creek Areas) is also based upon the contamination of metals (antimony, cadmium, copper, lead, and zinc), cyanide, and DDT. The contamination from the metals, cyanide, PAHs, and PCB is associated with the manufacturing processes and/or improper disposal at the Site. The contamination of DDT could have been due to improper disposal or application of insect control at the Site. Because DDT is co-located with the rest of the Site contaminants, however, the soil cleanup volume does not change if DDT were eliminated as a contaminant to be remediated. Also, there are no sediment cleanup levels for DDT or PCBs in Boys Creek; thus the Site's risk was not influenced by sources of DDT or PCBs originating off-site. The Site groundwater cleanup goals are for metals (cadmium, copper, lead, and zinc), and cyanide, which were all found in the manufacturing areas and soils at the Site. No cleanup levels at this Site are have been developed for contaminants originating solely from off-site sources nor are they below any background levels.

Regarding the Atlas Tack's comment regarding the statement from the RI, this excerpt takes the RI out of context. The language is from Section 7.5 Preliminary Remedial Action Objectives of the RI (Weston, 1995) and is only a preliminary discussion of the cleanup objectives. The beginning of Section 7.5 states that: "The RI, including the Risk Assessment, is one step in the decision-making process leading to selection of a remedy for the Atlas Tack Site. The step immediately following completion of the RI will be the FS, including an evaluation of remedial alternatives. The first step in the FS process is establishment of Remedial Action Objectives (RAOs)." Furthermore, the last paragraph on Page 7-14 is not completely cited in Comment #5. The paragraph states the following: "The preliminary RAOs presented above require further review and definition in the initial phase of the FS. As mentioned above, identification of ARARs will be a critical activity prior to the finalization of the RAOs. RAOs addressing ecological receptors will be very difficult to attain, but it appears a significant portion of the estimated ecological risk is due to conditions which may be naturally occurring or which may not be site-related."

Therefore, prior to preceding with the FS, EPA developed a Technical Memorandum Remedial Alternatives Screening (Weston, 1997b). Within this document, the technical review team (EPA, NOAA, U.S. FWS, Weston, and CENED) spent a considerable amount of time and effort developing a protocol for the development of ecological-based cleanup goals. Appendix D within this document identifies several comments and revisions to this protocol. The final protocol was draft in November of 1997 and this was integrated into the Draft Final FS. Within the FS, Page 2-20 states: "Table 2-5 also presents background soil data for metals. It is not feasible to achieve a cleanup goal that is lower than background, therefore the ecological risk-based concentrations (ERBCs) for each metal were compared to background for the metal. The derivation and limitations of the background soil values is presented in Section 2.3.1 [of the FS]."

From the information presented within the FS, it is quite clear that EPA is not proposing to cure conditions that are neither naturally occurring nor non-site related.

2.7.4.1.6 O'Connor General Comment #6

The sampling and analysis performed at the Site by Atlas Tack in 1998 and 1999 show

that EPA's assessment of risk to the environment and its FS were based upon assumed contamination levels and assumed exposure pathways that do not exist. Most importantly, the recent testing performed by Atlas shows that contamination at levels above EPA's cleanup goals is not leaching into groundwater and traveling from the fill area to the wetland areas of the Site. Based upon this information, EPA needs to reconsider what it has proposed as a remedy at the Site.

EPA Response

EPA is not convinced that it ought to reconsider its remedy based upon the information cited in this comment. EPA has collected sufficient data to characterize the Site, and determine the ecological and human health risks presented by this contamination. In an effort to evaluate the potential future exposure scenarios to human and ecological receptors, EPA made predictions based on historic data and complete exposure pathways (see Sections V., VI., and VII. of the ROD). The confirmation of these data will be taken care of during Remedial Design or as part of long term monitoring.

A review of Atlas Tack's recent (1998-1999) data along with EPA's previous data, shows that this Site still poses a risk to the environment due to the migration of contaminants into the groundwater. Atlas Tack's selection of wells sampled was not sufficient to adequately characterize the current Site conditions nor the risks at the Site.

First, when EPA did the RI sampling, a rigorous Quality Assurance/Quality Control (QA/QC) program was performed. The Atlas Tack sampling did appear to have some QA/QC but was not up to the same standards as EPA's sampling. Even assuming that the Atlas Tack sample results are unassailable, EPA has issues with Atlas Tack's sampling and analysis. Atlas Tack never sent, with their responses, a map that indicates where their wells were located. Most of the wells sampled could be located based upon work done in the RI as shown in Figure 3-1 (Weston, 1995), but locations for wells AT-200 and SB-711 could not be determined.

Second, Atlas Tack limited its sampling to the following wells: AT-1 (on north side of former lagoon area); 521 (east of former lagoon); MW-1 (east of the Filled Area); MW-3 (in Marsh Area, east of the Filled Area); 517 and 604 (on the Hathaway Braley property portion of the Site); and SB-711 and AT-200 (two wells not apparently sampled during the RI). Atlas Tack did not sample inside the building (wells AT-11 and AT-12). EPA's sample of well AT-11 was higher than the cleanup goals for copper (filtered and unfiltered samples) and cyanide (filtered and unfiltered samples). Atlas Tack did not sample just outside the building (wells AT-103 and 606 [a bedrock well]). EPA's sample of well AT-103 was higher than the cleanup goals for copper, zinc, and cyanide (all filtered and unfiltered samples). EPA's sample of bedrock well 606 was higher than the cleanup goals for zinc (filtered and unfiltered samples). Atlas Tack did not sample the former lagoon area well MW-5. EPA's sample of well MW-5 was higher than the cleanup goals for cadmium, copper, lead, zinc, and cyanide (all unfiltered samples); and cadmium, zinc, and cyanide (all filtered samples). Atlas Tack did not sample the Filled Area (well MW-8). EPA's sample of well MW-8 was higher than the cleanup goals for copper, lead, and cyanide (all unfiltered samples); and cyanide (filtered sample).

Atlas Tack selected, for at least half their wells, locations where the contaminants were limited or known not to be located. Wells 617 and 604 (both on the Hathaway Braley property) and well MW-3 did not have contamination levels above the cleanup levels even when EPA sampled them during the RI. Well MW-1 had contamination levels above the cleanup levels in just the 1991 round of EPA sampling. Well SB-711 location is unknown and did not appear to have any groundwater contamination. On Table 2, of the Atlas Tack response letter dated March 11, 1999, an average of sample results only from the wells that Atlas Tack recently sampled (1998-1999) were included as evidence that the groundwater levels have been reduced to acceptable levels.

Third, Atlas Tack's own sampling results indicate that there is still a risk from the Site contamination to the environment. Well AT-1 had a copper concentration (1,000 ug/L) in the unfiltered sample significantly above the cleanup goal of 31 ug/L. Also, well AT-1 had a cyanide concentration (10 ug/L) in the filtered sample at the cleanup goal of 10 ug/L. Well 521 had a zinc concentration (2,600 ug/L, unfiltered sample and 2,000 ug/L, filtered sample) and Well AT-200 had a zinc concentration (870 ug/L, unfiltered sample) above the cleanup goal of 810 ug/L for zinc. Well AT-200 had a copper concentration (1,100 ug/L, unfiltered sample), cyanide concentration (12 ug/L, filtered sample), and lead concentration (110 ug/L, unfiltered sample) above the cleanup goals of 31 ug/L for copper, 10 ug/Lfor cyanide, and 81 ug/L for lead. It is evident from the Atlas Tack sampling results that this Site still has significant groundwater contamination at some locations.

Fourth, EPA notes that Atlas Tack did not provide any soil, sediment, or surface water sample results with their response. Part of the risk to environment is attributable to the migration of contamination directly via surface water runoff from the Filled Area to Boys Creek. The migration of contamination, and thus risk, is not exclusively by groundwater into Boys Creek. See Response Number 2.7.4.9.13 for additional response regarding this point.

Fifth, Atlas Tack provided its own plant sample results which indicate that there is not an uptake of contamination into plants and thus plants are not a risk to other biota. Atlas Tack did not provide plant sampling locations, nor the soil and sediment contamination concentrations at those plant sampling locations. It is impossible to determine the exact locations of the plant and shellfish samples from the Sampling Photographs or Site Map. Thus, there is no way to determine from Atlas Tack's information if these plants are in locations with contaminated soils. Thus it cannot be determined what if any risk these plant samples may pose to the species at the Site. Also, the risk from ingestion of plants by animals is not just from contamination in plants, but from the contamination in the soils or sediments that are attached to the plants. As long as there is contamination in the soils and sediments (which there still is at this Site), animals are at risk from eating plants at this Site irrespective of the presence of contamination in the plants.

2.7.4.1.7 O'Connor General Comment #7

The FS should have included consideration of a remedy principally involving placement of an impermeable cap over necessary areas of the Site. That remedy would provide all of the environmental benefits of the proposed plan, but at a much lower cost. That precise sort of remedial action was being discussed between Atlas Tack and DEP ten years ago when the Site first became part of the Superfund process. Rizzo Associates estimates that such a remedy could be implemented at the Site for less than $1.0 million.

EPA Response

Capping of this Site was included in the screening of technologies in the "Identification and Screening of Technologies" in Section 3 of the FS. However, capping was not retained as a technology because it is not protective of the environment for this Site. EPA disagrees with Atlas Tack's assertion that capping would provide all of the environmental benefits of the Proposed Plan. Since contamination exists below the groundwater table, without source removal, contaminants would still be in contact with the groundwater even after a cap is placed over the waste areas. Even if the contamination was capped, the groundwater under the cap would still migrate into the surface water and be a threat to the environment. Also, to ensure the cap's adequacy, on-site wetlands will have to be destroyed, without the possibility of on-site wetland mitigation. This is not consistent with the Federal Executive Orders 11990 and 11988 which must be complied with under the Superfund law. A part of Boys Creek would have to be relocated since some of the waste locations are next to this Creek. EPA cannot respond to Atlas Tack's estimate of $1 million to cap this Site, since Atlas Tack did not provide cost documentation nor details regarding its capping proposal.

2.7.4.1.8 O'Connor Specific Comment #1

The Proposed Plan, RI, and FS are not consistent with the NCP because the Site should not have been included on the National Priorities List.

EPA Response

This Site was properly placed on the National Priorities List (NPL) in accordance with all necessary legal requirements. Challenges to NPL listings can only occur during the listing process which ended many years ago.

2.7.4.1.9 O'Connor Specific Comment #2

The RI conducted by EPA did not comply with the NCP.

EPA Response

See Response Numbers 2.7.4.1.9.1 (2.7.4.1.9.1 through 2.7.4.1.9.1.4) and 2.7.4.1.9.2.

2.7.4.1.9.1 O'Connor Specific Comment #2.1

EPA did not gather the necessary information.

EPA Response

According to Section 300.430(d) of the NCP, "the purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." EPA did gather sufficient data and information to satisfy this purpose and otherwise conducted the RI in full compliance with the NCP and the above-stated purpose.

2.7.4.1.9.1.1 O'Connor Specific Comment #2.1.1

No soil samples were taken in the vast majority of the marsh areas proposed as areas for excavation and treatment.

EPA Response

During the RI, a significant amount of data from the Marsh Area was collected, evaluated, and analyzed. These data included specific soil/sediment samples and screening level data, which are discussed in the Response Number 2.7.4.1.4, the RI (Weston, 1995), and the Ecological-Based Cleanup Goals Technical Memorandum (Weston, 1997b).

2.7.4.1.9.1.2 O'Connor Specific Comment #2.1.2

EPA's plan to conduct "bioavailability studies" on marsh surface soils as part of Remedial Design should instead have been conducted as part of the RI.

EPA Response

EPA typically predicts the exposure to contaminants and their effects on ecological receptors through food chain modeling at the time the RI is conducted, without the performance of bioavailability studies. EPA believes that the data gather during the RI were and still is sufficient to adequately characterize the Site since the contaminant concentrations currently present at the Site have not substantially changed since the RI; thus the Site still poses a risk to the environment, thereby requiring a remedy (see Response Number 2.7.4.1.2 for further discussion). However, obtaining additional information on the acid-volatile sulfide and simultaneously extracted metals concentrations within the marsh surface soils will lead to determining whether the divalent metals, cadmium, copper, lead, zinc and nickel are bioavailable to those organisms in direct contact with them. EPA will collect additional site-specific data as part of Remedial Design. A Bioavailability Study will be performed that will verify the bioavailability of those divalent metals to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland, or riverfront area. EPA believes this is a prudent next step although it is also believes that the areas and overall volumes designated for remediation in the ROD will not change substantially as a result of this study.

2.7.4.1.9.1.3 O'Connor Specific Comment #2.1.3

EPA failed to establish the pathway for the significant transport of dissolved metal contamination via groundwater from the fill area and other upland areas of the Site to surface water in the wetland and marine areas.

EPA Response

EPA disagrees with the contention that the transport of contaminants from the upland and fill areas to the wetlands/marsh via groundwater is not clearly established. Soils in the source areas, the groundwater which flows towards the wetlands/marsh areas, and the sediments and soils in the wetlands/marsh areas all have high levels of the same contaminants, which present the ecological risk at the Site (see Tables 1 to 6 for list of chemicals of concern). Further, the transport mechanisms, including leaching of Site contaminants into the groundwater resulting in their eventual migration to the surface water, have been clearly established in scientific literature and are discussed in detail in Section 5.0 of the RI (Weston, 1995).

2.7.4.1.9.1.4 Mr. O'Connor Specific Comment #2.1.4

EPA failed to include treatability studies in the RI, as required where they are necessary by the NCP and instead has proposed to include them as part of Remedial Design.

EPA Response

The NCP does not "require" the conduct of treatability studies as part of the RI. 40 CFR 300.430(a)(2) states that developing and conducting a RI/FS "generally includes" treatability studies, and 40 CFR 300.430(d)(1) states that "to characterize the site, the lead agency shall, as appropriate, conduct field investigations, including treatability studies..." At this Site, EPA has decided to conduct treatability studies as part of the design step because the "basic" technology, solidification/stabilization of soils and sediments to minimize contaminant leaching, is an existing treatment technology. Enough is known about this technology, for the purposes of the RI/FS, to estimate its costs. The treatability studies to be conducted during the design and/or the remediation will not determine if solidification/stabilization will work, but will allow EPA to select the most appropriate solidification/stabilization process. They will also provide the contractor with information specific on how effective the various chemicals and solidification/ stabilization agents will be, when applied to the soils and sediments. While the costs may be somewhat dependent upon which will be used, they should not vary substantially.

2.7.4.1.9.2 O'Connor Specific Comment #2.2

EPA did not conduct the required site-specific baseline risk assessment. Instead, EPA's risk assessments were based upon assumptions, rather than site-specific data, about exposure point concentrations, exposure pathways, exposure media, and exposure routes.

EPA Response

See Response Numbers 2.7.4.1.3, 2.7.4.1.4, and 2.7.4.1.9.1.

2.7.4.1.10 O'Connor Specific Comment #3

EPA's FS and selection of a Proposed Plan are not consistent with the NCP.

EPA Response

See Response Numbers 2.7.4.1.10.1. to 2.7.4.1.10.3.

2.7.4.1.10.1 O'Connor Specific Comment #3.1

By transferring critical data collection and evaluation processes from the RI to the RD, EPA has diminished the ability of Atlas Tack and the public to make meaningful comments on EPA's decisions.

EPA Response

EPA disagrees with this comment. It is assumed that the references to the so called "critical data collection and evaluation processes" that will take place during the RD are the bioavailability study and the treatability studies. The reasons for conducting these studies as part of the RD can be found in previous responses.

2.7.4.1.10.2 Mr. O'Connor Specific Comment #3.2

EPA has failed to identify a particular remedial technology, the volume of soils to be treated and disposed of on-site, and the areas of the Site subject to excavation.

EPA Response

With respect to source control, in the Proposed Plan, EPA identified Alternative 4, source removal with treatment and on-site disposal, as the preferred alternative. The FS clearly describes this alternative's treatment to involve solidification/stabilization. The Proposed Plan identified the total volume of wastes to be up to 58,000 cubic yards; while the FS (Weston, 1998b) identified in the figures the approximate areas to be excavated. The selected source control remedy in this ROD is a modification of Alternative 4. The ROD states: “The on-site treatment will be for materials requiring treatment for off-site disposal (estimated to be 6,000 yds^3 treated). The most appropriate treatment method(s) will be determined from the Treatability Studies. The treatment will eliminate the potential for contaminants to leach from these materials. The treatment technology(s) will most probably be some form of solidification/ stabilization.” The selected remedy calls for all disposal to occur off-site (see Section XI. Selected Remedy). The areas to be remediated (excavated) are identified in Figure 3 of the ROD.

2.7.4.1.10.3 O’Connor Specific Comment #3.3

Not knowing the exact volume of materials makes it impossible to accurately assess the cost effectiveness of on-site treatment and off-site disposal and the other remedial options involving off-site disposal. These deficiencies impact the ability to comment upon the action- and location-specific ARARs identified by EPA in the FS.

EPA Response

The "exact" volumes of soils/sediments are never known at this point in the process. However, reasonable estimates have been made based on the available data. EPA believes those estimates to be sufficiently accurate to evaluate alternatives, including cost estimates and to make a cost effectiveness determination. It is important to note that EPA’s Guidance for conducting RI and FS Under CERCLA, acknowledges a degree of uncertainty in FS cost estimates; the goal is to achieve a +50 to -30 percent accuracy. The data collected as part of the above activities are typical of pre-design studies the Superfund program uses to help refine the selected remedy variables during design to enable prospective RA bidders to provide more informed and accurate bids on the work. We see no reason why the lack of this information would impact the ability of anyone to comment on the ARARs associated with this work.

2.7.4.1.11 O’Connor Specific Comment #4.A

EPA has not identified location specific ARARs that are applicable at the Site.

EPA Response

Within Section 2.2.3.3 (Page 2-10 to 2-12) and Appendix B of the FS, the following location-specific ARARs were identified: the Endangered Species Act (ESA) (16 USC 1521 et seq.); the Fish and Wildlife Coordination Act (FWCA) (16 USC 661 et seq.); Procedures on Floodplain Management and Wetlands Protection (40 CFR 6, App. A), Wetlands Protection Executive Order 11990, Floodplain Management Executive Order 11988, Section 404 of the Clean Water Act (CWA), the Massachusetts Wetlands Protection Act (310 CMR 10.00), the Massachusetts River Protection Act, the Federal Coastal Zone Management Act (16 USC 1451), and the Commonwealth of Massachusetts Coastal Zone Management Policies. These are still the location-specific ARARs for the selected remedy.

2.7.4.1.12 O'Connor Specific Comment #4.B

The Clean Water Act (CWA) is not an ARAR with respect to surface water at the Site. The CWA is not applicable. The CWA is applicable only to point source discharges of pollutants and therefore does not apply to any releases to surface water now occurring at the Site. The CWA water quality standards do not apply. The CWA criteria are not relevant and appropriate. The water quality standards regulate industrial and other discharges, which are not present at the Site. These standards are of general application and not based upon the risks posed at the Site. Even if the CWA standards were R&A, they should be waived because much if not all of the surface water contamination in Boys Creek and discharged into Buzzards Bay from Boys Creek is from off-site sources.

EPA Response

The CWA controls the direct discharge of pollutants to surface waters through the National Pollutant Discharge Elimination System (NPDES) program. Any on-site discharge to surface waters as a result of dewatering activities must meet the substantive NPDES requirements, which have been identified as action-specific ARARs.

