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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.

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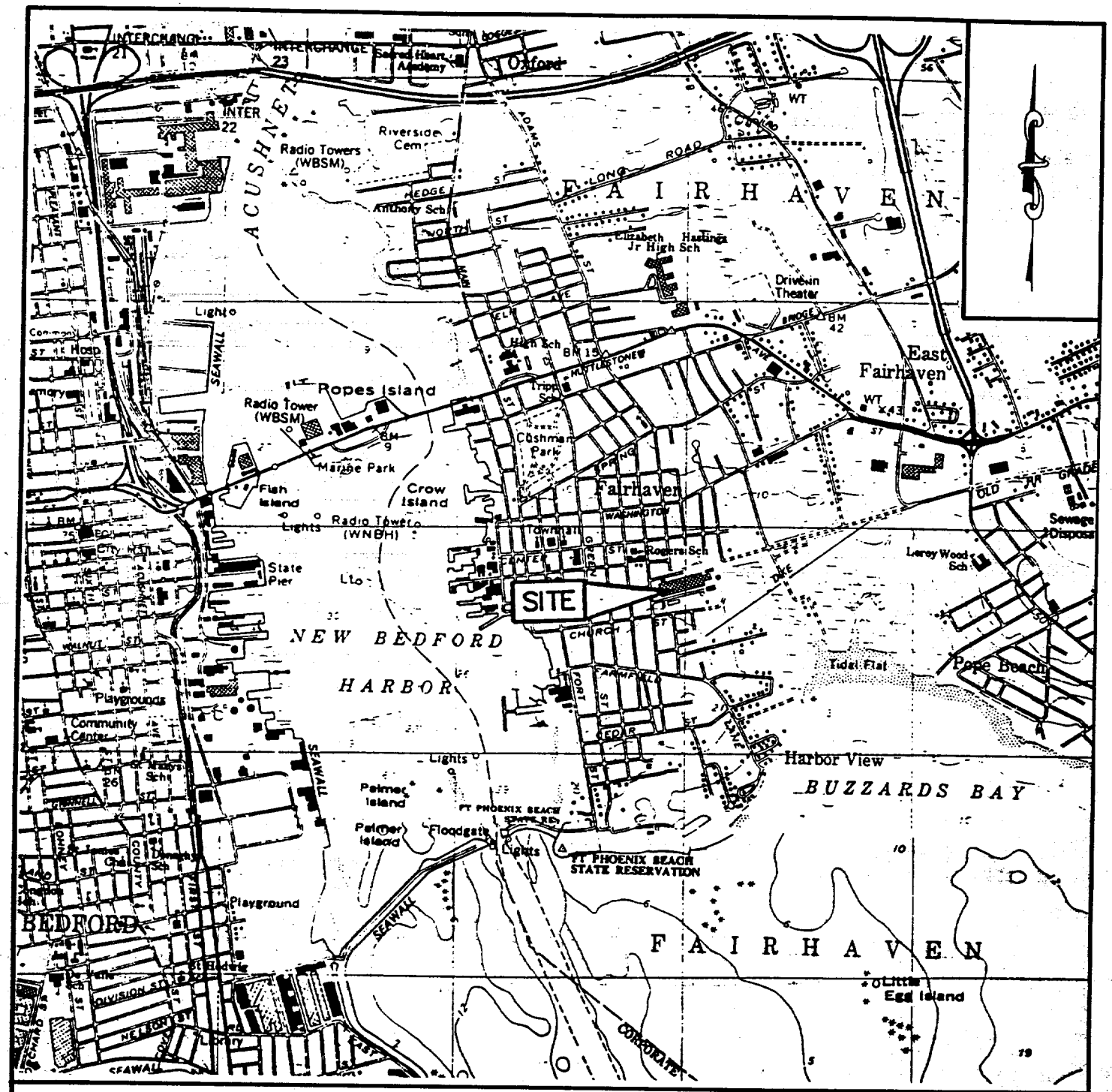
FIGURES