In addition, the CWA, as amended, sets forth ambient water quality criteria (AWQC) for the protection of aquatic life and human health. Water quality standards are based on the designated use(s) for the water, and the criteria necessary to protect the designated use(s). Federal AWQC (a.k.a. National Recommended Water Quality Criteria) developed under Section 304(a) of the CWA are nonenforceable guidance criteria based on the latest scientific information to evaluate the effect a toxic pollutant concentration has on a particular aquatic species and/or human health. Although AWQC are nonenforceable, Section 121 of CERCLA, 42 U.S.C. 9621, states that remedial actions shall attain AWQC where they are relevant and appropriate. In determining if AWQC are relevant and appropriate, the primary factors are the designated or potential uses of the water, the media affected, the purposes for which the potential requirement are intended and the latest available information.

In the selected remedy, AWQC were used to determine appropriate groundwater, soil, and sediment cleanup levels based upon contaminant migration from soils and sediments to the groundwater and then the groundwater to surface water. AWQC are not, however, ARARs per se for the surface water at the Site. The intent is to address Site-related contamination to the extent they are the source of contamination of the surface water, but not to address the surface water contamination directly.

With respect to the issue of a waiver of the Clean Water Act requirements, EPA does not find that any of the six waiver criteria, as enumerated in 40 CFR 300.430(f)(1)(ii)(C), applies to the Site circumstances. Moreover, EPA disagrees with Atlas Tack's assertion that much, if not all, of the surface water contamination in Boys Creek is from off-site sources. See Response Number 2.7.4.2.11.3.2 regarding the issue of off-site sources.

2.7.4.1.13 O'Connor Specific Comment #4.C

The Commonwealth of Massachusetts' GW-3 Groundwater Standards are not applicable or relevant and appropriate to the cleanup of groundwater at the Site. The MCP allows for a site-specific assessment of risk to determine whether, where Method 1 standards such as GW-3 groundwater standards are exceeded, those levels of contaminants actually present any risk to human health or the environment.

EPA Response

In the Proposed Plan and FS, EPA indicated that DEP's Massachusetts Contingency Plan (MCP) GW-3 Method 1 standards would be used for those contaminants for which there exist GW-3 Method 1 standards, while the approach of multiplying the AWQC by a 10-fold dilution factor would be used for copper, for which there does not exist a GW-3 Method 1 standard. EPA has given additional thought to this in light of the comments received and has opted to set the interim groundwater cleanup levels for all COCs based on the AWQC, where there exist AWQC. Refer to more details in Section XI. of the ROD. These changes do not substantially alter the interim groundwater cleanup levels from those proposed in the Proposed Plan, nor do they affect the estimated time for the Selected Remedy to attain these levels.

2.7.4.1.14 O'Connor Specific Comment #4.D

The National Oceanic And Atmospheric Administration Technical Memorandum is not a valid basis upon which to establish Creek Bed sediment or Marsh surface soil cleanup goals. Use of the NOAA memorandum is not appropriate because it is not based upon an analysis of this Site.

EPA Response

In support of the RI, various field sampling and laboratory efforts were conducted and those results integrated into the ecological risk assessment. Results from the sediment toxicity testing indicated that the exposure to chemicals was responsible for a decrease in survival at the majority of the sampling locations north of the hurricane barrier. In order to develop site-specific cleanup goals, mortality rates at sampling locations in the main stem of Boys Creek were evaluated in relation to grain size, total organic carbon, simultaneously extracted metal/acid volatile sulfide (SEM/AVS) ratio, metal concentrations, and organic chemical concentrations. In most cases, there was no clear correlation between those measured parameters and mortality making it difficult to develop site-specific cleanup goals based on the results of the sediment toxicity tests alone.

Therefore, tissue data from ribbed mussels, hard shell clams, soft shell clams, and mummichogs were incorporated to develop the site-specific cleanup goals. Prior to conducting the FS, EPA prepared a technical memorandum concerning ecological-based cleanup goals for the Site (Weston, 1997b), which discussed the approach used to derive the site-specific sediment and marsh surface soils cleanup levels. Based on the weight of evidence approach discussed within this technical memorandum, ER-Ms were chosen to establish sediment cleanup levels for cadmium, copper and zinc. This weight-of-evidence evaluation, along with the results of the site-specific toxicity testing and field observations, indicates that the ER-M values for cadmium, copper, and zinc are protective for this Site.

2.7.4.1.15 O'Connor Conclusion

Atlas Tack Corp. incorporates by reference the attached documents (technical comments submitted by its consultants and informal comments submitted by it to EPA on or about July 2, 1998), its responses to EPA's requests for information, and its other submissions to EPA regarding designation of potentially responsible parties at the Site.

EPA Response

EPA has included all materials (including attachments) received during the comment period as part of the Administrative Record. In this Responsiveness Summary, EPA is responding to all significant comments. Below is EPA's response to the "attached documents" (technical comments submitted by Atlas Tack's consultants and informal comments submitted by Atlas Tack to EPA on or about July 2, 1998). The other previous Atlas Tack submissions to EPA regarding designation of potentially responsible parties at the Site are not relevant to the selection of the Remedial Action, and as such, EPA will not respond to such submissions. Likewise, EPA will not respond to Atlas Tack's responses to EPA's requests for information because they are not relevant to EPA's remedy selection.

2.7.4.2 Rizzo Associates and Menzie-Cura Comments, dated February 19, 1999

Comments on Proposed Cleanup Plan by Rizzo Associates, Inc. and Menzie-Cura & Associates, Inc. with Appendices dated February 19, 1999

2.7.4.2.1 Rizzo and Menzie-Cura Comment - 1.0 Preface

Preface - Listed out documents reviewed for comment.

EPA Response

EPA has no comment on the preface.

2.7.4.2.2 Rizzo and Menzie-Cura Comment - 2.0 Site Background and NPL Listing

Site background and NPL listing issues included: State's role in NPL listing; incorrect HRS scoring; and cleanup delays caused by federal process.

EPA Response

Notwithstanding the fact that this Site was properly scored using the Hazard Ranking System and properly listed on the NPL (see response to Comment 2.7.4.1.8), much of the information presented (particularly dates) by Atlas Tack in this comment is inaccurate. EPA will not be respond to these comments because they are not relevant to the selection of the remedy.

2.7.4.2.3 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comments on Proposed Plan

Introduction to Comments on Proposed Plan: The major and overriding comment concerning the EPA's plan is that the data collected and analysis of that data do not reflect actual conditions at the Site.

EPA Response

See Response Numbers 2.7.4.1.3 to 2.7.4.1.6.

2.7.4.2.3.1 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comment 1.1

The draft human health risk assessment appeared to use incorrect values for arsenic in shellfish

EPA Response

See Response Number 2.7.4.2.11.3.1.

2.7.4.2.3.2 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comment 1.2

Modeling used to estimate ecological risks was unrealistic.

EPA Response

See Response Number 2.7.4.1.4.

2.7.4.2.3.3 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comment 1.3

The risk analysis failed to properly account for naturally occurring (background concentrations) metals.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.3.4 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comment 1.4

Human Health Risk assessment was based on a single data point from within a manhole.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.3.5 Rizzo and Menzie-Cura Comment - 3.0 Introduction to Comment 1.5

Atlas Tack sampled plants, clams, and groundwater as "reality checks." The proposed plan is based on risk estimates that do not represent actual site conditions and seriously overestimate the risks present.

EPA Response

See Response Numbers 2.7.4.1.6 and 2.7.4.2.12.

2.7.4.2.4 Rizzo and Menzie-Cura Comment - 4.0 Summary of Proposed Plan

Summary of Proposed Plan: The comments include a summary of EPA's proposed plan including a short discussion of the nine criteria used in selecting the remedy. The selected remedy is not cost effective since "the no action alternative may not actually exceed the target risk goals" and since there is no environmental risk from the Site. The commenters state that they have data which shows no evidence of contaminants leaching from the soil into the groundwater. Further the proposed excavation of the marsh would destroy the marsh area to address an unknown source.

EPA Response

The commenter inaccurately summarized the NCP's nine criteria for the selection of a remedy—"time to reach cleanup" is not one of the five primary balancing criteria, "cost" is a balancing criteria, and "cost effectiveness" is not one of the two balancing criteria. 40 CFR 430(e)(9)(iii) & (f)(1)(i) set forth the two threshold criteria, the five primary balancing criteria and the two modifying criteria, which were used to evaluate and compare the remedial alternatives, including the selected remedy.

The commenter concludes as the result of its own groundwater sampling (January 1999) that the leaching of contaminants from the existing soils into groundwater is not occurring, which means that there is no risk to the environment from this Site. As discussed in Response Number 2.7.4.1.6, Atlas Tack's groundwater sampling was inadequate; at the same time, it shows that the groundwater at this Site still poses an unacceptable risk to the environment.

The commenter suggests that the "bioavailability study" and "excavation of the marsh sediments...would be ill advised and at odds with EPA policy" because the "excavation in the marsh area would destroy habitat to remove contaminants from an unknown source." The selected remedy does include the excavation of contaminated sediments and soils from the wetlands, marsh and riverfront areas and this will result in the short-tern destruction of these areas. The Ecological Risk Assessment shows that the existing contamination causes adverse and unacceptable consequences to the ecological sensitive receptors inhabiting the wetlands, marsh and riverfront areas and would continue to do so for the foreseeable future. EPA evaluated other alternatives to excavation, including no action, capping, and in-situ biodegradation, and has determined that there are no other effective and practicable alternatives which would have less impact on the wetlands, marsh and riverfront areas. The remedy requires that an extensive pre-design sampling program be undertaken, including bioavailability studies, to avoid any unnecessary excavation, and that a restoration program be implemented as part of the remedy. See Appendix E of ROD for additional information on the floodplains, wetlands and riverfront assessment.

The commenter stated that "there were some significant errors in the risk assessment assumptions and methodology used to determine the need for remediation." EPA disagrees with this statement. EPA followed the relevant RI/FS guidances and utilized the standard assumptions and methodology in performing the risk assessment. See Response Numbers 2.7.4.1.3 and 2.7.4.1.4 for more details regarding risk assessment.

2.7.4.2.5 Rizzo and Menzie-Cura Comment -- 5.0 Comments on EPA's Question "Why is cleanup needed?"

Comments on EPA's Question "Why is cleanup needed?"

EPA Response

See Response Numbers 2.7.4.2.5.1 to 2.7.4.2.5.5.

2.7.4.2.5.1 Rizzo and Menzie-Cura Comment 5.1.

EPA's revised risk assessment concludes that trespassers on the Site are not at risk from contact with Site contaminants. EPA's risk calculations associated with arsenic in shellfish are questionable.

EPA Response

EPA's risk assessment indicates that trespassers to the Site are not at risk from direct contact from Site contamination (See Section VII of the ROD). See Response Number 2.7.4.2.11.3.1 regarding arsenic in shellfish.

In addition, Atlas Tack provided its own shellfish sampling results which indicate that there is no chemical-related health risk associated with Boys Creek and Marsh Area. It should be noted that is impossible to determine the exact locations of the shellfish samples from the sampling photographs or site map. Moreover, the Sampling Map has the shellfish being sampled in Buzzards Bay, not in Boys Creek. The Site Photographs 5 and 6 suggest that the shellfish were sampled in Boys Creek. The text in the Hard Shell Clam Sampling Protocol states: "To accomplish this task, a certified scuba diver collected hard shell claims specimens from the mouth of Boys Creek. These samples duplicated the location of samples by previous reviewers of the Site. Samples were also taken in the waters at the reference site." First, it is unclear who the "previous reviewers of the Site" are, since no references were presented in Atlas Tack's report. The locations EPA used for shellfish sampling are in Figure 2-6 of the RI (Weston, 1995) and include locations north of the hurricane barrier (close to the contamination sources and in contaminated sediments), at the mouth of Boys Creek (but not in Buzzards Bay), and in Girls Creek. The Atlas Tack shellfish locations are apparently in Buzzards Bay and did not seem to be near any of the Site contamination sources nor any of the EPA sample locations. If a scuba diver was used to collect samples, it is unclear from the information presented by Atlas Tack at what depth of water these samples were taken. If the shellfish samples were taken at locations great distances (in Buzzards Bay) from the sources of contamination or contamination in Boys Creek, it would be expected that the shellfish would not be contaminated, as Atlas Tack's sampling apparently shows. Also, no sediment samples were presented (or apparently none were collected) to determine if the Atlas Tack shellfish samples were in areas that have any contamination.

2.7.4.2.5.2 Rizzo and Menzie-Cura Comment 5.2.

The ecological risk assessment is flawed because of the use of screening-level data and as a result risks are overestimated. Also, Atlas Tack's plant contaminant uptake sampling shows that EPA overestimated risks by 2 to 3 orders of magnitude.

EPA Response

See Response Numbers 2.7.4.1.4 and 2.7.4.1.6.

2.7.4.2.5.3 Rizzo and Menzie-Cura Comment 5.3.

Atlas Tack's January 1999 groundwater sampling shows that virtually all existing concentrations of metals in the groundwater are many times less than the cleanup values.

EPA Response

See Response Number 2.7.4.1.6

2.7.4.2.5.4 Rizzo and Menzie-Cura Comment 5.4.

Atlas Tack questions EPA's premise that contaminants leach from the site soils and

migrate via the groundwater to the surface water bodies.

EPA Response

See Response Numbers 2.7.4.1.6 and 2.7.4.1.9.1.3.

2.7.4.2.5.5 Rizzo and Menzie-Cura Comment 5.5.

EPA has overestimated risks because of the use of incorrect and/or outdated dermal soil adherence factors and gastrointestinal (oral) absorption factors. Because EPA's risk calculation was based upon a single high value, the removal of this value from the calculation, by physically removing it from the Site, would substantially reduce risks in the Commercial Area. Also, assuming a concrete floor is installed (standard practice in industrial or commercial buildings), thus will essentially remove the exposure pathway.

EPA Response

EPA appropriately calculated the risks at this Site. The risk assessment was completed using the latest EPA guidances and updated risk information as summarized in Section VII. of the ROD (Summary of Site Risks). More details on the risk factors used in the risk assessment can be found in the RI (Weston, 1995), FS (Weston, 1998b), and Technical Reports (Weston, 1997a, 1998a, and 1998c). See Response Number 2.7.4.1.3 for issue related to a single high value. Since Atlas Tack has not indicated its plans for its property, EPA cannot assume that there will be a concrete floor over any portion of the Site. Even if Atlas Tack's plans were developed, there are no assurances that any concrete floor would remain in place in the future. Thus, EPA is justified in assuming a worker's potential contact with contaminated soils at the Site. Presently, the middle section of the main building is exposed to the elements, with the roof and walls having been taken out in late 1998; the floor in this middle section is only partially concrete.

2.7.4.2.6 Rizzo and Menzie-Cura Comment - 6.0 Suggested Approach for Rehabilitating the Site

Suggested Approach for Rehabilitating the Site: In-situ capping in lieu of the proposed remedy was not properly evaluated by EPA.

EPA Response

A number of different types of caps were considered in the FS (Weston, 1998b) which would have had varying success on limiting exposure to contaminants as well as minimizing the mobility of contaminants by limiting infiltration and erosion. Since some of the contaminated soils are located below the water table, they will continue to serve as a contaminant source under any of the capping options. No capping options were actually included in any of the final FS alternatives, for which detailed analyses were performed, because they would not have been effective in meeting the cleanup objectives and because capping in the floodplains, wetlands, and riverfront areas would have had irreversible and permanent adverse consequences to these areas due to a permanent loss of wetland habitat and flood storage capacity.

2.7.4.2.7 Rizzo and Menzie-Cura Comment - 7.0 ARARs for Justification of Remedial Action

These comments are similar to Comment Numbers 2.7.4.1.12.2.1 to 2.7.4.1.12.2.3.

EPA Response

See Response Numbers 2.7.4.1.12.2.1 to 2.7.4.1.12.2.3.

2.7.4.2.8 Rizzo and Menzie-Cura Comment - 8.0 Comments on the Risk Assessment

Atlas Tack's comments on the Risk Assessment are in Appendix D.

EPA Response

See Response Numbers 2.7.4.2.11.7.2 to 2.7.4.2.11.7.26, 2.7.4.2.11.8.1, and 2.7.4.2.11.8.2.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.9 Rizzo and Menzie-Cura Comment - 9.0 Comments on the Draft FS

Comments on the Draft FS are in Appendix E.

EPA Response

See Response Numbers 2.7.4.2.11.8.1 and 2.7.4.2.11.8.2.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.10 Rizzo and Menzie-Cura Comment - 10.0 Summary and Conclusion

The substance of most these comments in this section have been stated in other sections.

EPA Response

No response to previously stated comments is needed. See Response Number 2.7.4.2.10.1 for response to additional comments.

2.7.4.2.11 Rizzo and Menzie-Cura Comment - Appendix A July 1998 Comments

Appendix A included a letter from Kevin O'Connor dated July 2, 1998 with the following two memos: "Comments of Dr. Charles A. Menzie, Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels," dated July 2, 1998; and "Comment Package, Atlas Tack Corporation," dated February 17, 1999, from Dr. Charles

Menzie.

2.7.4.2.11.1 Kevin O'Connor letter dated July 2, 1998

This commenter's letter covered the same issues as his letter of February 19, 1999 and the two attached memorandums by Dr. Menzie (see following comments).

EPA Response

See Response Numbers 2.7.4.1.1 to 2.7.4.1.15 and Response Numbers 2.7.4.2.11.2.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.11.2.1 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #1

The Atlas Tack Site is an industrial property with contaminated media similar to other industrial properties. It has become a Superfund site due to scoring that is unrelated to the types of risks that the site actually poses to health and the environment. The Site scored sufficiently high to be placed on the National Priorities List because of the groundwater pathway to a drinking water well. Neither the drinking water source nor the pathway from the Site to it exist. Thus, the basis for ranking the Site as an NPL site is inconsistent with the potential risk actually posed by the Site.

EPA Response

See Response Number 2.7.4.1.8.

2.7.4.2.11.2.2 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #2

The Atlas Tack Site has many features that qualify it as a potential Brownfield Site. However, the Superfund process currently prevents assessors from looking at this site in terms of focused redevelopment.

EPA Response

The primary goal of CERCLA is to clean up sites. In order for a site to be developed it must be cleaned up, that is, a site's risks to human health and the environment must be addressed, even as a Brownfield site. EPA and DEP encourage development of sites, and will be interested in working with the Atlas Tack Corp. on any development plans it has for this Site that are consistent with the cleanup specified in the ROD.

2.7.4.2.11.2.3 Dr. Menzie Memo dated July 2, 1998- Primary Comment #3

There is public concern regarding the site because of the presence of contaminants that

are well-recognized by the lay person and are, therefore, of concern. These compounds include arsenic and cyanide among other metals and organic chemicals. However, some of these metals are actually present at natural levels and the risk analysis fails to properly account for the naturally occurring concentrations of these compounds.

EPA Response

It is EPA policy to evaluate risk posed by site contamination and those posed by naturally occurring compounds in order to present a comprehensive understanding of the nature and magnitude of risk to public health. However, EPA makes an important distinction between site contamination and naturally occurring contamination in the establishment of cleanup goals. As Menzie-Cura notes, the cleanup goal identified for arsenic inside the building in Table 2-3 of the FS was set at the background level on the property as the risk-based concentration was below background. This approach is in keeping with the NCP as EPA does not seek to clean up contamination below levels which would be expected naturally at this Site.

2.7.4.2.11.2.4 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #4

The methodology used in EPA's risk assessment has led site managers at EPA and the public to reach conclusions that do not properly account for the actual locations of contamination and the risk that they pose. This is in part a consequence of applying a risk assessment procedure that does not focus on actual sources and their distribution around the site. Risks to people that might utilize adjacent areas have been calculated incorrectly and convey a false impression about potential hazards and risks to the average person that might visit areas near the site and perhaps eat shellfish from those areas.