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

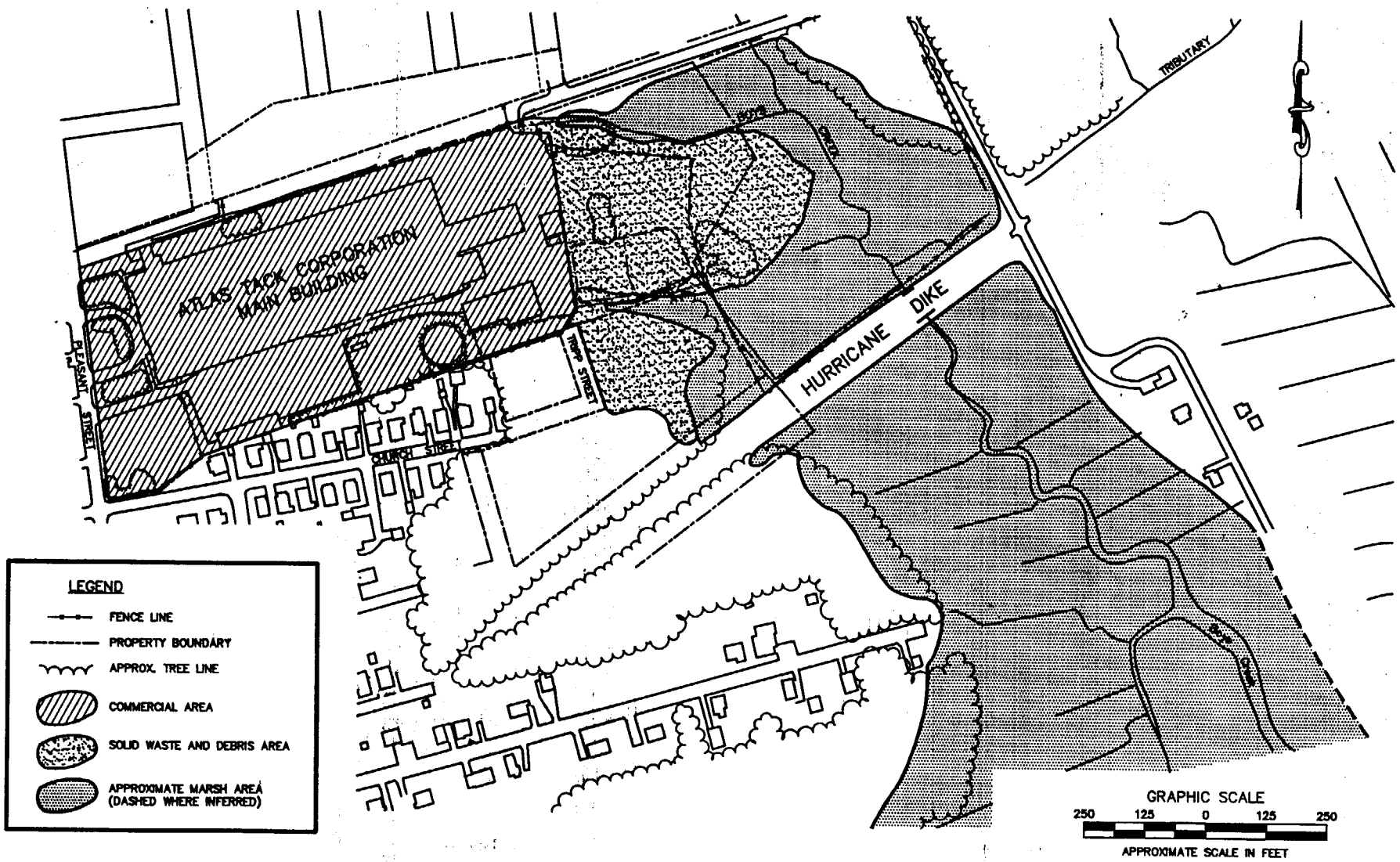
ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

SITE LOCUS MAP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE SEPTEMBER 1999