EPA Response

See Response Numbers 2.7.4.1.6 and 2.7.4.2.11.3.4 for shellfish.

2.7.4.2.11.2.5 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #5

The conceptual model of sources, fate and transport and eventually receptors is not well developed for the site and there are misconceptions about sources and the fate and transport of contaminants. As a result, the proposed remedial measures have not included methods that would be effective at eliminating exposure and enabling the site to be put into productive use in a cost-effective manner.

EPA Response

See Response Numbers 2.7.4.1.6, 2.7.4.1.9.1.3, and 2.7.4.1.9.2.

2.7.4.2.11.2.6 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #6

The methodology is "cookbook," failing to consider site-specific factors and thus fails to characterize true risk at the site.

EPA Response

While the commenter believes portions of public health risk assessments were "cookbook" in approach, we sought to use as much site specific information possible. For example, at this Site, input from several public meetings with the neighbors from the surrounding area formed the basis for the future land use at the site (commercial vs. residential). Certainl,y Menzie-Cura Associates is aware of the enormous impact this land use decision had on the baseline human health risk and resulting remedy. For example, had residential land use been deemed appropriate for the site itself, then considerably more data (down to a depth of 10 feet or so) on subsurface contamination and resulting risk would have factored into the human health risk assessment and potential remedial alternatives.

In addition, actual fish and shellfish samples were collected rather than strict reliance on fish and shellfish model predictions regarding the extent of contamination that is often a characteristic of "cookbook" style risk assessments. As fate and transport models often have simplifying (conservative) assumptions inherent in them, it is felt that efforts made to obtain actual site-specific data greatly enhanced this portion of the risk assessment and helped reduce the uncertainty regarding human health risk posed by the consumption of contaminated biota.

Because EPA under the CERCLA process must assess both current and future potential risks to human health and the environment, EPA must rely on assumptions for behaviors that may take place at some point in the future. As such, EPA typically does utilize default exposure assumptions where such assumptions make sense to use. For example, specific exposure assumptions regarding magnitude and frequency of contact with contaminated media were based on default exposure assumptions. In addition, EPA has been responsive to comments that have indicated it would be more appropriate to use site specific factors. For example, it should be noted that the default value used for the worker's soil adherence rate (0.08 mg/cm^2) used in the "Revised Draft of the Update of the Baseline Human Health Risk Assessment and Development of Cleanup Levels" (Weston, 1998c) as well as in the establishment of cleanup levels reflect a significant reduction from the value previously assigned to the default soil adherence rate (1 mg/cm^2) to address the concern that the exposure was overestimated [page specific comment on page 14 of 16 Feb. 17,1999 made in reference to comments on page 2-12 (Table 2-10) of the "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels" (Weston, 1998a).
2.7.4.2.11.2.7 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #7

Commercial Area requirement for cleanup is based on a single data point from a sewer cover (this calculation is based on a repair person climbing into the manhole cover everyday - unlikely).

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.2.8 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #8

Cleanup calculations for the sediments are based on several incorrect assumptions about arsenic behavior in the environment and exposure.

EPA Response

See Response Number 2.7.4.2.11.3.4.

2.7.4.2.11.2.9 Dr. Menzie Memo dated July 2, 1998 - Primary Comment #9

Several of the chemicals listed as "site-related," most notably DDT and other pesticides, were not used in the Atlas Tack manufacturing processes.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.11.3.1 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #1

Contaminant concentrations (including arsenic) in shellfish appear to be misrepresented as derived from wet weight measurements when, in fact, they are derived from dry weight measurements.

EPA Response

The Update of Baseline Human Health Risk Assessment (Weston, 1998a) was revised in a supplement to the update (Weston, 1998c) based on comments received from Atlas Tack after the FS was finalized. The calculated human risk from shellfish ingestion did drop from 7.4 x 10^{-4} to 1.45 x 10^{-4} (Carcinogenic Risk) and 4.0 to 0.8 (Total Hazard Index). While shellfish ingestion still poses an unacceptable human health carcinogenic risk (see Section VII. Summary of Site Risks in the ROD), sediment cleanup levels for shellfishing were not separately established. The selected remedy's excavation of sediments from Boys Creek and adjacent marsh areas to ecologically protective levels, however, will also mean that the human health risk from the ingestion of shellfish posed by this Site will be eliminated.

2.7.4.2.11.3.2 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #2

Background concentrations of compounds in the area are not considered and cleanup

goals are often less than the regional background. EPA appears to be unaware of the effect that New Bedford Harbor has had on area wide metals contamination. This is one of the classic cases of metals pollution and has been documented in textbooks. Several facilities on the Acushnet River and harbor are believed to be responsible for metal-contaminated sediments in the harbor and adjacent Buzzards Bay. The area wide metal contamination was reported on extensively as part of the New Bedford Harbor Superfund Site but was first documented extensively by Summerhayes et al. (1977). They observed that:

> ***Wastes rich in metal are discharged into the waters at the head of the [New Bedford] harbor, and rapidly become fixed in the bottom sediment throughout the harbor. Together, copper, chromium and zinc, the three main contaminant metals, locally form more than one percent of the dry weight of harbor sediments. The metals are located in the very fine silt and clay fractions of the sediment. They migrate slowly out of the harbor...and appear to spread out over portions of Buzzards Bay in a carpet 10-20 cm thick.***

EPA Response

With respect to lead, zinc, and DDT for soils (0 to 2 feet depth), the higher of Site or area background concentrations were selected for cleanup goals both in the Proposed Plan (see Table 2-5 in FS) and ROD (see Table 14). EPA has considered the background concentrations of contaminants, and EPA has not set cleanup goals below the Site or area background soil concentrations.

EPA does not agree that the New Bedford Harbor Site has an effect on the contamination at the Atlas Tack Site. The final FS completed in 1990 for the New Bedford Harbor Site does not indicate that there is "a carpet 10-20 cm thick" spread out over portions of Buzzards Bay. This FS indicates that there is wide-spread contamination of PCBs and metals within New Bedford Harbor north of the New Bedford hurricane barrier and at certain sewer discharge points (e.g. Cornell plant and New Bedford City sewage outfall) directly into Buzzards Bay south of the New Bedford hurricane barrier. The New Bedford Harbor ROD, dated September 1998, is based on PCB contamination, not metals. There is no evidence that the PCBs nor metals from the NBH Site migrated to the Atlas Tack Site in any amount to impact the Atlas Tack Site risks. The Atlas Tack Site data indicates the opposite - that the contamination from the Atlas Tack Site is impacting Buzzards Bay. The Atlas Tack Site data shows a general and significant decrease in contamination concentration in Boys Creek toward the Fairhaven hurricane barrier, and similarly the contamination concentration is significantly less once it reaches Buzzards Bay.

A review of the data of the Atlas Tack Site RI indicates that there were no PCBs detected in the sediments of Boys Creek at the Site and downstream of the Site (See Figure 4-19 of the RI, Weston 1995). There were very low levels (all levels detected were significantly below 1 mg/kg) of PCBs (Arochlor 1254) detected more than 500 feet upstream (north and east) of the Site boundary. The source(s) of these PCBs are unclear. But it seems unlikely that the source of these PCBs were from the New Bedford Harbor Site, since the New Bedford Harbor Site primarily has a mixture of PCB Aroclors (mostly1242, with some 1252, 1254 , and 1016), which would not separate into just into Arochlor 1254.

The type of PCB found in the Atlas Tack Site soils was Arochlor 1260, which has not been found typically at the New Bedford Harbor Site. The levels of PCBs (Arochlor 1260) detected range from 0.28 mg/kg to 36 mg/kg in the former building area and from 0.82 mg/kg to 260 mg/kg in the Solid Waste and Debris Area (see Figures 4-1 and 4-7 in the RI, Weston, 1995). Based upon this data, we can only conclude that the PCBs found at the Atlas Tack Site did not originate from the New Bedford Harbor Site nor any other place but the Site.

2.7.4.2.11.3.3 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #3

Arsenic levels in shellfish from the site are comparable to arsenic concentrations in shellfish throughout New England.

EPA Response

EPA has not attempted to verify this statement. The point is moot since it is EPA's policy to report a risk to human health regardless of the source and since none of the cleanup is predicated on attaining any arsenic sediment cleanup goals. However, since arsenic coexists in site sediments with the contaminants which drive the risk and remedy, we may see a reduction arsenic levels in the shellfish upon completion of the remediation.

2.7.4.2.11.3.4 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #4

The form of arsenic in shellfish is not considered to pose a health risk to humans.

EPA Response

Acting in a conservative manner and in the absence of shellfish data revealing the form of the arsenic (organic vs. inorganic), in the human health risk assessment, EPA made the simplifying assumption that the arsenic present in shellfish was in the inorganic state. While aware that some of the arsenic in the shellfish may have been present in an organic form (which is generally regarded as less toxic than inorganic arsenic), EPA does not believe the assumption made was inappropriate for the purpose of evaluating risk to human health nor more importantly to the chosen remedy since:

1. In choosing the selected remedy for the site, it was not a primary objective of EPA to reduce potential human health risk posed by the ingestion of arsenic in shellfish obtained from the study area. While the baseline human health risk evaluation revealed the potential for marginally unacceptable human health risks posed by the consumption of shellfish due in large part to the arsenic levels detected, numerous uncertainties in the risk estimate were also identified including a limited number of samples, uncertainty in shellfish consumption rates and bioavailability. Based on

these factors and the magnitude of the human health risk projected, EPA did not identify a cleanup level for arsenic in shellfish, sediments, nor surface waters in the study area.

However, EPA did find unacceptable risk to ecological receptors throughout the Boys Creek Marsh and adjacent upland areas . (It should be noted that arsenic was not identified as major contributor to the unacceptable ecological risk level). Mitigation of potential ecological risks posed by compounds (other than arsenic), thus served as the primary remedial objective for Boys Creek sediments. EPA anticipates that while remedial efforts have been targeted on compounds other than arsenic in the Boys Creek Marsh area, they will indirectly result in reductions in arsenic concentrations and any potential human health and ecological risk the arsenic may pose.

2. In evaluating risk in the CERCLA context, EPA quantitates potential risk in a conservative manner such that the true risk falls below that estimated. In quantitating risk, often assumptions must be made in the absence of complete knowledge or data. Faced only with analytical data indicating the total amount of arsenic present in the shellfish from the study area, EPA acted conservatively in assuming that 100% of the arsenic present in the shellfish was in the inorganic form so as to not underestimate the magnitude of potential risk. EPA believes it would have been inappropriate to assume otherwise in the absence of data revealing the form of the arsenic (organic vs. inorganic) since a study by researchers in the Netherlands (Vaessen HA, Van Ooik A. 1989. "Speciation of arsenic in Dutch total diets: Methodology and Results," Z. Lebensm Unters Forsch 189:232-235.) has shown that as much as 41% of the total arsenic in seafood may be present in the inorganic form. Menzie-Cura's suggestion that EPA assume none of the arsenic to be in the inorganic form (essentially eliminating it from the risk assessment) would not be conservative as it may result in an underestimate of the actual risk. In the absence of site-specific data, EPA believes it would have been inappropriate for a CERCLA risk assessment to assume that none of the arsenic in shellfish was in the inorganic form.

2.7.4.2.11.3.5 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #5

The analyses do not include a hot spot analysis. The result is that single high samples drive the risk.

EPA Response

See Response Number 2.7.4.1.3 .

2.7.4.2.11.3.6 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #6

For several of the chemicals that are driving risk issues at the site (most notably the pesticides and perhaps also metals in the marsh) the site is unlikely to be the source.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.11.3.7 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #7

Modeling in place of actual sampling serves too great a role in the assessment.

EPA Response

Response Numbers 2.7.4.1.4 and 2.7.4.1.6's provide some of the details on the data collection efforts which support the selected remedy (more information can be found in the RI [Weston, 1995]). EPA contends that the modeling used in the development of the risk assessments and other supporting documents are typical of Superfund studies and appropriate for this Site, and that the data collected fully support the conclusions of these assessments.

2.7.4.2.11.3.8 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #8

Risk assessors applied a higher acceptable risk benchmark (10^{-4} cancer risk) to locate areas requiring remediation and calculate the cleanup goals using a (100 fold) lower benchmark (10^{-6} cancer risk). The result will be 'clean' areas surrounded by dirtier areas. Standard practice in risk assessment is to screen sites using highly conservative risk targets and then to modify to less conservative, but still health protective targets if the screening analysis indicates such modification is needed. For example, the MCP uses 10^{-6} risk as a screen, but uses 10^{-5} risk as an ultimate cumulative risk target. For this site, the opposite approach was used.

EPA Response

EPA uses the general 10^{-4} to 10^{-6} risk range as a target range within which the Agency strives to manage human health risks as a part of Superfund Cleanup. Once a decision has been made to take action, the Agency has expressed a preference for cleanups achieving the more protective of the risk range (i.e. 10^{-6}). The 10^{-6} risk level was used as a point of departure for determining remediation goals in keeping with Section 300.430(e)(2)(i) of the NCP.

This approach is exactly how EPA typically makes the key decisions as to whether or not a site warrants remediation and if so, how much remediation is warranted. EPA Region I acted in accordance with OSWER Directive 9355.0-30 of April 1991 (Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions) which states that where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for either the current or future land use exceeds 10^{-4}, a CERCLA action is generally warranted. In keeping with this same directive and the NCP, once the decision has been made to take an action, EPA has a strong preference for achieving cleanups at the more protective end of the risk range, i.e. 10^{-6}. Consequently, 10^{-6} is used to guide the selection of appropriate cleanup levels for compounds exhibiting carcinogenic potential.

While cleanup levels corresponding to other risk levels (e.g. 10^{-4}, 10^{-5}) have been called for by Dr. Menzie, these target risk levels not only do not meet EPA's preference for achieving cleanups at the more protective end of the risk range, but also due to the presence of multiple compounds, are not likely to meet the MA DEP cumulative risk target of 10^{-5}.

2.7.4.2.11.3.9 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #9

The ecological risk assessment and clean-up levels for target metals (cadmium, copper, and zinc) are based on NOAA's ER-Ms which, although useful for screening, are not intended to be used as cleanup levels without careful consideration." The "strong binding capacity" of anaerobic sediments in marine or marsh environments essentially make the metals "unavailable." The use of the ER-Ms could therefore result in the unnecessary destruction of the marsh.

EPA Response

See Response Number 2.7.4.1.14. Also, a pre-design bioavailability study will be performed to determine the appropriate amount of wetland removal and to avoid, to the extent practicable, the unnecessary destruction of any wetland. The bioavailability study will likely include data from the chemical sources, chemical distribution (including transformation), and spatial-temporal distributions of key receptors. Specific assessment tools to measure or estimate bioavailability may include: sediment, pore water and overlying water concentrations; SEM; AVS and organic carbon concentrations; tissue concentrations; biomarkers; fate and transport models; and food chain models (Ingersoll, 1997). See Section XI.C.1.a of the ROD for further information on the bioavailability study to be done during the remedy.

2.7.4.2.11.3.10.1 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #10

A number of soil to groundwater to surface water relationships have been invoked as a basis for reducing risks of biota in marshes and in adjacent surface waters. All of these relationships should be reviewed along with the benefits of proposed remedial actions. Again, some aspects of the ecological and human health risk assessments for marsh and surface water environments appear incorrect. Also the following issues were raised: 1) DDT and dieldrin are risk drivers but are not likely to be site related; 2) in Table 2-12 of the FS, only a small percentage of samples actually contain detectable amounts of target chemicals; 3) the metals and cyanide concentrations reported are probably on a total rather than dissolved basis, thus overestimating actual exposure.

EPA Response

See Response Numbers 2.7.2.11.3.10.2 and 2.7.4.1.5. Also, Atlas Tack indicated that this section was a review of the "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels,"(Weston, 1998a) and Draft FS (dated April 20, 1998). The Draft FS does not have a Table 2-12. Table 2-12 in the updated risk assessment (Weston, 1998a) does not concern "target chemicals." Thus, EPA cannot respond to the commenter's comment regarding "Table 2-12."

2.7.4.2.11.3.10.2 Dr. Menzie Memo dated July 2, 1998 - Specific Comment #11

We suggest that an assessment be made that uses actual groundwater concentrations and evaluates the potential risks groundwater discharge poses to surface waters. The risk assessment has not adequately evaluated this and it is unclear how the proposed soil remediation would benefit or reduce risks to marsh or surface water environments. The SSL method used for the site appears to be an inappropriate approach for deriving clean-up levels for protection of marsh and marine biota. ("SSL" was not defined by the commenter, but EPA is assuming "SSL" is similar to the "Soil Leaching Concentration" used in the modeling in the FS.)

EPA Response

As discussed in this ROD, the selected remedy is based on the existence of unacceptable risks to human health and the environment at the Site, including wetlands and marsh sediments but not Site surface waters . The data supporting this determination is contained in the RI (Weston, 1995) and the subsequent Risk Assessment, and includes samples from the Site soils, sediments, groundwater and surface water. This data clearly demonstrates the existence of a completed contaminant migration pathway from the contaminated soils in the source areas to the groundwater via leaching, and then, to the wetland/marsh sediments via groundwater flow and transport. (Additionally, the potential for the existence of such a pathway is commonly accepted and well documented in the hazardous waste management and remediation field.) Cleanup levels for the "source area" soils were derived from a model of this pathway, as discussed in the FS (Weston, 1998b), and will result in the achievement and maintenance of protective levels in the wetlands and marsh sediments. There is no aspect of the remedy which directly relates to the cleanup of site surface water although the remedy will likely have a beneficial effect on the surface water. Also see Response Number 2.7.4.1.6.

2.7.4.2.11.4 Dr. Menzie Memo dated February 17, 1999 - General Overview

Section I: General Overview

EPA Response

No response is needed.

2.7.4.2.11.5.1 Dr. Menzie Memo dated February 17, 1999 - Section II: Primary Comment #1

This is same comment as Number 2.7.4.2.11.2.1.

EPA Response

See Response Number 2.7.4.2.1.8.

2.7.4.2.11.5.2 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #2

This is same comment as Number 2.7.4.2.11.2.2.

EPA Response

See Response Number 2.7.4.2.11.2.2.

2.7.4.2.11.5.3 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #3

This is same comment as Number 2.7.4.2.11.2.3.

EPA Response

See Response Number 2.7.4.2.11.2.3.

2.7.4.2.11.5.4 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #4

This is same comment as Number 2.7.4.2.11.2.4.

EPA Response

See Response Number 2.7.4.2.11.2.4.

2.7.4.2.11.5.5 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #5

This is same comment as Number 2.7.4.2.11.2.5.

EPA Response

See Response Number 2.7.4.2.11.2.5.

2.7.4.2.11.5.6 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #6

This is mainly the same comment as Number 2.7.4.2.11.2.6 and 2.7.4.1.9.2.

EPA Response

See Response Number 2.7.4.2.11.2.6 and 2.7.4.1.9.2.

2.7.4.2.11.5.7 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #7

In several cases, the risk estimates reflect a very small number of data points. This lead to an inappropriate remedial decision. The Commercial Area cleanup is based on a single data point from a sewer cover.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.5.8 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #8

This is same comment as Number 2.7.4.2.11.2.8.

EPA Response

See Response Number 2.7.4.2.11.2.8.