FIGURE NO. 1



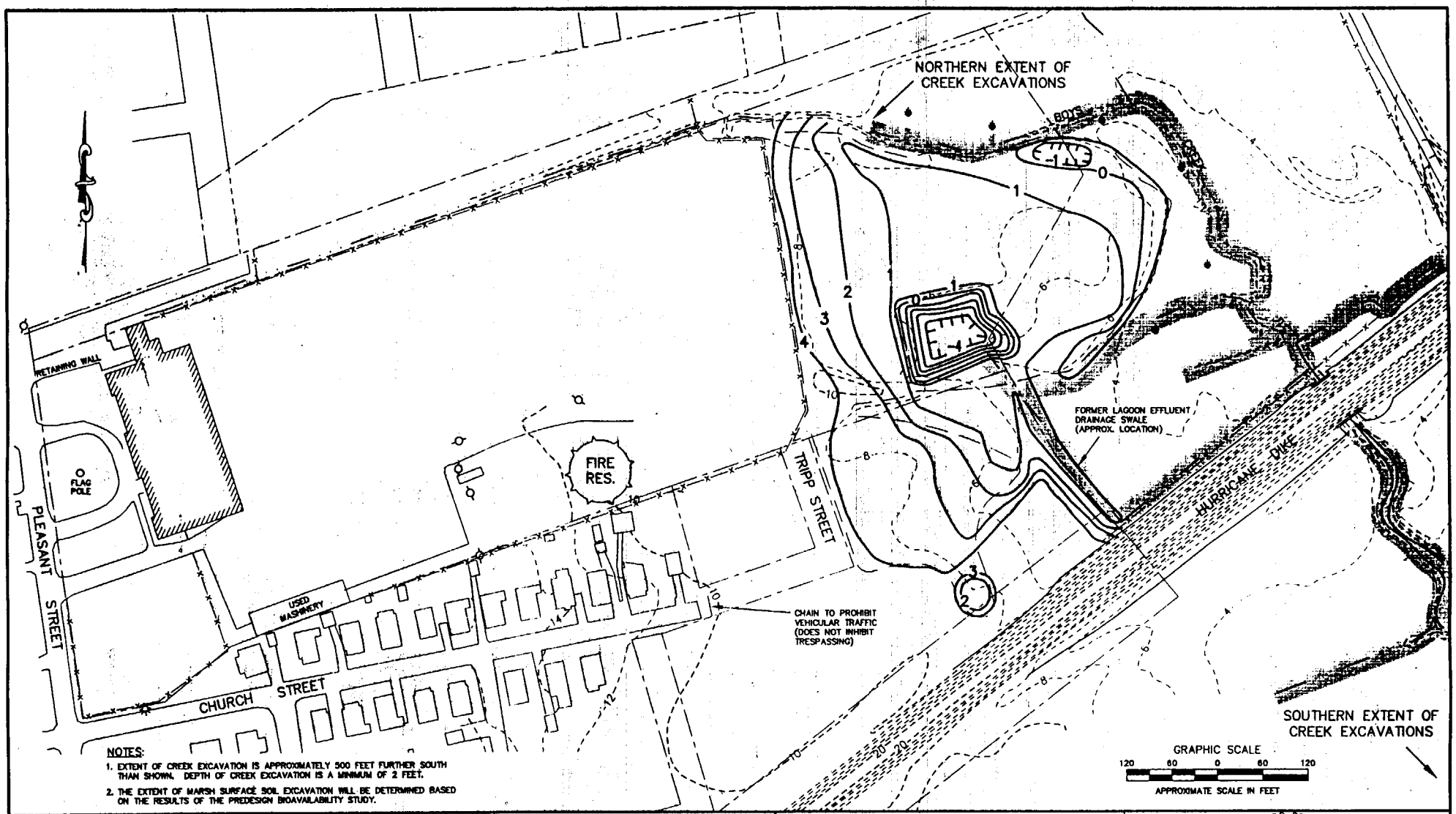
ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

STUDY AREA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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