2.7.4.2.11.5.9.1 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #9.1

Several of the chemicals are driving risk issues at the site (most notably the pesticides and perhaps also metals in the marsh) are unlikely to be the source. DDT and other pesticides were not used in the process at the Atlas Tack manufacturing operation but were widely used for mosquito control in marshes.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.11.5.9.2 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #9.2

EPA appears to be unaware of the effect that the New Bedford Harbor has had on area wide metals contamination.

EPA Response

See Response Number 2.7.4.2.11.3.2.

2.7.4.2.11.5.9.3 Dr. Menzie Memo dated February 17, 1999 - Primary Comment #9.3

No consideration of the potential role that other sources may have had in influencing the levels of metals.

EPA Response

See Response Numbers 2.7.4.1.5 and 2.7.4.2.11.3.2.

2.7.4.2.11.6.1 Dr. Menzie Memo dated February 17, 1999 - Section III: Detailed Comment #1

This is same comment as Number 2.7.4.2.11.3.1.

EPA Response

See Response Number 2.7.4.2.11.3.1.

2.7.4.2.11.6.2 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #2

The cyanide level in one soft shell clams is suspected of being based on dry not wet weight, which changes the concentration.

EPA Response

See Response Number 2.7.4.2.11.3.1.

2.7.4.2.11.6.3 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #3

This is same comment as Number 2.7.4.2.11.3.2.

EPA Response

See Response Numbers 2.7.4.1.5. and 2.7.4.2.11.3.2.

2.7.4.2.11.6.4 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #4

This is mainly the same as Comment Numbers 2.7.4.2.11.3.3 and 2.7.4.2.11.3.1.

EPA Response

See Response Numbers 2.7.4.2.11.3.3 and 2.7.4.2.11.3.1.

2.7.4.2.11.6.5 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #5

This is mainly the same comment as Number 2.7.4.2.11.3.4.

EPA Response

See Response Numbers 2.7.4.2.11.3.4.

2.7.4.2.11.6.6 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #6

This is mainly the same comment as Number 2.7.4.2.11.3.5. EPA's analysis does not include a hot spot analysis, e.g., the risk for the commercial area was based on one sample, with high carcinogenic PAH concentration (location 411-S001), below the floor of the building. If this sample were excluded and treated as a localized hot spot, the resultant risk for the commercial area would fall within the acceptable risk range. This should be given additional thought before proceeding with a site wide soil remediation plan based on a single sample that appears unrepresentative of Site soils.

EPA Response

See Response Numbers 2.7.4.1.3 and 2.7.4.2.11.3.5.

2.7.4.2.11.6.7 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #7

This is mainly the same comment as Number 2.7.4.2.11.5.9.1.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.11.6.8 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #8

Iron is a risk driver for the meadow vole and the great blue heron; however, the risk assessment does not consider that iron is a naturally occurring macronutrient.

EPA Response

EPA is required to assess (as it did for this Site) the risk from all chemicals at a site. An iron cleanup goal was not established because iron is naturally occurring and impractical to clean up.

2.7.4.2.11.6.9 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #9

This is mainly the same comment as Number 2.7.4.2.11.3.7. Modeling in place of actual

sampling serves too great a role in the assessment rather than collecting site specific data such as specific plant tissues.

EPA Response

See Response Numbers 2.7.4.1.4 and 2.7.4.1.6.

2.7.4.2.11.6.10 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #10

This is mainly the same comment as Number 2.7.4.2.11.3.8. A logical disconnect exists between the risk assessment and the calculation of risk-based cleanup levels. The use of 10^{-6} the basis for the cleanup levels will result in "clean areas surrounded by dirtier areas". More consideration should have been given in the FS to the use of levels based 10^{-5} and 10^{-6} risks.

EPA Response

See Response Number 2.7.4.2.11.3.8.

2.7.4.2.11.6.11 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #11

This is the same comment as Number 2.7.4.2.11.3.9.

EPA Response

See Response Number 2.7.4.1.14.

2.7.4.2.11.6.12 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #12

This is the same comment as Number 2.7.4.2.11.3.10.

EPA Response

See Response Number 2.7.4.2.11.3.10.
2.7.4.2.11.6.13 Dr. Menzie Memo dated February 17, 1999 - Detailed Comment #13

Groundwater issues were presented, such as the limitation of the Kd values and factors influencing the transfer of chemicals from the soil to groundwater to surface water to aquatic organisms. The development of target soil concentrations in the FS, based on chemicals migrating from site soils to the creek surface water, has the following limitations: 1) the Kd values should be calculated based on co-located samples to avoid outliers and 2) basing the overall site cleanup on a collection of assumptions for this complicate pathway is inappropriate without more detailed analysis. An evaluation of surface water and sediment concentrations in on-site and off-site locations suggests that chemicals from the site (specifically, copper and

zinc but not cyanide) are elevated as a result of site conditions. Whether the elevated levels of certain chemicals such as copper and zinc are as a result of the soil-groundwater-surface water pathway is not clear.

EPA Response

There were some limitation to the Kd (soil sorption coefficient) values. However, the Kd values were spot checked based upon soil and groundwater data. There were very few "co-located" samples, and the spot Kd varied widely across the Site. The check for the assumptions is the analysis of the surface water quality during periods of low flow/low dilution (i.e. dry weather, low tide). Metals and cyanide are present in the surface water and fish during "normal" conditions, and based upon the RI (Weston, 1995) data, are expected to be present at levels exceeding the AWQC. See Response Number 2.7.4.1.9.1.3 regarding soil-groundwater surface water pathway.

2.7.4.2.11.7 Dr. Menzie Memo, dated February 17, 1999, Comments on "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels" (Weston, 1998b) - Section VI: Page Specific Comments

2.7.4.2.11.7.1 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #1

Table of Contents does not have a section on uncertainties.

EPA Response

The uncertainty discussion is in Section 6.3.5 of the RI (Weston, 1995).

2.7.4.2.11.7.2 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2

Page 1-1, paragraph 2: Risk changes due to changes in exposure assumptions and toxicity guidance only estimate the risk change, the actual risk remains the same.

EPA Response

EPA agrees that the actual risk remains the same.

2.7.4.2.11.7.3 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #3

Page 1-1: Different soil samples were combined (0-2 ft vs. 0-8 ft). Some information on the impact would be useful.

EPA Response

Section 2.2.1 (page 2-2) of the "Update of Baseline Human Health Risk Assessment and Development of Risk-Based Cleanup Levels" (Weston, 1998b) has more information regarding the evaluation of soil depth used for the risk assessment. The report states that "the 0 to 2-ft depth was evaluated since it was assumed that the maintenance worker would only contact surficial soils."

2.7.4.2.11.7.4 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #4

Page 2-2: The use of 0-2 ft samples because these surficial soils could be contacted appears to conflict with the use of samples from under a building that generally has a concrete floor.

EPA Response

None of the samples in the RI (Weston, 1995) were obtained from under the concrete floor. Also, pavement is not viewed by EPA as a barrier to exposure over the long-term. As such, it is customary practice to utilize data obtained from below paved areas in assessing future potential risk. See Response Number 2.7.4.2.5.5 for more information.

2.7.4.2.11.7.5 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #5

Page 2-5: Use of a single PAH sample had an adverse impact on EPA's risk assessment.

EPA Response

See Response Numbers 2.7.4.1.3.

2.7.4.2.11.7.6 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #6

Page 2-7: The benefit of arbitrarily eliminating six of the non-detect samples in order that the UCL be less than the maximum value is not clear.

EPA Response

The standard practice by EPA in risk assessment calculations is to eliminate non-detect samples.

2.7.4.2.11.7.7 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #7

Page 2-7: UCLs for PAHs are based on a single hot spot.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.7.8 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #8

Page 2-8: DDT and dieldrin are principal contributors to risk in surface water, but these chemicals are not likely to be site-related.

EPA Response

See Response Number 2.7.4.1.5.

2.7.4.2.11.7.9 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #9

Page 2-13: There is no discussion of the implication of use of single DDT sample on risk calculations.

EPA Response

EPA followed standard risk assessment guidances regarding the calculation of risk (see Response Number 2.7.4.1.3).

2.7.4.2.11.7.10 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #10

Page 2-14: The use of chemicals with very low frequency of detection and no site relevance is questionable.

EPA Response

See Response Numbers 2.7.4.2.11.7.9 and 2.7.4.1.5.

2.7.4.2.11.7.11 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #11

Page 2-15: The number of detected values is not listed for sediments. It is also unclear how the mean values were calculated and it is noted that many are estimated "J" values.

EPA Response

The numbers of detected values for sediments are listed on Tables I.8 and I.9 in the RI (Weston, 1995). An explanation of the calculation of the mean values is in Section 6.2.3 of the RI. Section 6.2.3 states in part: "The arithmetic mean was calculated for contaminants of concern in each medium by summing the sample results and dividing by the number of sample locations. If a chemical was reported as a non-detect in a sample for a sample set with detects or "J" values, it was assumed to be present at one-half of the limit of detection for that sample." An explanation of the calculation of the and use of "J" values is in Section 6.2.2 of the RI. Section 6.2.2 states in part: "All data qualified by a single flag of "J" were assumed to be valid. Data may be a qualified "J" if they are identified below the contract required quantitation limits, if holding times are exceeded, it instrument calibration was found to be outside of control limits, or for several other reasons outlined in EPA data validation guidance documents. Data flagged with a "UJ" or "NJ" were considered non-detects."

2.7.4.2.11.7.12 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #12

Page 2-17 (Table 2-7): The average value reported for several chemicals exceed the maximum value listed.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.7.13 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #13

Page 2-20 (Table 2-9): Ingestion rate, exposure duration, and exposure frequency for maintenance worker seem reasonable; but in combination represent an substantial overestimation of exposure.

EPA Response

See Response Number 2.7.4.1.3..

2.7.4.2.11.7.14 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #14

Similar comment to Number 2.7.4.2.11.7.13.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.7.15 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #15

Page 2-22: The description of the development of soil ingestion rate is unclear but appears to result in a high value.

EPA Response

The description of the development of the soil ingestion rates are in the EPA risk guidances, see Response Number 2.7.4.1.3.

2.7.4.2.11.7.16 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #16

Page 2-23: Dermal absorption factors do not account for decreased bioavailability with time and are overly conservative.

EPA Response

EPA's Human Health Risk Assessment Guidance does not include the consideration of changes in bioavailability over time. It may be true that aging of a pollutant in the environment can influence its ability to be absorbed by humans via the dermal route of exposure; however, in some cases this may enhance absorption, while in other cases inhibit absorption of the contaminant. EPA does not believe that there is sufficient published literature on this phenomenon that would support departing from the current approach used to evaluate human health risk via dermal exposure.

2.7.4.2.11.7.17 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #17

Page 2-24: The discussion of Table 2-12 fails to note that only a small percentage of samples collected actually contained detectable amounts of target chemicals.

EPA Response

See Response Number 2.7.4.2.11.3.10.1.

2.7.4.2.11.7.18 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #18

Page 2-24: The shellfish ingestion rate appears reasonable but the rationale for the value is not provided.

EPA Response

The shellfish ingestion rate of 54 g/day was obtained from the EPA guidance "Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors," March 1991.

2.7.4.2.11.7.19 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #19

Page 2-25: Individual exposure factors seem reasonable but collectively, the values make little sense. What are the children doing that results in 4500 cm^2 of skin exposure for 2.6 hrs/day for 10 years?

EPA Response

EPA followed standard risk assessment guidances regarding the calculation of risk (see Response Number 2.7.4.1.3).

2.7.4.2.11.7.20 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #20

Page 2-36: Risk to maintenance workers exceeds 10^{-4} based on single sample. Also, cookbook approach to risk assessment and lack of uncertainty resulted in inappropriate conclusions.

EPA Response

See Response Numbers 2.7.4.1.3 and 2.7.4.2.11.2.6.

2.7.4.2.11.7.21 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #21

Page 2-37: Risks are lower than expected for Surface Water Pathway Table 2-18.

EPA Response

EPA followed standard risk assessment guidances regarding the calculation of risk (see Response Number 2.7.4.1.3).

2.7.4.2.11.7.22 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #22

Page 2-38: Much of risk estimated is based on a single elevated PAH sample. Also, estimated exposure resulted in an unlikely overestimation of actual risk.

EPA Response

See Response Number 2.7.4.1.3.

2.7.4.2.11.7.23 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #23

This is the same comment as Number 2.7.4.2.11.3.4.

EPA Response

See Response Number 2.7.4.2.11.3.4.

2.7.4.2.11.7.24 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #24

Page 3-3: Biota-Sediment Accumulation Factors (BSAFs) are noted as based on empirical data. It is more appropriate to note that the empirical data used as the basis for the value is extremely limited. The use of literature values to at least confirm the empirical results is essential. (This comment relates to sediment cleanup levels for shellfish ingestion risks.)

EPA Response

Sediment cleanup levels based on shellfish ingestion by humans were not selected in the Proposed Plan nor in the Selected Remedy. See Section XI.B. of the Selected Remedy for a discussion regarding sediment cleanup levels.

2.7.4.2.11.7.25 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #25

Page 3-7: Cleanup levels for lead in soil for adults can be higher than 600 mg/kg.

EPA Response

The 600 mg/kg cleanup level is based on EPA's model for the evaluation of risk associated with an adult exposure to lead in soil. This value is based on site specific soil ingestion rates to provide adequate protection of a fetus, rather than exposure of a female, since the fetus is believed to be more sensitive to adverse effects of lead than an adult. In managing risk from lead, EPA strives to achieve fetal blood lead levels below 10 ug/dl.

2.7.4.2.11.7.26 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #26

Page 3-9 (Table 3-4) The listed Risk Based Clean-Up Goals (RBCs) are very low, generally below rural background levels. RBCs can be certainly below background in some cases, but the presence of so many low values suggest additional refinement of the risk assessment is needed.

EPA Response

The Risk Based Clean-up Goals (which are in Table 3-6 on page 3-9, not Table 3-4) were calculated based on cancer risk of 1×10^{-6}. The risk assessment was updated in September of 1998 (Weston, 1998c). EPA selected cleanup goals based (see Table 13 of the ROD) upon this updated risk assessment and believes that these goal are protective of a commercial worker in the commercial area.

2.7.4.2.11.8.1 Dr. Menzie Memo dated February 17, 1999 Comments on Draft Feasibility Study by Weston, April 20, 1998 - Page Specific Comment #1

Page 2-17: Comparison with background is very limited, consisting of comparison with three site-specific values and with the 50th percentile concentration from the MADEP rural background data set.

EPA Response

Since the Site background data set is small, use of the rural background data set is adequate for comparison purposes since the rural background data set are based on a large data set, as stated in the Draft FS (dated April 1998).

2.7.4.2.11.8.2 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2

Tables 2-3 to 2-10: Cleanup goals are subject to a host of problems.

EPA Response

See Responses Numbers 2.7.4.2.11.8.2.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.11.8.2.1 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2.1

No background concentrations are provided for PAHs, even though these chemicals are ubiquitous in urban soil.

EPA Response

PAHs concentrations were presented in Figures 4-2 and 4-8 of the RI (Weston, 1995). There were several sample locations (including sample locations on-site) that had PAH concentrations below detection limits. Thus for this Site, background concentrations for PAHs would be considered non-detect.

2.7.4.2.11.8.2.2 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2.2

Cleanup levels of 10^{-6} cleanup below EPA 10^{-4} risk target.

EPA Response

See Response Number 2.7.4.2.11.3.8.

2.7.4.2.11.8.2.3 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2.3

Cleanup levels for soil to protect groundwater are inappropriate when actual groundwater concentrations can be measured.

EPA Response

The groundwater is being contaminated by the contamination in the soils at the Site. The cleanup goals in the selected remedy removes this continuing source of contamination by removing the contaminated soils. EPA is unsure how measuring groundwater concentrations alone would remediate the Site.

2.7.4.2.11.8.2.4 Dr. Menzie Memo dated February 17, 1999 - Page Specific Comment #2.4

Ecological risk-based concentrations that are below background clearly make no sense.

EPA Response

EPA agrees that "ecological risk-based concentrations that are below background clearly make no sense." There are no cleanup goals below background concentrations.

2.7.4.2.12 Rizzo and Menzie-Cura Comment - Appendix B 1998 Plant and Clam Sampling Results

Atlas Tack included a memo titled "Selected 'Reality Check' on the Risk Assessment Performed by EPA for the Atlas Tack Site," by Menzie-Cura & Associates, Inc. dated November 5, 1998. This memo included an introduction, reality check on contaminant levels in vegetation, reality check on wet weight versus dry weight measures for hard-shell clams, conclusions, sampling photographs, and sampling map. These comments have been discussed in previous Atlas Tack comments including 2.7.4.1.6, 2.7.4.2.5.1, and 2.7.4.2.11.3.1.

EPA Response

See Response Numbers 2.7.4.1.6, 2.7.4.2.5.1, and 2.7.4.2.11.3.1.

2.7.4.2.13 Rizzo and Menzie-Cura Comment - Appendix C 1999 Groundwater Sampling Results

Eric Axelrod and Richard Hughto (both from Rizzo Associates, Inc.) sent a letter to Martin Legg (Atlas Tack Corp.) dated February 19, 1999, presenting their groundwater sampling results. The letter included the monitoring well purging, monitoring well sampling, groundwater analytical results. These results have been discussed in previous Atlas Tack comments, including 2.7.4.1.6.

EPA Response

See Response Number 2.7.4.1.6.

2.7.4.2.14 Rizzo and Menzie-Cura Comment - Appendix D 1999 Page-Specific Comment on the Risk Assessment

These comments are exactly the same comments as Comment Numbers 2.7.4.2.11.7.2 to 2.7.4.2.11.7.26 and 2.7.4.2.11.8.1 to 2.7.4.2.11.8.2.4.

EPA Response

See previous responses to Comments Numbers 2.7.4.2.11.7.2 to 2.7.4.2.11.7.26 and

2.7.4.2.11.8.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.15 Rizzo and Menzie-Cura Comment - Appendix E Page-Specific Comment on the FS

These comments are exactly the same comments as Comment Numbers 2.7.4.2.11.8.1 to 2.7.4.2.11.8.2.4.

EPA Response

See previous responses to Comments Numbers 2.7.4.2.11.8.1 to 2.7.4.2.11.8.2.4.

2.7.4.2.16 Rizzo and Menzie-Cura Comment - Appendix F Ecological Risk Management Principles for Superfund Sites

As part of its comments, Atlas Tack included a copy of a draft EPA document, entitled "Ecological Risk Management Principles for Superfund Sites," dated August 13, 1998, which it referenced in comment Number 2.7.4.2.4.

EPA Response

See Response Numbers 2.7.4.1.3, 2.7.4.1.4, and 2.7.4.2.4.

2.7.5 Mr. Martin Legg letter dated March 11, 1999

This commenter's letter included supplemental laboratory data to the Rizzo Associates memo "Comments to the Proposed Cleanup Plan," dated February 19, 1999. This information amended Section 5.3 and Appendix C of the Rizzo Associates memo.

EPA Response

See Response Number 2.7.4.1.6.

Appendix B - Administrative Record Index

Atlas Tack Corp. Superfund Site
Record of Decision

Atlas Tack Corp.
NPL Site

Administrative Record

Index

Compiled: December 1, 1998
Recompiled: March 8, 2000

Prepared by
EPA-New England
Office of Site Remediation and Restoration

With Assistance From
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2070 Chain Bridge Road
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INTRODUCTION

This document is the Index to the Administrative Record for the remedial action at the Atlas Tack Corp. Superfund Site. The citations in the Index are for those documents that EPA relied upon in selecting a response action at the Site. Site-specific documents are cited in Section I of the Index, and EPA guidance documents are cited in Section II. Documents cited in Section I of the Index are ordered by the Document Number that appears at the end of each citation.

The Administrative Record is available for public review at the EPA New England Office of Site Remediation and Restoration (OSRR) Records Center, 1 Congress Street, 11th Floor, Boston, Massachusetts 02114 [(617) 918-1440], and the Millicent Public Library, 45 Center Street, Fairhaven, MA 02719. Please note that this Administrative Record also incorporates, by reference, the documents in the May 27, 1992 removal action Administrative Record for this Site. EPA guidance documents cited in Section II are available for review only at the OSRR Records Center. The Staff of the OSRR Records Center recommends that you set up an appointment prior to your visit.

Questions concerning the Administrative Record should be addressed to the Remedial Project Manager for the Atlas Tack Corp. Superfund Site.

An Administrative Record is required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

03.06 REMEDIAL INVESTIGATION - REMEDIAL INVESTIGATION REPORTS

Title:	Remedial Investigation Report, Atlas Tack Corporation, Fairhaven, Massachusetts, Volumes 1-5.		
Addressee:	US EPA REGION 1		
Authors:	ROY F WESTON INC		
Date:	May 5, 1995		
Format:	REPORT, STUDY	No. Pgs:	508
AR No.	03.06.1	Document No.	000001

04.06 FEASIBILITY STUDY - FEASIBILITY STUDY REPORTS

Title:	Final Technical Memorandum, Structural Assessment, Atlas Tack Building, Fairhaven, Massachusetts		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	October 30, 1996		
Format:	MEMORANDUM	No. Pgs:	98
AR No.	04.06.1	Document No.	000025

Title:	Final Technical Memorandum, Development of Human Health Risk-Based Concentrations for Current/Future Use, Atlas Tack Corporation, Fairhaven, MA.		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	October 17, 1997		
Format:	MEMORANDUM	No. Pgs:	26
AR No.	04.06.2	Document No.	000026

Title:	Technical Memorandum, Ecological-Based Cleanup Goals, Atlas Tack Superfund Site, Fairhaven, MA.		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	November 11, 1997		
Format:	REPORT, STUDY	No. Pgs:	148
AR No.	04.06.3	Document No.	000002

Title:	Update of Baseline Human Health Risk Assessment and Development of Risk-Based Clean-Up Levels.		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	April 23, 1998		
Format:	MEMORANDUM	No. Pgs:	156
AR No.	04.06.4	Document No.	000027

Title:	Draft Final Feasibility Study, Atlas Tack Corporation Superfund Site, Fairhaven, MA.		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	July 10, 1998		
Format:	REPORT, STUDY	No. Pgs:	790
AR No.	04.06.5	Document No.	000003

Title:	Final Revised Supplement to Update of Baseline Human Health Risk Assessment and Development of Risk-Based Clean-Up Levels, Atlas Tack Superfund Site.		
Addressee:	US DOD/ARMY CORP OF ENGINEERS		
Authors:	ROY F WESTON INC		
Date:	September 10, 1998		
Format:	REPORT, STUDY	No. Pgs:	16
AR No.	04.06.6	Document No.	000028

04.09 FEASIBILITY STUDY - PROPOSED PLANS FOR SELECTED REMEDIAL ACTION

Title:	Proposed Cleanup Plan, Atlas Tack Corp. Superfund Site.		
Authors:	US EPA REGION 1		
Date:	December 1998		
Format:	FACT SHEET, PRESS RELEASE	No. Pgs:	15
AR No.	04.09.1	Document No.	000030

05.03 RECORDS OF DECISION - RESPONSIVENESS SUMMARIES

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: CHANNING W HAYWARD
Date: December 2, 1998
Format: LETTER No. Pgs: 1
AR No. 05.03.1 Document No. 000031

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: ROBERT T HAMILTON - FAIRHAVEN BOARD OF SELECTMEN
Date: December 2, 1998
Format: LETTER No. Pgs: 1
AR No. 05.03.2 Document No. 000059

Title: Comment on Proposed Plan [Cross-Reference to 16.1].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: KENNETH FINKELSTEIN - US DEPT OF COMMERCE/NOAA
Date: December 8, 1998
Format: LETTER No. Pgs: 1
AR No. 05.03.3 Document No. 000080

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARINUS VANDERPOL JR - FAIRHAVEN CONSERVATION COMMISSION
Date: December 21, 1998
Format: LETTER No. Pgs: 2
AR No. 05.03.4 Document No. 000064

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: RAE ANN SILVA, WILLIAM SILVA
Date: 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.5 Document No. 000049

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: HENRY FERREIRA
Date: 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.6 Document No. 000058

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: PATRICIA A ESTRELLA, ALBERT G KENNEY
Date: January 11, 1999
Format: MEMORANDUM No. Pgs: 1
AR No. 05.03.7 Document No. 000032

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: HIBEN SKARSTEIN
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.8 Document No. 000033

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: DONALD SYLVIA, IMELDA E SYLVIA, GERARD A VIEL
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.9 Document No. 000034

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: JOSE BAPTISTA, MRS JOSE BAPTISTA
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.10 Document No. 000035

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: JOHN CHAMBERLAIN
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.11 Document No. 000036

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: BESSIE B SOUZA
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.12 Document No. 000037

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: SHIRLEY THEBERGE, STEPHEN THEBERGE
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.13 Document No. 000038

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: BEVERLY VIEIRA
Date: January 11, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.14 Document No. 000039

Title: Comment on Proposed Plan.
Addressee: JOHN P DEVILLARS - US EPA REGION 1
Authors: ALBERT R TEIXEIRA
Date: January 12, 1999
Format: LETTER No. Pgs: 3
AR No. 05.03.15 Document No. 000040

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MICHAEL J BOUVIER
Date: January 13, 1999
Format: LETTER No. Pgs: 3
AR No. 05.03.16 Document No. 000042

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: ROBERT T HAMILTON, WINFRED A ECKENREITER, BRYAN D WOOD - FAIRHAVEN BOARD OF SELECTMEN
Date: January 14, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.17 Document No. 000060

Title: Comment on Proposed Plan.
Addressee: JOHN P DEVILLARS - US EPA REGION 1
Authors: ROBERT T HAMILTON, WINFRED A ECKENREITER, BRYAN D WOOD - FAIRHAVEN BOARD OF SELECTMEN
Date: January 14, 1999
Format: LETTER No. Pgs: 11
AR No. 05.03.18 Document No. 000061

Title: Comment on Proposed Plan.
Addressee: US EPA REGION 1
Authors: GARY S GOLAS - FAIRHAVEN DEPT OF WATERWAYS RESOURCES
Date: January 14, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.19 Document No. 000069

Title: Response to Marinus VanderPol, Jr.'s Letter of December 21, 1998.
Addressee: MARINUS VANDERPOL JR - FAIRHAVEN CONSERVATION COMMISSION
Authors: SANDRA DUPUY - US EPA REGION 1
Date: January 19, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.20 Document No. 000065

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: WILLIAM M STRAUS - MA HOUSE OF REPRESENTATIVES
Date: January 19, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.21 Document No. 000074

Title: Comment on Proposed Plan [Cross-Reference to 14.1].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: BARNEY FRANK, JOHN F KERRY - US CONGRESS
Date: January 20, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.22 Document No. 000079

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: BRIAN K BOWCOCK
Date: January 21, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.23 Document No. 000043

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: FAIRHAVEN CONSERVATION COMMISSION
Date: January 21, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.24 Document No. 000066

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: ROMAN RUSINOSKI
Date: January 23, 1999
Format: LETTER No. Pgs: 3
AR No. 05.03.25 Document No. 000044

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARK MONTIGNY - MA SENATE
Date: January 24, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.26 Document No. 000075

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: RAYMOND L RICHARD, DAVID SZELIGA, DR EDWARD J MEE - FAIRHAVEN BOARD OF HEALTH
Date: January 25, 1999
Format: LETTER No. Pgs: 3
AR No. 05.03.27 Document No. 000072

Title: Comment on Proposed Plan [Cross-Reference to 9.1].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: RICHARD G J GRELOTTI - MA EXEC OFFICE OF PUBLIC SAFETY
Date: January 26, 1999
Format: LETTER No. Pgs: 4
AR No. 05.03.28 Document No. 000077

Title:	Comment on Proposed Plan.		
Addressee:	PAUL CRAFFEY - US EPA REGION 1		
Authors:	MARGO VOLTERRA		
Date:	January 27, 1999		
Format:	MEMORANDUM	No. Pgs:	1
AR No.	05.03.29	Document No.	000046

Title:	Comment on Proposed Plan [Cross-Reference to 11.9].		
Addressee:	PAUL CRAFFEY - US EPA REGION 1		
Authors:	KEVIN J OCONNOR		
Date:	January 27, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.30	Document No.	000081

Title:	Comment on Proposed Plan by Margo Volterra to Paul Craffey and Response.		
Addressee:	MARGO VOLTERRA		
Authors:	PAUL CRAFFEY - US EPA REGION 1		
Date:	January 28, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.31	Document No.	000045

Title:	Comment on Proposed Plan by William Mc Lane to Paul Craffey, EPA Region 1, and Response.		
Addressee:	WILLIAM F MCLANE		
Authors:	PAUL CRAFFEY - US EPA REGION 1		
Date:	January 29, 1999		
Format:	MEMORANDUM	No. Pgs:	2
AR No.	05.03.32	Document No.	000048

Title:	Comment on Proposed Plan.		
Addressee:	US EPA REGION 1		
Authors:	SHIRLEY THEBERGE, STEPHEN THEBERGE		
Date:	February 1, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.33	Document No.	000050

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: ROBERT T HAMILTON, WINFRED A ECKENREITER, BRYAN D WOOD - FAIRHAVEN BOARD OF SELECTMEN
Date: February 1, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.34 Document No. 000063

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: DONNA JENNINGS, EDWARD H JENNINGS JR
Date: February 7, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.35 Document No. 000052

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARK RASMUSSEN - COALITION FOR BUZZARDS BAY
Date: February 8, 1999
Format: LETTER No. Pgs: 5
AR No. 05.03.36 Document No. 000053

Title: Response to Fairhaven Conservation Commission's January 21, 1999 Letter.
Addressee: WAYNE FOSTIN - FAIRHAVEN CONSERVATION COMMISSION
Authors: PAUL CRAFFEY - US EPA REGION 1
Date: February 10, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.37 Document No. 000067

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARINUS VANDERPOL JR - FAIRHAVEN CONSERVATION COMMISSION
Date: February 11, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.38 Document No. 000068

Title:	Response to Albert Teixeira Letter of January 12, 1999.		
Addressee:	ALBERT R TEIXEIRA		
Authors:	PATRICIA MEANEY - US EPA REGION 1		
Date:	February 12, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.39	Document No.	000041

Title:	Response to Margo Volterra's January 27, 1999 Comment on Proposed Plan.		
Addressee:	MARGO VOLTERRA		
Authors:	PATRICIA MEANEY - US EPA REGION 1		
Date:	February 18, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.40	Document No.	000047

Title:	Response to the Theberge's Letter of February 1, 1999.		
Addressee:	STEPHEN THÈBERGE		
Authors:	PATRICIA MEANEY - US EPA REGION 1		
Date:	February 18, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.41	Document No.	000051

Title:	Comment on Proposed Plan.		
Addressee:	PAUL CRAFFEY - US EPA REGION 1		
Authors:	CLAUDIA KIRK		
Date:	February 18, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.42	Document No.	000055

Title:	Comment on Proposed Plan.		
Addressee:	DAN COUGHLIN - US EPA REGION 1		
Authors:	PATRICIA PELCZAR		
Date:	February 19, 1999		
Format:	LETTER	No. Pgs:	2
AR No.	05.03.43	Document No.	000057

Title: Comment on Proposed Plan.
Addressee: JOHN P DEVILLARS - US EPA REGION 1
Authors: GARY S GOLAS - FAIRHAVEN DEPT OF WATERWAYS RESOURCES
Date: February 19, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.44 Document No. 000070

Title: Comment on Proposed Plan.
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: PAUL E FRANCIS - FAIRHAVEN BOARD OF PUBLIC WORKS
Date: February 19, 1999
Format: LETTER No. Pgs: 2
AR No. 05.03.45 Document No. 000073

Title: Comment on Proposed Plan [Cross-Reference to 9.1].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: JAY NAPARSTEK - MA DEPT OF ENVIRONMENTAL PROTECTION
Date: February 19, 1999
Format: LETTER No. Pgs: 8
AR No. 05.03.46 Document No. 000076

Title: Comment on Proposed Plan [Cross-Reference to 9.1].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARGARET M BRADY - MA EXEC OFFICE OF ENVIRONMENTAL AFFAIRS
Date: February 19, 1999
Format: LETTER No. Pgs: 6
AR No. 05.03.47 Document No. 000078

Title: Comment on Proposed Plan [Cross-Reference to 11.9].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARTIN L LEGG - ATLAS TACK CORP
Date: February 19, 1999
Format: LETTER No. Pgs: 1
AR No. 05.03.48 Document No. 000082

Title:	Comment on Proposed Plan [Cross-Reference to 11.9].		
Addressee:	PAUL CRAFFEY - US EPA REGION 1		
Authors:	M L LEWIS - ATLAS TACK CORP		
Date:	February 19, 1999		
Format:	LETTER	No. Pgs:	137
AR No.	05.03.49	Document No.	000083

Title:	Comment on Proposed Plan by George Vezina to Paul Craffey, EPA Region 1, and Response.		
Addressee:	GEORGE VEZINA		
Authors:	PAUL CRAFFEY - US EPA REGION 1		
Date:	February 22, 1999		
Format:	MEMORANDUM	No. Pgs:	2
AR No.	05.03.50	Document No.	000054

Title:	Comment on Proposed Plan by Kim McLaughlin to Paul Craffey, EPA Region 1 and Response.		
Addressee:	KIM MCLAUGHLIN		
Authors:	PAUL CRAFFEY - US EPA REGION 1		
Date:	February 22, 1999		
Format:	MEMORANDUM	No. Pgs:	1
AR No.	05.03.51	Document No.	000056

Title:	Response to Fairhaven Selectmen's January 14, 1999 Letter.		
Addressee:	ROBERT T HAMILTON - FAIRHAVEN BOARD OF SELECTMEN		
Authors:	JOHN P DEVILLARS - US EPA REGION 1		
Date:	February 23, 1999		
Format:	LETTER	No. Pgs:	2
AR No.	05.03.52	Document No.	000062

Title:	Response to Gary Golas' February 19, 1999 Letter.		
Addressee:	GARY S GOLAS - FAIRHAVEN DEPT OF WATERWAYS RESOURCES		
Authors:	JOHN P DEVILLARS - US EPA REGION 1		
Date:	March 5, 1999		
Format:	LETTER	No. Pgs:	1
AR No.	05.03.53	Document No.	000071

Title: Comment on Proposed Plan [Cross-Reference to 11.9].
Addressee: PAUL CRAFFEY - US EPA REGION 1
Authors: MARTIN L LEGG - ATLAS TACK CORP
Date: March 11, 1999
Format: LETTER   No. Pgs: 23
AR No. 05.03.54   Document No. 000084

Title: Responsiveness Summary.
Authors: US EPA REGION 1
Date: March 2000
Format: REPORT, STUDY
AR No. 05.03.55   Document No. 000095

Title: Record of Decision.
Authors: US EPA REGION 1
Date: March 2000
Format: REPORT, STUDY
AR No. 05.03.56   Document No. 000096

13.02 COMMUNITY RELATIONS - COMMUNITY RELATIONS PLANS

Title: Community Relations Plan, Atlas Tack Corporation Superfund Site, Fairhaven, Massachusetts.
Addressee: US EPA REGION 1
Date: April 1997
Format: REPORT, STUDY   No. Pgs: 27
AR No. 13.02.1   Document No. 000029

13.03 COMMUNITY RELATIONS - NEWS CLIPPINGS/PRESS RELEASES

Title: Notice to Mailing List.
Authors: US EPA REGION 1
Date: November 19, 1998
Format: PUBLIC MEETING RECORDS   No. Pgs: 1
AR No. 13.03.1   Document No. 000085

Title:	Public Notice.		
Authors:	US EPA REGION 1		
Date:	December 1998		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	1
AR No.	13.03.2	Document No.	000086

Title:	Public Notice.		
Authors:	US EPA REGION 1		
Date:	January 1999		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	1
AR No.	13.03.3	Document No.	000087

13.04 COMMUNITY RELATIONS - PUBLIC MEETINGS/HEARINGS

Title:	Agenda, Atlas Tack Community Relations Public Meeting.		
Authors:	US EPA REGION 1		
Date:	April 6, 1995		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	1
AR No.	13.04.1	Document No.	000009

Title:	Atlas Tack Corp. Superfund Site, Town Representative Meeting.		
Authors:	PAUL CRAFFEY - US EPA REGION 1		
Date:	May 22, 1995		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	3
AR No.	13.04.2	Document No.	000010

Title:	Atlas Tack Corp. Superfund Site, Remedial Investigation Meeting.		
Authors:	US EPA REGION 1		
Date:	July 11, 1995		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	17
AR No.	13.04.3	Document No.	000011

Title:	Meeting Summary Number 1, Atlas Tack Corp. Superfund Site, Citizen/Government Work Group.		
Authors:	US EPA REGION 1		
Date:	August 15, 1995		
Format:	PUBLIC MEETING RECORDS	No. Pgs:	4
AR No.	13.04.4	Document No.	000012

Title: Meeting Summary Number 2, Atlas Tack Corp. Superfund Site, Citizen/Government Work Group.
Authors: US EPA REGION 1
Date: November 15, 1995
Format: PUBLIC MEETING RECORDS No. Pgs: 17
AR No. 13.04.5 Document No. 000013

Title: Memorandum for the Record: Meeting with Fairhaven, Massachusetts Town Officials Regarding Atlas Tack Feasibility Study.
Date: April 10, 1996
Format: PUBLIC MEETING RECORDS No. Pgs: 5
AR No. 13.04.6 Document No. 000014

Title: Memorandum for the Record: Atlas Tack Superfund Site Feasibility Study Public Meeting.
Date: April 24, 1996
Format: PUBLIC MEETING RECORDS No. Pgs: 6
AR No. 13.04.7 Document No. 000015

Title: Meeting Summary Number 3, Atlas Tack Corp. Superfund Site, Citizen/Government Work Group.
Authors: US EPA REGION 1
Date: September 10, 1996
Format: PUBLIC MEETING RECORDS No. Pgs: 6
AR No. 13.04.8 Document No. 000016

Title: Agenda, Environmental Roundtable, New Bedford, MA.
Date: February 24, 1997
Format: PUBLIC MEETING RECORDS No. Pgs: 1
AR No. 13.04.9 Document No. 000017

Title: Meeting Summary Number 4, Atlas Tack Corp. Superfund Site, Citizen/Government Work Group.
Authors: US EPA REGION 1
Date: February 25, 1997
Format: PUBLIC MEETING RECORDS No. Pgs: 6
AR No. 13.04.10 Document No. 000018

Title: Meeting Summary Number 5, Atlas Tack Corp. Superfund Site, Citizen/Government Work Group.
Authors: US EPA REGION 1
Date: November 12, 1997
Format: PUBLIC MEETING RECORDS No. Pgs: 8
AR No. 13.04.11 Document No. 000019

Title: Meeting Summary Number 6, Citizen/Government Work Group, Atlas Tack Corp. Superfund Site.
Authors: US EPA REGION 1
Date: May 13, 1998
Format: PUBLIC MEETING RECORDS No. Pgs: 13
AR No. 13.04.12 Document No. 000020