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

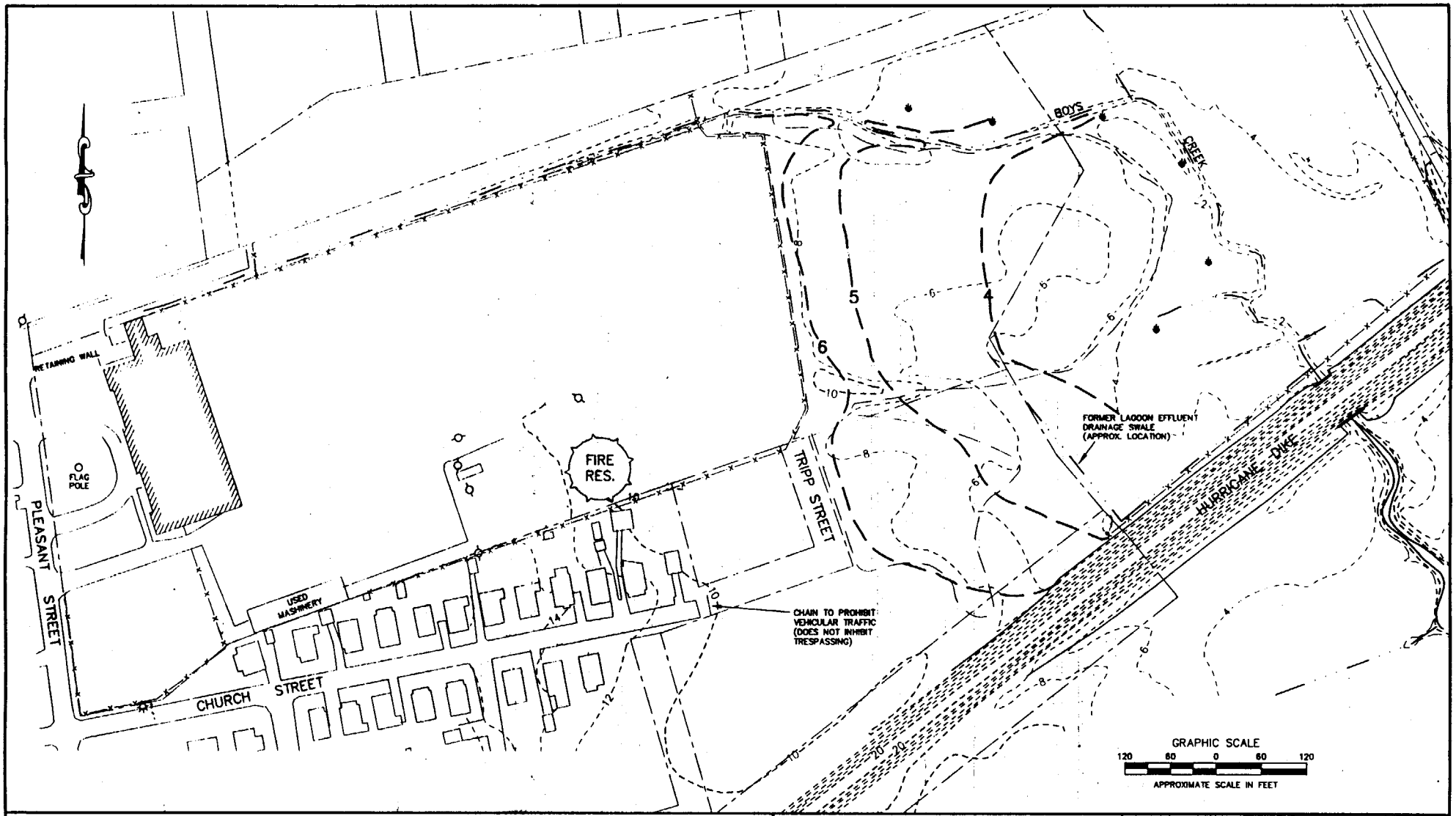
ATLAS TACK CORPORATION SUPERFUND SITE
FAIRHAVEN, MASSACHUSETTS

APPROXIMATE EXTENT OF EXCAVATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE JULY 1999

FIGURE NO. 3



LEGEND

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