Title: Meeting Summary Number 7, Citizen/Governmenta Work Group, Atlas Tack Corp. Superfund Site.
Authors: US EPA REGION 1
Date: August 6, 1998
Format: PUBLIC MEETING RECORDS No. Pgs: 15
AR No. 13.04.13 Document No. 000021

Title: Information Meeting - Agenda and Handouts.
Authors: US EPA REGION 1
Date: December 1, 1998
Format: LETTER No. Pgs: 11
AR No. 13.04.14 Document No. 000088

Title: Information Meeting - Agenda and Handouts.
Authors: US EPA REGION 1
Date: January 27, 1999
Format: PUBLIC MEETING RECORDS No. Pgs: 6
AR No. 13.04.15 Document No. 000089

Title: Transcript of Site Information Meeting - EPA Public Hearing.
Authors: LAPLANTE & ASSOCIATES
Date: January 27, 1999
Format: PUBLIC MEETING RECORDS No. Pgs: 29
AR No. 13.04.16 Document No. 000090

Title: Transcript of EPA Public Hearing.
Authors: LAPLANTE & ASSOCIATES
Date: February 11, 1999
Format: PUBLIC MEETING RECORDS No. Pgs: 69
AR No. 13.04.17 Document No. 000091

13.05 COMMUNITY RELATIONS - FACT SHEETS/INFORMATION UPDATES

Title: Atlas Tack Remedial Investigation Results.
Authors: US EPA REGION 1
Date: June 1995
Format: FACT SHEET, PRESS RELEASE No. Pgs: 9
AR No. 13.05.1 Document No. 000022

Title: Atlas Tack Corp., Massachusetts.
Authors: US EPA REGION 1
Date: January 1998
Format: FACT SHEET, PRESS RELEASE No. Pgs: 3
AR No. 13.05.2 Document No. 000023

Title: Atlas Tack Feasibility Study Fact Sheet.
Authors: US EPA REGION 1
Date: August 1998
Format: FACT SHEET, PRESS RELEASE No. Pgs: 8
AR No. 13.05.3 Document No. 000024

Title: Atlas Tack Q & A Regarding Questions at December 1, 1998 Informational Meetings.
Authors: US EPA REGION 1
Date: January 1999
Format: FACT SHEET, PRESS RELEASE No. Pgs: 2
AR No. 13.05.4 Document No. 000092

Title: Atlas Tack Q & A Regarding Questions at December 1, 1998 and January 27, 1999 Informational Meetings.
Authors: US EPA REGION 1
Date: February 1999
Format: FACT SHEET, PRESS RELEASE No. Pgs: 2
AR No. 13.05.5 Document No. 000093

16.01 NATURAL RESOURCE TRUSTEE - CORRESPONDENCE

Title:	Comment on the Proposed Plan.		
Addressee:	KENNETH FINKELSTEIN - US DEPT OF COMMERCE/NOAA		
Authors:	PAUL CRAFFEY - US ENVIRONMENTAL PROTECTION AGENCY		
Date:	December 8, 1998		
Format:	LETTER	No. Pgs:	1
AR No.	16.01.1	Document No.	000097

Title:	Analysis of Atlas Tack Corporation's February 19, 1999 Comment on Proposed Plan.		
Addressee:	PAUL CRAFFEY - US EPA REGION 1		
Authors:	KENNETH FINKELSTEIN - US DEPT OF COMMERCE/NOAA		
Date:	February 25, 1999		
Format:	LETTER	No. Pgs:	3
AR No.	16.01.2	Document No.	000094

GUIDANCE DOCUMENTS

The EPA guidance documents listed below were considered during the process of selecting the response action for the Atlas Tack Superfund Site. These EPA guidance documents can be viewed at the EPA New England Office of Site Remediation and Restoration Records Center, 1 Congress Street, 11th Floor, Boston, MA 02114.

1. Additional Interim Guidance for Fiscal Year 1987 Records of Decision. Final. J. Winston Porter. OSWER #9355.0-21. July 24, 1987. [C001]

2. Basics of Pump-and-Treat Ground-Water Remediation Technology. Kerr Environmental Research Laboratory. EPA/600/8-90/003. March 1, 1990. [C194]

3. CERCLA Compliance with Other Environmental Statutes. J. Winston Porter. Office of Solid Waste and Emergency Response. OSWER #9234.0-2. October 2, 1985. [3001]

4. CERCLA Compliance with Other Laws Manual (Draft). Office of Emergency and Remedial Response. OSWER #9234.1-01. August 8, 1988. [3002]

5. CERCLA Compliance with Other Laws Manual-CERCLA Compliance with State Requirements [Quick Reference Fact Sheet]. OSWER #9234.2-05FS. December 1, 1989. [3009]

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7. CERCLA Compliance with Other Laws Manual. RCRA ARARs: Focus on Closure Requirements. OSWER #9234.2-04FS. October 1, 1989. [3017]

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Appendix C - Description of the Excavation, Treatment, and Disposal of Wastes and Contaminated Media

Atlas Tack Corp. Superfund Site
Record of Decision

Memorandum

Description of the Excavation, Treatment, and Disposal of Wastes and Contaminated Media

1.0 Background

The protocol for the disposition of wastes and contaminated media at the Site was developed in accordance with EPA and DEP policies and requirements for management of contaminated media. The primary references are the memorandum "Management of Remediation Waste Under RCRA," by Timothy Fields, Jr. and Steven A. Herman, dated October 14, 1998, and the Contaminated Media rule (Final Rule, Federal Register, 63 FR 65874, November 1998). The primary DEP reference is the "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills," DEP Policy # COMM-97-001, dated August 15, 1997. EPA and DEP regulations regarding hazardous waste disposal were also reviewed.

The volumes of wastes and contaminated media (soils, sediments, and debris) to be excavated from the Commercial Area, Solid Waste and Debris (SWD) Area (which consists of the Commercial and Industrial Debris (CID) Area, the Fill Area, and the Former Lagoon Area), the Marsh Surface Soils (MSS), and the Creek Bed Sediments (CBS) were estimated as described in Appendix G of the FS (Weston, 1998b). The estimates of the quantities of debris and soil that could be separated from the debris were estimated from the RI test pit and soil boring logs (Weston, 1995). For the SWD and CBS areas, the RI analytical data were then reviewed to evaluate whether debris and soil might "fail" the RCRA *characteristic* analysis. For the MSS, the x-ray fluorescence (KEVEX) field screening data was used, corrected for lead content (based on the correlation between field screening and laboratory analysis of split samples).

The solid waste, debris, and treated and un-treated soils and sediments will be disposed of in the appropriate off-site disposal facilities in compliance with the EPA Off-Site Rule, 40 CFR 300.440.

The five categories of off-site disposal facilities are expected to be:

<u>Non-Hazardous Wastes</u>

- A local landfill that could accept non-hazardous vegetation, decontaminated large debris, and soils suitable for use as cover, per DEP policy.
- A RCRA "D" landfill that could accept virtually any non-hazardous waste. A special permit would be required from DEP in order for an existing Massachusetts landfill to fit into this category.

Hazardous or TSCA Wastes

- A landfill at a licensed RCRA Treatment, Storage, or Disposal Facility (TSDF).
- A licensed RCRA TSDF that could accept contaminated media rejected by the RCRA landfill (e.g., subject to Land Disposal Restrictions (LDRs) or not allowed by the facility's operating permit).
- A Toxic Substances and Control Act (TSCA) landfill for regulated PCB materials.

Available facilities in the last three facility categories would be located outside of Massachusetts. The waste amounts and disposal options for each waste category and unit transportation and disposal (T&D) costs are shown on Table C-1 and Figure C-1. The costs are based on communication with representatives of facilities permitted or licensed to accept waste or contaminated media in one or more of the above five categories.

The following presents the assumptions underlying the selected remedy.

2.0 Excavation and Characterization

Wastes and contaminated materials (soils, sediments, and debris) excavated from the Commercial, SWD, MSS, and CBS Areas would need to be stockpiled and sampled. The contaminated materials would be analyzed to determine:

- if they are *listed* hazardous waste,
- if they "contain" *listed* hazardous waste,
- if they exhibit a *characteristic* of hazardous waste,
- if they meet the site-specific cleanup goals without treatment,
- whether the media requiring treatment, and the contaminants requiring treatment, would be amenable to the on-site solidification/stabilization treatment process, and
- if they are subject to TSCA.

Waste materials which are determined to be RCRA Hazardous Wastes (i.e., RCRA listed wastes, media containing RCRA listed wastes, or RCRA characteristic wastes) may be subject to the RCRA Land Disposal Restrictions (LDRs). These LDRs require the treatment of waste materials to certain specific levels prior to land disposal.

Excavated debris would be mechanically separated from soils and sent off-site without treatment, since debris is not amenable to the stabilization/solidification process, and on-site disposal of debris is not included in this remedy. Where feasible, large pieces of debris would be decontaminated on-site prior to off-site disposal. Excavated soils or sediments that do not meet site cleanup goals would only be treated on-site if treatment would lower the cost of disposal. For example, if the material without on-site treatment was acceptable only at a RCRA TSDF, but would be acceptable at a commercial landfill following on-site treatment, then on-site treatment would be performed. Since the stabilization/solidification process is effective for soil but not debris, any soil requiring treatment would need to be separated from debris.

2.1 Non-Hazardous Materials (Approximately 50,000 yd^3 Disposed)

The non-hazardous materials include non-hazardous debris and contaminated media determined to not contain hazardous wastes (treated and un-treated).

Under the contained-in policy, contaminated media (soils and sediments) that do not contain *listed* hazardous waste, and that pass the RCRA *characteristic* test can be declared non-hazardous by EPA, and can be sent to a commercial or municipal landfill permitted to accept the contaminated media. The determination would be based on the results of a standard RCRA *characteristic* analysis (i.e. tests for the characteristics of corrosivity, reactivity, ignitability, and toxicity). Exceptions would be solid waste or soils that are encountered during the remediation that, based on professional judgement of field personnel, contain a *listed* hazardous waste.

Media that do not contain hazardous waste (based on a "determination") but that contain a contaminant in a concentration greater than the respective site-specific cleanup goal would be disposed of off-site at an appropriate landfill. Volume estimates performed using this approach resulted in a significantly lower estimated volume of soils and sediments requiring on-site treatment (approximately 5,000 yd^3 before treatment, 6,000 yd^3 after treatment), compared to the volume in the preferred alternative in the Proposed Plan. Contaminated material will only be treated on-site if it lowers the cost of off-site disposal. This approach also resulted in a significantly higher estimate of the amount of contaminated media that would be sent to a non-hazardous waste landfill (approximately 50,000 yd^3).

Two types of non-hazardous landfills were included in the cost estimate: a local landfill permitted to accept waste generated during clearing and grubbing (approximately 19,500 yd^3); and a commercial landfill permitted to accept virtually any non-hazardous waste including un-treated lead restricted soils, sediments, and debris (approximately 24,000 yd^3) and treated soils (approximately 6,000 yd^3 after treatment).

2.2 Hazardous Wastes (Approximately 5,000 yd^3 for Disposal as Hazardous Waste)

It is not anticipate that any *listed* hazardous wastes will be found at the Site. If any *listed* hazardous wastes are found, then they will be taken off-site, and properly treated and/or disposed of in the appropriate the RCRA facilities. The hazardous wastes from the Site include contaminated media containing a *listed* hazardous waste or media that fails the "Characteristic Test." Some of these hazardous wastes may be subject to the RCRA Land Disposal Restrictions (LDRs) and thus may require treatment prior to disposal.

2.2.1 Contaminated Media Determined to Contain a *Listed* Hazardous Waste (Approximately 1,200 yd^3 Excavated)

EPA considers contaminated media to contain a *listed* hazardous waste when they are contaminated with hazardous constituents from *listed* hazardous waste. EPA uses health-based levels to determine whether the contaminated media should be regulated as hazardous waste; but these health-based levels have not been established for the Site. EPA policy states that the risk-based standards would be based on a reasonable maximum exposure scenario, and would not consider elimination of risk by elimination of exposure. One approach would be to develop an exposure scenario for a worker at the disposal facility receiving the contaminated media. This would be a less intense exposure than the maintenance-worker scenario evaluated in the supplemental human health risk assessment for the Site (Weston, 1998c).

Site-specific health-based levels would need to be developed specifically for the "hazardous constituents" that cause the waste to be listed. Concentrations of these constituents (a much shorter list than the Atlas Tack contaminants of concern) would be compared to risk-based standards in order to determine whether the media *contain* hazardous waste, even if the media does not exhibit a *characteristic* of hazardous waste. If the determination is made that the concentration of these constituents in the contaminated media do not exceed the health-based levels, and the media do not exhibit a *characteristic* of hazardous waste, the media would not be considered hazardous and would be handled as described in the previous section. If the determination is made that constituents are above health-based levels, however, the media would be subject to management as hazardous waste.

Examples of media that are expected to be encountered during remediation, based on presently available information, which would be determined to contain *listed* hazardous waste include:

1. Sludges removed from the trenches and plating pit (F006, F007 and/or F008 listed waste, with underlying constituents nickel, cadmium, chromium and/or cyanide);

2. Non-Aqueous Phase Liquids (NAPLs) from the Well MW-5 area (F001 and/or F002 listed waste, with underlying constituents including toluene); and

3. Blue sludge or soil from the fill area east of the former lagoon (F006, F007 and/or F008 listed waste, with underlying constituents nickel, cadmium, chromium and/or cyanide).

2.2.2 Contaminated Media Determined to Contain Hazardous Waste, Due to Failing the "Characteristic Test" (Approximately 8,800 yd^3 Excavated)

Soils, sediments, and debris that do not contain *listed* hazardous waste but that fail the RCRA *characteristic* test would be determined to "contain" hazardous waste. Based on our data review, failure of the *toxicity and reactivity characteristic* would occur primarily due to three contaminants: lead, cadmium, and cyanide. Also, some soils containing toluene may be considered a *characteristic* hazardous waste if they failed the *ignitability characteristic* test.

Based on Site data for total lead and cadmium, and a limited amount of lead TCLP data from the Site, it is estimated that approximately 5,200 yd^3 of soils would likely to fail the *toxicity characteristic* test for lead and cadmium. These soils will be treated on-site and most (5,000 yd^3 excavated, 6,000 yd^3 after treatment) will be disposed of in a special landfill as a non-hazardous waste. In addition, an estimated 200 yd^3 would still fail the *toxicity characteristic* test, thereby requiring disposal in a RCRA landfill. Additional treatment off-site is not expected, but will be done if required to meet LDRs. In addition, approximately 1,300 yd^3 of debris is assumed to fail the *toxicity characteristic* test, but not require treatment to meet LDRs; as such, disposal in a RCRA landfill is required.

Based on Site data for total cyanide, it is estimated that approximately 2,200 yd^3 of soils would fail the *reactivity characteristic* test. The Site cyanide concentration data were compared to the concentration in soil that would theoretically cause failure of the reactivity test, 590 mg/kg. For estimating purposes, these soils were included in the estimated volume of soils being manifested to an off-site RCRA TSDF for treatment and disposal.

An estimated 100 yd^3 of soils from the vicinity of Well MW-5 may fail the *ignitability characteristic* test due to toluene and would require off-site treatment prior to disposal at an off-site a RCRA TSDF. Note that, while no cleanup level has been established for toluene, toluene-containing soils that exhibit a *characteristic* would require treatment and disposal as a hazardous waste.

2.3 Media Subject to TSCA Requirements (Approximately 500 yd^3 Disposed)

PCB concentrations were compared to the requirements in the EPA's rules promulgated under TSCA regarding PCB remediation waste disposal (including Final Rule, 63 FR 35384, June 1998). Off-site disposal of PCB remediation wastes, as defined by 40 CFR 761.3, generated at the Site would be subject to TSCA. The volume estimate for off-site disposal at a TSCA facility (approximately 500 yd^3) is based on an estimate of volume of soils with PCB concentrations exceeding 50 mg/kg.

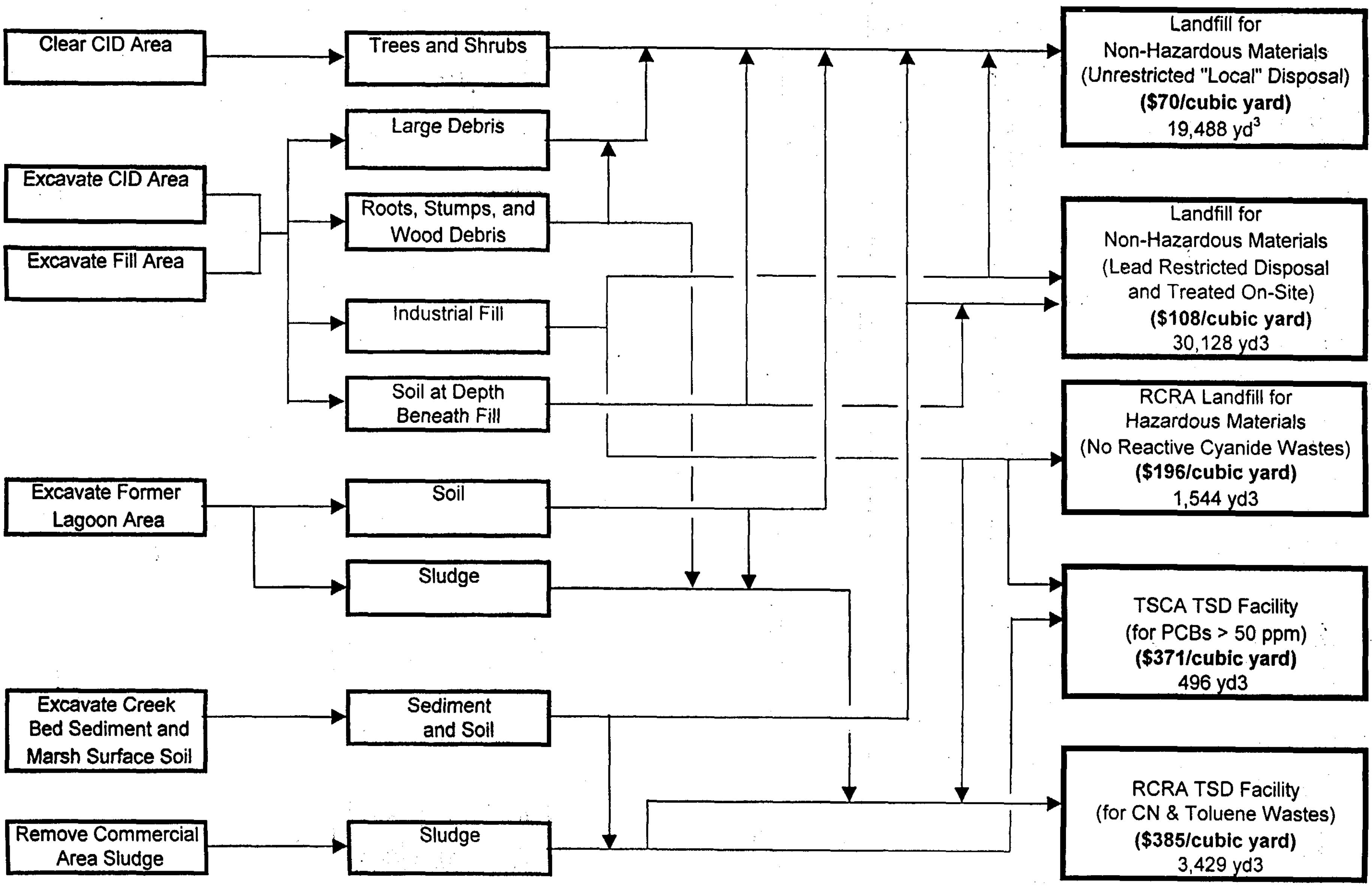
3.0 Waste Treatment and/or Disposal

The decision whether contaminated media generated at the Site will require treatment would be made following the determination that the media are hazardous. For example, at the time of generation (excavation), chemical analysis will be required to determine whether soils that are hazardous due to cyanide (*characteristic of reactivity*) are also subject to RCRA Land Disposal Restrictions. If the soils contain less than "ten times the Universal Treatment Standard" (10 times UTS) for cyanide (5,900 mg/kg for total cyanide, and 300 mg/kg for cyanide amenable to chlorination), the soils would not require treatment under the RCRA Land Disposal Restrictions prior to placement in a RCRA landfill.

The solidification/stabilization treatment process would not effectively treat volatile organic compounds. In low concentrations, these contaminants would not interfere with the treatment process and would not limit post-treatment disposal options. However, some of the VOCs present in VOC-contaminated soils would be emitted to the air during stabilization/solidification treatment in the on-site facility. For the purpose of volume and cost estimation, we assumed that soils containing volatile concentrations greater than 10 times UTS would not be treated on-site. For example, 10 times UTS for toluene is 100 mg/kg, so we included soils containing greater than 100 mg/kg toluene in the estimated volume of media requiring treatment at a RCRA TSDF. This approach was used for cost estimation purposes and, in the case of toluene, is believed to be conservative with respect to protection of human health during on-site soil treatment. These soils would not necessarily be hazardous media (i.e. they may pass the hazardous waste *characteristic* test), however, commercial landfills and thermal processing facilities that are not RCRA TSDFs may not be permitted to accept the soils, depending on the concentration of other constituents present in the soils. For this reason, we conservatively included the estimated volume of VOC-contaminated (10 times UTS) soils in the volume of soils for off-site treatment and disposal at a RCRA TSDF.

Most of the hazardous media "generated" ("excavated") during remediation would be expected to either be treated on-site (approximately 5,200 yd^3 before treatment, or 6,200 yd^3 after treatment) or not require treatment (approximately 1,300 yd^3). The volume of contaminated media requiring RCRA off-site treatment (approximately 3,400 yd^3) was estimated conservatively high, presuming that all of the *listed* hazardous waste and *reactive characteristic* contaminated media encountered would require treatment prior to disposal, and that the toluene-contaminated soil expected in the vicinity of Well MW-5 which are expected to fail the *ignitability characteristic* test would require treatment.

Figure C-1: Disposition of Contaminated Materials



Note: The CID (Commercial and Industrial Debris Area). Fill Area, and Former Lagoon Area are all part of the *Solid Waste and Debris Area.*

Table C-1: **Disposition of Wastes and Disposal Costs**
Selected Remedy

		Non-Hazardous Materials			Hazardous Wastes		TSCA Wastes
Remedial Areas	Total Cubic Yards[1]	"Local" Landfill for Non-Hazardous Materials	Special Landfill for Non-Hazardous Materials (Lead Restricted Disposal)	Special Landfill for Non-Hazardous Materials After On-Site Treatment[2]	RCRA TSD Facility (for Cyanide and Toluene Wastes)	Dispose in RCRA Landfill (No Reactive Cyanide)[3]	TSCA TSD Facility (for PCBs > 50ppm)
Commercial Area	650	0	0	0	625	0	25
Solid Waste/Debris	38,289	13,731	16,078	3,860	2,679	1,544	396
Marsh Surface Soils	15,046	5,201	7,618	2,078	100	0	50
Creek Bed Sediments	1,100	556	494	0	25	0	25
Totals (CYs)	55,085	19,488	24,190	5,938	3,429	1,544	496
Disposal Cost per CY:		$ 70	$ 108	$ 108	$ 385	$ 196	$ 371
Disposal Cost per Category:		$ 1,364,185	$ 2,612,495	$ 641,289	$ 1,320,204	$ 302,575	$ 184,175

Total Disposal Cost all Categories: **$ 6,424,923**

Note: [1] Total volumes consist of the volume of excavated materials not needing treatment, the volume of treated materials after on-site treatment, and the volume of excavated materials before shipment for treatment. Also, all numbers (except costs) refer to volume of material in cubic yards.
[2] Volumes of treated soil have been increase by approximately 20% due to treatment admixture. Untreated estimated volume of 4948 cubic yards would increase to estimated volume of 5938 cubic yards following treatment.
[3] Out of an estimated 5,200 cubic yards of soils contaminated with lead and cadmium that will be treated for disposal in a special landfill as a non-hazardous waste, an estimated volume of 203 cubic yards (final volume 244 cubic yards) would still fail the TCLP test for cadmium following treatment, thereby requiring disposal in a RCRA landfill. Additionally,1,300 cubic yards of debris not needing treatent to meet LDRs, will be sent to a RCRA landfill for disposal.

Appendix D - Methodology for Modeling Indoor Air Concentrations

Atlas Tack Corp. Superfund Site
Record of Decision

Memorandum

Methodology for Modeling Indoor Air Concentrations

1.0 Background and Objective

The potential for migration of toluene in groundwater to indoor air was evaluated for the Atlas Tack Site. The objective of this evaluation was to address this potential exposure pathway of concern and determine a risk-based screening level for toluene based on achieving a target hazard quotient of 1.

The model that was used to evaluate this pathway is the Johnson and Ettinger (1991) model for subsurface vapor intrusion into buildings (Johnson and Ettinger, 1991). A discussion of the Johnson and Ettinger model is presented in the Subsection below.

1.1 Johnson and Ettinger Model

The Johnson and Ettinger model is a screening-level model which incorporates both convective and diffusive mechanisms for estimating the transport of contaminant vapors emanating from either subsurface soils or groundwater to indoor air spaces located directly above or in close proximity to the source of contamination. The model incorporates the following assumptions:

- Soil is homogenous such that the effective diffusion coefficient is constant.
- Contaminant loss from leaching downward does not occur.
- Source degradation and transformation is not considered (e.g., biodegradation, hydrolysis, etc.).
- Concentration at the soil particle surface/soil pore air space interface is zero.
- Convective vapor flow near the building foundation is uniform.
- Contaminant vapors enter the building through cracks and openings in the walls and foundation at or below grade.
- Convective vapor flow rates decrease with increasing contaminant source-building distance.
- All contaminant vapors directly below the building will enter the building, unless the floor and walls are perfect vapor barriers. This implies that a constant pressure field is generated between the interior spaces and the soil surface and that the vapors are intercepted within the pressure field and transported into the building. This assumption is inherently conservative in that it neglects periods of near zero pressure

differential (e.g., during mild weather when windows are left open).

- The building contains no other contaminant sources or sinks; well mixed air volume. It therefore neglects contaminant sinks and the room-to-room variation in vapor concentration due to unbalanced mechanical and/or natural ventilation.

2.0 Modeling

A screening level risk-based analysis was conducted using guidance downloaded from the national United States Environmental Protection Agency (U.S. EPA) Superfund Risk Assessment WEB site. The address for the WEB site is as follows: http://www.epa.gov/oerrpage/superfund/ programs/risk/. This guidance was developed to address concerns raised about the potential for subsurface contamination in either soil or groundwater to adversely impact indoor air quality. In response to this concern, EPA developed a series of spreadsheets (and User's Guide) that allow for site-specific application of the Johnson and Ettinger Model (1991). The user's guide is titled, User's Guide For The Johnson and Ettinger (1991) Model For Subsurface Vapor Intrusion Into Buildings, and was prepared by Environmental Quality Management, Inc. (Environmental Quality Management, Inc., 1997) for submittal to U.S. EPA. The spreadsheets and accompanying user's guide were used to perform the risk-based analysis for this site. A description of the spreadsheet system used to model concentrations in groundwater to indoor air is provided below.

2.1 Groundwater Spreadsheet System

The groundwater to indoor air model in spreadsheet form consisted of two separate workbooks in Microsoft® Excel. One workbook provided screening-level results (GWSCREEN.XLS) while the other workbook provided Tier-2 results (GWTIER2.XLS). The screening-level approach employs conservative default values for many model input parameters but allows the user to define values for key variables such as depth to groundwater. The Tier-2 approach allows the user to define values for all model variables and allows for up to three different soil strata between the top of contamination and the enclosed structure.

2.2 Approach

Indoor air modeling was conducted using a screening-level approach as discussed below. In the screening-level evaluation, conservative approaches were used to generate the risk-based screening level. Using conservative approaches provides a worst case scenario for potential exposure and risk.

The future use for the "commercial area" of the site is commercial (not used as a place of residence). The default values recommended by EPA for exposure duration (30 years) and exposure frequency (350 days/year) were based on residential exposure, therefore these defaults were replaced with more appropriate input values. The exposures for an industrial/commercial scenario, exposure duration of 25 years and exposure frequency of 250 days/year, were used. In addition, the default value recommended for depth to groundwater (13 feet or 400 centimeters) was changed to reflect a conservative site-specific value of 5 feet or 152 centimeters. Note, risk-based screening concentrations were also developed based on assumed depths to groundwater of 10 and 13 feet below grade level. The default air exchange rate value of 0.45 exchanges per hour was changed to 0.8 exchanges per hour to reflect an air exchange rate more typical of a commercial building. ASTM standards recommends a default value of 0.8 exchanges per hour for commercial buildings (this may be higher for a warehouse) (ASTM, 1995). The soil type under the slab was assumed to be sand, a worst case assumption. Default values were used for the rest of the model input parameters. Values for the model input parameters used in the screening-level evaluation are shown in Table D-1.

Screening-level RBSL calculations were performed using the GWSCREEN.XLS spreadsheet. Calculated risk-based screening levels are presented in Table D-2. Risk-based screening levels presented in Table D-2 were based on achieving a target hazard quotient of 1. Output generated by the spreadsheets and data information are presented in Table D-3 to D-7.

3.0 REFERENCES

Environmental Quality Management, Inc. 1997. *User's Guide For The Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion Into Buildings.* September 1997.

Johnson, P.C. and Ettinger, R.A. 1991. *Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings*. Environmental Science and Technology, Vol. 25, No. 8, 1991.

Table D-1
Johnson And Ettinger Indoor Air Model – Tier 1 Industrial
Major Input Parameters
Atlas Tack

Parameter	Units	Default Value	Value Used in the Tier 1 Evaluation	Comments
Average Soil/Groundwater Temperature	Celsius	10	10	
Depth Below Grade to Bottom of Enclosed Space Floor	cm	15	15	
Depth Below Grade to Water Table	cm	400	152 (5 feet) 305 (10 feet) 400 (13 feet)	Calculated risk-based screening values based on a range of values. Parameter has a large effect on risk-based screening concentrations.
Vadose Zone SCS Soil Type	–	Sandy Clay Loam	Sand	
SCS Soil Type Directly Above Water Table	–	Sandy Clay	Sand	
Vadose Zone Soil Dry Bulk Density	g/cm^3	1.5	1.5	
Vadose Zone Soil Total Porosity	Unitless	0.43	0.43	
Vadose Zone Water Filled Porosity	cm^3/cm^3	0.3	0.3	
Enclosed Space Floor Thickness	cm	15	15	
Enclosed Space Floor Length	cm	961	961	
Enclosed Space Floor Width	cm	961	961	
Enclosed Space Floor Height	cm	488	488	
Floor-Wall Seam Crack Width	cm	0.1	0.1	
Indoor Air Exchange Rate	1/hour	0.45	0.8	Used recommended value from ASTM for Commercial/Industrial
Averaging Time – Noncarinogens	days	Exposure Duration x 365	Exposure Duration x 365	
Exposure Duration	years	25	25	Value is for a commercial/industrial scenario.
Exposure Frequency	days/year	250	250	Value is for a commercial/industrial scenario.
Target Hazard Quotient - Noncarcinogens		1	1	

Table D-2

Calculated Groundwater to Indoor Air Risk-Based Concentrations For Toluene Groundwater Based on Nonresidential Inhalation Exposure

Atlas Tack

				RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS: TARGET HAZARD QUOTIENT = 1			
Chemical of Concern	CAS	Assumed Depth to Groundwater (feet)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	Indoor exposure groundwater conc., carcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
Toluene	108-88-3	5	1.0E+00	NA	1.46E+05	5.26E+05	1.46E+05
Toluene	108-88-3	10	1.0E+00	NA	5.42E+05	5.26E+05	5.26E+05
Toluene	108-88-3	13	1.0E+00	NA	6.32E+05	5.26E+05	5.26E+05

Table D-3

DATA ENTRY SHEET - TOLUENE

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION

(enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108883		Toluene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	152	s	10
15	305	s	10
15	400	s	10

Calculated Risk-Based Screening Values based on varying depths to groundwater.

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
s			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	25	25	250

Used to calculate risk-based groundwater concentration.

Table D-4

CHEMICAL PROPERTIES SHEET - TOLUENE

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	0.0E+00	4.0E-01

Table D-5

INTERMEDIATE CALCULATIONS SHEET - TOLUENE

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm³/cm³)	Vadose zone effective total fluid saturation, S_{te} (cm³/cm³)	Vadose zone soil intrinsic permeability, k_i (cm²)	Vadose zone soil relative air permeability, k_{rg} (cm²)	Vadose zone soil effective vapor permeability, k_v (cm²)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm³/cm³)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm³/cm³)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm³/cm³)	Floor-wall seam perimeter, X_{crack} (cm)
137	0.130	0.662	1.10E-07	0.232	2.56E-08	17.05	0.43	0.136	0.294	3,844

Bldg. ventilation rate, $Q_{building}$ (cm³/s)	Area of enclosed space below grade, A_B (cm²)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m³/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm²/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm²/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm²/s)
1.00E+05	9.24E+05	4.16E-04	15	9,154	2.92E-03	1.26E-01	1.75E-04	5.34E-04	6.15E-04	5.43E-04

Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm³/s)	Crack effective diffusion coefficient, D^{crack} (cm²/s)	Area of crack, A_{crack} (cm²)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m³)
137	15	1.26E+02	0.10	2.47E+01	5.34E-04	3.84E+02	#NUM!	3.18E-05	4.01E-03	NA	4.0E-01

Table D-6

RESULTS SHEET - TOLUENE

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (μg/L)	Indoor exposure groundwater conc., noncarcinogen (μg/L)	Risk-based indoor exposure groundwater conc., (μg/L)	Pure component water solubility, S (μg/L)	Final indoor exposure groundwater conc., (μg/L)
NA	1.46E+05	1.46E+05	5.26E+05	1.46E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Table D-7

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α (1/cm)	N (unitless)	M (unitless)	θ_s (cm³/cm³)	θ_r (cm³/cm³)	Mean Grain Diameter (cm)
C	0.20	0.008	1.09	0.083	0.38	0.068	0.0092
CL	0.26	0.019	1.31	0.237	0.41	0.095	0.016
L	1.04	0.036	1.56	0.359	0.43	0.078	0.020
LS	14.59	0.124	2.28	0.561	0.41	0.057	0.040
S	29.70	0.145	2.68	0.627	0.43	0.045	0.044
SC	0.12	0.027	1.23	0.187	0.38	0.100	0.025
SCL	1.31	0.059	1.48	0.324	0.39	0.100	0.029
SI	0.25	0.016	1.37	0.270	0.46	0.034	0.0046
SIC	0.02	0.005	1.09	0.083	0.26	0.070	0.0039
SICL	0.07	0.010	1.23	0.187	0.43	0.089	0.0056
SIL	0.45	0.020	1.41	0.291	0.45	0.067	0.011
SL	4.42	0.075	1.89	0.471	0.41	0.065	0.030

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm³/g)	Diffusivity in air, D_a (cm²/s)	Diffusivity in water, D_w (cm²/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m³/mol)	Henry's law constant reference temperature, T_R (°C)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF (μg/m³)⁻¹	Reference conc., RfC (mg/m³)
50293	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04	8.10E-06	25	533.15	720.75	11,000	9.7E-05	0.0E+00
50328	Benzo(a)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05	1.13E-06	25	715.90	969.27	15,000	2.1E-03	0.0E+00
51285	2,4-Dinitrophenol	1.00E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05	4.44E-07	25	605.28	827.85	15,000	0.0E+00	7.0E-03
53703	Dibenz(a,h)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07	1.47E-08	25	743.24	990.41	16,000	2.1E-03	0.0E+00
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00	3.05E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00
56553	Benz(a)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04	3.34E-06	25	708.15	1004.79	15,000	2.1E-04	0.0E+00
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	13,000	3.7E-04	0.0E+00
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04	1.40E-05	25	596.55	839.36	13,000	3.7E-04	0.0E+00
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04	1.51E-05	25	613.32	842.25	13,000	4.6E-03	0.0E+00
65850	Benzoic Acid	6.00E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05	1.54E-06	25	720.00	751.00	10,000	0.0E+00	1.4E+01
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.88E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	0.0E+00
71363	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04	8.80E-06	25	390.88	563.05	10,346	0.0E+00	3.5E-01
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01	5.56E-03	25	353.24	562.16	7,342	8.3E-06	0.0E+00
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	1.0E+00
72208	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04	7.51E-06	25	718.15	986.20	12,000	0.0E+00	1.0E+00
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04	1.58E-05	25	651.02	848.49	14,000	0.0E+00	1.1E-03
72548	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04	4.00E-06	25	639.90	863.77	14,000	0.0E+00	1.8E-02
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04	2.10E-05	25	636.44	860.38	14,000	6.9E-05	0.0E+00
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01	6.24E-03	25	276.71	467.00	13,000	9.7E-05	0.0E+00
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-06	2.76E+03	1.11E+00	2.71E-02	25	259.25	432.00	5,714	0.0E+00	5.0E-03
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02	2.19E-03	25	313.00	510.00	5,250	8.4E-05	0.0E+00
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,706	4.7E-07	3.0E+00
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02	5.34E-04	25	422.35	696.00	6,391	0.0E+00	7.0E-01
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02	1.60E-03	25	363.15	585.85	9,479	1.1E-06	0.0E+00
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	7,000	1.8E-05	0.0E+00
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.61E-02	25	304.75	576.05	6,895	0.0E+00	5.0E-01
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02	1.09E-03	25	603.69	846.31	6,247	5.0E-05	0.0E+00
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00	2.71E-02	25	512.15	746.00	13,000	1.3E-03	0.0E+00
78591	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04	6.63E-06	25	488.35	715.00	10,931	0.0E+00	7.0E-05
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.80E-03	25	369.52	572.00	10,271	2.7E-07	0.0E+00
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02	9.12E-04	25	386.15	602.00	7,590	0.0E+00	4.0E-03
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01	1.03E-02	25	360.36	544.20	8,322	1.6E-05	0.0E+00
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02	3.44E-04	25	419.60	661.15	7,505	1.7E-06	0.0E+00
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03	1.55E-04	25	550.54	803.15	8,996	5.8E-05	0.0E+00
84662	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05	4.51E-07	25	567.15	757.00	12,155	0.0E+00	2.1E-01
84742	Di-n-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08	9.39E-10	25	613.15	798.67	13,733	0.0E+00	2.8E+00

Table D-7 (Continued)

VLOOKUP TABLES

85687	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05	1.26E-06	25	660.60	839.68	13,000	0.0E+00	7.0E-01
86306	N-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04	5.00E-06	25	632.28	890.45	13,000	1.4E-06	0.0E+00
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03	6.37E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01
86748	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07	1.53E-08	25	627.87	899.00	13,977	5.7E-06	0.0E+00
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01	8.15E-03	25	486.15	738.00	10,206	2.2E-05	0.0E+00
87865	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06	2.44E-08	25	582.15	813.20	14,000	3.4E-05	0.0E+00
88062	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04	7.78E-06	25	519.15	749.03	12,000	3.1E-06	0.0E+00
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.83E-04	25	491.14	748.40	10,373	0.0E+00	1.4E-01
91941	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07	4.00E-09	25	560.26	754.03	13,000	1.3E-04	0.0E+00
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01	5.20E-03	25	417.60	630.30	8,661	0.0E+00	7.0E+00
95487	2-Methylphenol (o-cresol)	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05	1.20E-06	25	464.19	697.60	10,800	0.0E+00	1.8E-01
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01
95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02
95954	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04	4.34E-06	25	526.15	759.13	13,000	0.0E+00	3.5E-01
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04	2.40E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01	7.88E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01	2.76E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00
105679	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05	2.00E-06	25	484.13	707.60	11,329	0.0E+00	7.0E-02
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01	7.66E-03	26	411.52	616.20	8,525	0.0E+00	7.0E+00
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02	2.43E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01
106478	p-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05	3.32E-07	25	503.65	754.00	11,689	0.0E+00	1.4E-02
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02	9.78E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02	5.12E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01	7.34E-03	25	412.27	617.05	8,523	0.0E+00	7.0E+00
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.63E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01	3.71E-03	25	404.87	632.40	8,410	0.0E+00	2.0E-02
108952	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05	3.98E-07	25	455.02	694.20	10,920	0.0E+00	2.1E+00
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04	1.80E-05	25	451.15	659.79	9,000	3.3E-04	0.0E+00
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02
117817	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06	1.02E-07	25	657.15	806.00	15,999	4.0E-06	0.0E+00
117840	Di-n-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03	6.68E-05	25	704.09	862.22	15,000	0.0E+00	7.0E-02
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	0.0E+00
120127	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03	6.51E-05	25	615.18	873.00	13,121	0.0E+00	1.1E+00
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	2.0E-01
120832	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04	3.17E-06	25	482.15	708.17	11,000	0.0E+00	1.1E-02
121142	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06	9.27E-08	25	590.00	814.00	13,467	1.9E-04	0.0E+00
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02	7.83E-04	25	416.14	678.20	8,000	2.4E-05	0.0E+00
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01	1.84E-02	25	394.40	620.20	8,288	5.8E-07	0.0E+00
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04	1.10E-05	25	667.95	936.00	14,370	0.0E+00	1.1E-01
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544.00	7,192	0.0E+00	3.5E-02
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01	9.39E-03	25	320.85	516.50	6,717	0.0E+00	7.0E-02
193395	Indeno(1,2,3-cd)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05	1.60E-06	25	809.15	1078.24	17,000	2.1E-04	0.0E+00
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03	1.11E-04	25	715.90	969.27	15,000	2.1E-04	0.0E+00
206440	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04	1.61E-05	25	655.95	905.00	13,815	0.0E+00	1.4E-01
207089	Benzo(k)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05	8.29E-07	25	753.15	1019.70	16,000	2.1E-05	0.0E+00
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03	9.46E-05	25	714.15	979.00	16,455	2.1E-06	0.0E+00
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03	1.70E-04	25	603.01	839.37	13,000	4.9E-03	0.0E+00
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04	1.06E-05	25	596.55	839.36	13,000	1.8E-03	0.0E+00
319857	beta-HCH (beta-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05	7.44E-07	25	596.55	839.36	13,000	5.3E-04	0.0E+00
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01	1.77E-02	25	381.15	587.38	7,000	3.7E-05	2.0E-02
606202	2,6-Dinitrotoluene	6.92E+01	3.27E-02	7.26E-06	1.82E+02	3.06E-05	7.46E-07	25	558.00	770.00	12,938	1.9E-04	0.0E+00
621647	N-Nitrosodi-n-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05	2.25E-06	25	509.60	746.87	11,000	2.0E-03	0.0E+00
1024573	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04	9.51E-06	25	613.96	848.76	13,000	2.6E-03	0.0E+00
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	5.62E-02	4.67E-01	1.14E-02	25	629.88	1750.00	14,127	0.0E+00	3.0E-04
8001352	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04	6.00E-06	25	657.15	873.31	14,000	3.2E-04	0.0E+00
11096825	Aroclor 1260 (PCB-1260)	2.90E+05	1.38E-02	4.32E-06	8.00E-02	1.89E-01	4.60E-03	25	402.50	539.37	19,000	1.0E-04	0.0E+00
11097691	Aroclor 1254 (PCB-1254)	2.00E+05	1.56E-02	5.00E-06	5.70E-02	8.20E-02	2.00E-03	25	377.50	512.27	19,000	1.0E-04	0.0E+00
12674112	Aroclor 1016 (PCB-1016)	3.30E+04	2.22E-02	5.42E-06	4.20E-01	1.19E-02	2.90E-04	25	340.50	475.22	18,000	1.0E-04	0.0E+00
53469219	Aroclor 1242 (PCB-1242)	3.30E+04	2.14E-02	5.31E-06	3.40E-01	2.13E-02	5.20E-04	25	345.50	482.20	18,000	1.0E-04	0.0E+00

Appendix E - Floodplain, Wetland, and Riverfront Area Assessment

Atlas Tack Corp. Superfund Site
Record of Decision

FLOODPLAIN, WETLAND, AND RIVERFRONT AREA ASSESSMENT

1.0 Background

The Environmental Protection Agency is in the process of selecting a cleanup plan for the Atlas Tack Superfund Site (the Site) consistent with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. 9601 et seq. (CERCLA). A RI, including baseline human health and ecological risk assessments, was completed to determine the nature and extent of the hazardous waste contamination at the Site (Weston, 1995). This study identified contamination in the Site floodplains, wetlands, and riverfront areas at levels which presented unacceptable risks to ecologically sensitive receptors. Subsequently, a FS was completed which developed and evaluated alternatives for the cleanup of the Site (Weston, 1998b). These studies were conducted in a manner consistent with the National Oil and Hazardous Substances Contingency Plan, 40 C.F.R. 300 et seq. (NCP). EPA released a Proposed Plan on December 2, 1998 in which the Agency revealed its preferred cleanup plan for the Site.

2.0 Selected Remedy and Its Effects on the Floodplains, Wetlands, and Riverfront Areas

The selected remedy is a comprehensive remedy which utilizes source control and management of migration components to address the principal Site risks. A modification of the Proposed Plan's preferred source control alternative, the selected source control remedy will result in the excavation of 54,000 yd^3 of contaminated soils and sediments, treatment (as necessary to satisfy RCRA Land Ban requirements and to facilitate off-site disposal), and disposal and some treatment off-site in licensed solid waste, TSCA, or RCRA Hazardous Waste facilities as appropriate. The excavation of contaminated soils and sediments will occur in the four designated areas of the Site: the Commercial Area, the Solid Waste and Debris Area, the Marsh Area, and the Creek Bed Area. The vast majority of this excavation will take place in floodplains, wetlands, and riverfront areas (as defined by the Massachusetts River Protection Act Amendments to the Wetlands Protection Act), as is shown in Figure 2. Excavation of the contaminated soils and sediments will result in the total, although short term, destruction of the floodplains, wetlands, and riverfront areas where the work will take place, since all vegetation will be removed and the soils and sediments will be excavated down to, and in some case below, the water table. Therefore, the use of these areas as a habitat and/or feeding ground will be temporarily disrupted. EPA has determined that there are no practicable alternative to the soil and sediment excavation from the floodplains, wetlands, and riverfront areas that would achieve site goals but would have less adverse impacts on the ecosystem. Unless soils and sediments with contaminant levels greater than the established cleanup levels are removed they will continue to pose an unacceptable ecological risk.

3.0 Alternatives Considered

A Feasibility Study, consistent with the requirements of CERCLA, was completed in which various remediation alternatives for each of the remediation areas were evaluated. Several alternatives and/or process options were evaluated which would have had less impacts on the floodplains, wetlands, and riverfront areas than the selected remedy.

- No Action - Under this alternative, no remediation would be undertaken and the contamination would be left as is in the Site soils, sediments, and groundwater. Therefore, the current adverse and unacceptable consequences, identified in the Ecological Risk Assessment, to the ecological sensitive receptors inhabiting the floodplains, wetlands, and riverfront areas would remain for the foreseeable future.

- Limited Action - This alternative is the same as the no action one except that it includes deed restrictions and monitoring of the contamination in the wetland soils and vegetation. As is the case with the no action alternative, the contamination and associated adverse consequences would remain unabated in the soils and sediments of the floodplains, wetlands, and riverfront areas.

- Capping (low permeability, synthetic membrane, permeable, etc.) - A number of different types of caps were considered for the contaminated areas in the floodplains, wetlands, and riverfront areas which would have had varying success on limiting exposure to contaminants as well as minimizing the mobility of contaminants by limiting infiltration and erosion. Since some of the contaminated soils are located below the water table, they will continue to serve as a contaminant source under any of the capping options. No capping options were actually included in any of the final alternatives, for which detailed analyses were performed, because they would not have been effective in meeting the cleanup objectives and because capping in the floodplains, wetlands, and riverfront areas would have had irreversible and permanent adverse consequences to these areas due to a permanent loss of wetland habitat and flood storage capacity.

- In-situ Biodegradation - This technology involves the enhancement of microorganisms' ability to degrade contaminants. Although this technology if successful could result in less disturbance of the floodplain and wetlands, it is still in the developmental phase for metals and therefore not commercially available. Also, it is not certain that this technology can attain cleanup goals. Additionally, the implementation of this technology may nonetheless result in substantial disruption to the wetlands. This technology was therefore not included in any of the alternatives which underwent detailed analyses.

EPA has therefore concluded that the only practicable alternative that will attain the project purpose of reducing risk to environmental receptors but does not also permanently destroy the floodplains, wetlands and riverfront areas is an alternative that provides for the excavation of soils and sediments with contaminants above cleanup levels and later the restoration of the excavated areas. Accordingly, EPA has determined that there are no other practicable alternatives which would have less adverse impacts on the floodplains, wetlands and riverfront areas than the selected remedy.

4.0 Measures to Minimize and Mitigate Impacts to the Floodplains, Wetlands, and Riverfront Areas

An extensive sampling program, including bioavailability studies, will be undertaken in the floodplains, wetlands and riverfront areas identified for remediation during remedial design to better define the extent of the areas requiring excavation, thereby avoiding, to the extent practicable, the unnecessary destruction of any floodplain, wetland, or riverfront area (see Section XI.C.1.a. of the ROD for a description of these bioavailability studies). During the implementation of the remedy, engineering controls will be utilized to minimize adverse impacts to floodplains, wetlands, and riverfront areas adjacent to the work areas, including mitigation techniques such as silt curtains. A restoration program for the floodplains, wetlands, and riverfront areas will be implemented upon completion of the remedial activities in these areas. All excavated areas will be backfilled with suitable material, graded, stabilized, and planted with vegetation of species typical of the area and/or this type of wetland. Organic fill material will be distributed throughout the excavated areas to re-create pre excavation elevation and drainage conditions, with the exception of the excavation in the Solid Waste and Debris Area. Since that area was a wetland prior to being filled, it will be restored to elevations and conditions consistent with the surrounding salt marsh; this will result in its flood storage capacity being restored to the likely original pre-fill conditions.

5.0 Public Participation Regarding the Selected Remedy

EPA has conducted numerous community participation events during the conduct of the FS and during the official Proposed Plan comment period. On August 6, 1998, EPA held an informational meeting to discuss the results of the FS including the various cleanup alternatives presented in the draft study. During this meeting, a summary of the FS was presented and a FS fact sheet was handed out.

On December 1, 1998, EPA held an informational meeting in the Fairhaven Town Hall to discuss the results of the RI and the cleanup alternatives presented in the FS, to present the Agency's Proposed Plan, and to answer questions from the public. From December 2, 1998 to February 19, 1999, the Agency held an 80 day public comment period to accept public comment on the alternatives presented in the FS (including those alternatives related to the floodplains, wetlands and riverfront areas) and the Proposed Plan, and on other relevant documents previously released to the public. The comment period was extended twice at the request of the Fairhaven Board of Selectmen and the Atlas Tack Corp. On January 27, 1999, EPA held an additional informational meeting in the Fairhaven Town Hall to discuss questions raised at the December 1, 1998 meeting about the Proposed Plan. On February 11, 1999, the Agency held a Public Hearing to discuss the Proposed Plan and to accept any oral comments. Numerous parties, including the Atlas Tack Corp., the Fairhaven Conservation Commission, Sea Change Inc., The Coalition for Buzzards Bay, the Massachusetts Office of Coastal Zone Management, the Massachusetts Department of Environmental Protection, and the public at large, submitted oral and written comments on the Proposed Plan, the other alternatives considered, and their effects on the floodplains, wetlands, and riverfront areas.

The public informational meetings and the Public Hearing were televised on local cable-access TV to reach as broad an audience as possible. An article about the December 1, 1998 Public Informational Meeting was published in the New Bedford Standard Times on November 30, 1998. A brief analysis of the Proposed Plan was included in The Advocate weekly newspaper on December 10, 1998. An article about the January 27, 1999 public informational meeting and Public Hearing was published in the New Bedford Standard Times on January 24, 1999. Notices of all meetings were sent to the people on the Site mailing list. Public notices were placed in The Advocate on December 22, 1998 and January 28, 1999 regarding the two extensions of the public comment period.

Additional community relations activities conducted by EPA include the following. On May 18, 1992, EPA and DEP held a public informational meeting to discuss the progress of Site activities and to update the schedule for future activities. On April 6, 1995, EPA and DEP held a public informational meeting to give an update of Site activities and discuss the formation of a Citizen/Government Work Group. On August 15, 1995, EPA established a Citizen/Government Work Group. The Citizen/Government Work Group also met on November 15, 1995; April 10, 1996; September 10, 1996; February 25, 1997; November 12, 1997 to discuss the Ecological-Based Cleanup Goals Technical Memorandum (Weston 1997b); and May 13, 1998 to discuss the draft FS Report including the various cleanup alternatives. All Citizen/Government Work Group meetings were held in the Fairhaven Town Hall.

As an additional effort to inform the public, the Town of Fairhaven hired Sea Change, Inc. to assemble an independent panel to review the RI, FS, and Proposed Plan. Sea Change's purpose is to provide citizens and government officials with independent scientific and technical information. Sea Change participated in the aforementioned public meetings and hearing, and held public panel sessions: on March 19, 1998 to discuss the RI; on June 25, 1998 to discuss the draft FS; and on October 1, 1998 to discuss the FS. The Sea Change panel presented comments on the RI, FS, and Proposed Plan.

Appendix F - State Concurrence

Atlas Tack Corp. Superfund Site
Record of Decision

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

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

March 9, 2000

Ms. Patricia Meaney, Director
Office of Site Remediation
U.S. EPA
JFK Federal Building
Boston, MA 02203

Re: State ROD Concurrence Letter
Atlas Tack Superfund Site
Fairhaven, Massachusetts

Dear Ms. Meaney:

The Department of Environmental Protection has reviewed the selected remedy recommended by the EPA for the cleanup of the Atlas Tack Superfund Site, Fairhaven, Massachusetts (the Site). The Department concurs with the selection of the remedy as presented in the Record of Decision (ROD).

The selected remedy addresses contamination of surface and subsurface soils at the Site through excavation, characterization, limited treatment by stabilization, and off-site removal. The selected remedy addresses the groundwater contamination at the Site through source removal, contaminant transport from the aquifer in conjunction with phytoremediation and long term monitoring. The ROD establishes the cleanup levels for the soils and groundwater at the Site using human health and ecological risk assessment methodologies, as well as federal criteria. Also, the ROD identifies applicable or relevant and appropriate state requirements for the selected remedy.

The ROD provides for the groundwater remediation of the "hot spot" of toluene through soil excavation four feet below the water table and removal of non-aqueous phase liquids that appear to contain the F001 and/or F002 listed hazardous wastes. The ROD further states that any water resulting from the soil dewatering process during this excavation will be containerized and removed or adequately treated. The ROD sets interim groundwater clean-up levels that will be re-evaluated in the future using a risk assessment process. In addition, the ROD makes clear that the remediation of the marsh area at the Site is contingent upon further study, and, if implemented, will be accompanied by careful wetland restoration.

The Department looks forward to working with you in implementing the selected remedial alternative during the Remedial Design and Remedial Action process. If you have any question, please contact Dorothy Allen at 292-5795.

Very truly yours,

Deirdre C. Menoyo

Deirdre C. Menoyo, Assistant Commissioner
Bureau of Waste Site Cleanup
Department of Environmental Protection

Appendix G - Acronym List

ARAR - Applicable or Relevant and Appropriate Requirement

AWQC - Ambient Water Quality Criteria

CA - Commercial Area

CAMU - Corrective Action Management Unit

CBS - Creek Bed Sediment Area

CCC - Criteria Continuous Concentration

CENED - United States Army Corps of Engineers, New England Division

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act of 1980

CFR - Code of Federal Regulations

CID - Commercial and Industrial Debris Area

CMC - Criteria Maximum Concentration

CMR - Code of Massachusetts Regulations

CNS - Central Nervous System

COC - Chemical of Concern

COPC - Chemical of Potential Concern

CSF - Cancer Slope Factor

CZM - Massachusetts Coastal Zone Management

CWA - Clean Water Act

DEP - Massachusetts Department of Environmental Protection

DF - Dilution Factor

EOEA - Massachusetts Executive Office of Environmental Affairs

EPC - Exposure Point Concentration

EPA - United States Environmental Protection Agency

ERBC - Ecological Risk Based Concentration

ER-M - Effects Range Medium

FS - Feasibility Study

FWS - United States Fish and Wildlife Service

HEAST - Health Effects Assessment Summary Tables

HI - Hazard Index

HQ - Hazard Quotient

HW - Hazardous Waste

GI - Gastrointestinal

GW - Groundwater

IRIS - Integrated Risk Information System

LDR - Land Disposal Restriction

MCP - Massachusetts Contingency Plan

MCL - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

MM - Management of Migration

MSS - Marsh Surface Soil Area

NA - Not Applicable

NAPL - Non-Aqueous Phase Liquid

NCEA - National Center for Environmental Assessment

NCP - National Contingency Plan

NOAA - National Oceanic and Atmospheric Administration.

NOAEL - No Observed Effects Level

NTV - No Toxic Value

O&M - Operation and Maintenance

OSWER - EPA's Office of Solid Waste and Emergency Response

PAH - Polycyclic Aromatic Hydrocarbon

PPM - Part Per Million (mg/kg)

PCB - Polychlorinated Biphenyl

QA/QC - Quality Assurance/Quality Control

RBC - Risk Based Concentration

RCRA - Resource Conservation and Recovery Act (Federal Solid and Hazardous Waste Act)

RfD - Reference Dose

RI - Remedial Investigation

RME - Reasonable Maximum Exposure

ROD - Record of Decision

SC - Source Control

SEM/AVS - Simultaneously Extracted Metals/Acid Volatile Sulfide

SESOIL - Seasonal Soil Compartment Model

SLC - Soil Leaching Concentration

SWD - Solid Waste and Debris Area

T&D - Treatment and Disposal

TAG - Technical Assistance Grant

TBC - To Be Considered

TCLP - Toxicity Characteristic Leaching Procedure

TSCA - Toxic Substance and Control Act

TSDF - Treatment, Storage, and Disposal Facility

UCL - Upper Confidence Limit

UTS - Universal Treatment Standard

VOC - Volatile Organic Compound

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